November 2011

Tennessee Gas Pipeline Company **Docket No. CP11-161-000**

Northeast Upgrade Project

Environmental Assessment

Cooperating Agencies:
U.S. Fish and Wildlife Service
U.S. Army Corps of Engineers

US Army Corps of Engineers

Washington, DC 20426

This environmental assessment was prepared by the staff of the Federal Energy Regulatory Commission to assess the potential environmental impacts of the Northeast Upgrade Project (Docket No. CP11-161-000), proposed for construction in Pennsylvania and New Jersey. The cooperation and assistance of the U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers was greatly appreciated.

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas 1
Tennessee Gas Pipeline Company
Northeast Upgrade Project
Docket No. CP11-161-000

TO THE PARTY ADDRESSED:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared an environmental assessment (EA) for the Northeast Upgrade Project (Project) proposed by Tennessee Gas Pipeline Company (TGP) in the above-referenced docket. TGP requests authorization to construct and operate certain pipeline and compressor facilities in Pennsylvania and New Jersey in order to expand the natural gas delivery capacity to the northeast region of the United States by up to 636,000 dekatherms per year.

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

The U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers participated as cooperating agencies in the preparation of the EA. Cooperating agencies have jurisdiction by law or special expertise with respect to resources potentially affected by the proposal and participate in the NEPA analysis.

The proposed Project includes the following facilities:

- installation of approximately 40.3 miles of new 30-inch-diameter pipeline loop[1] in five separate segments in Bradford, Wayne, and Pike Counties, Pennsylvania; and Sussex, Passaic, and Bergen Counties, New Jersey;

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

- modifications of four existing compressor stations in Bradford, Susquehanna, and Pike Counties, Pennsylvania; and Sussex County, New Jersey;

- abandonment of an existing meter station and construction of a new meter station in Bergen County, New Jersey;

- installation of associated appurtenant aboveground facilities including mainline valves and pig[2] launchers and receivers; and

- use of contractor/pipe yards and access roads.

The EA has been placed in the public files of the FERC and is available for public viewing on the FERC's website at www.ferc.gov using the eLibrary link. A limited number of copies of the EA are available for distribution and public inspection at:

Federal Energy Regulatory Commission
Public Reference Room
888 First Street NE, Room 2A
Washington, DC 20426
(202) 502-8371

Copies of the EA have been mailed 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; libraries in the project area; and parties to this proceeding.

Any person wishing to comment on the EA may do so. Your comments should focus on the 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 your comments are properly recorded and considered prior to a Commission decision on the proposal, it is important that the FERC receives your comments in Washington, DC on or before **December 21, 2011.**

For your convenience, there are three methods you can use to submit your comments to the Commission. In all instances please reference the project docket number (CP11-161-000) with your submission. The Commission encourages electronic

[2] A pig is an internal tool that can be used to clean and dry a pipeline and/or to inspect it for damage or corrosion.

filing of comments and has dedicated eFiling expert staff available to assist you at (202) 502-8258 or efiling@ferc.gov.

(1) You may file your comments electronically by using the eComment feature, which is located on the Commission's website at www.ferc.gov under the link to Documents and Filings. An eComment is an easy method for interested persons to submit brief, text-only comments on a project;

(2) You may file your comments electronically by using the eFiling feature, which is located on the Commission's website at 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 will be asked to select the type of filing you are making. A comment on a particular project is considered a "Comment on a Filing"; or

(3) You may file a paper copy of your comments at the following address:

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington, DC 20426

Although your comments will be considered by the Commission, simply filing comments will not serve to make the commenter a party to the proceeding. 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). [3] Only intervenors have the right to seek rehearing of the Commission's decision.

Affected landowners and parties with environmental concerns may be granted intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding which would not be adequately represented by any other parties. **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. Click on the eLibrary link, click on "General Search," and enter the docket number excluding the last three digits in the Docket Number field (i.e., CP11-

[3] Interventions may also be filed electronically via the Internet in lieu of paper. See the previous discussion on filing comments electronically.

161). 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. The eLibrary link also provides access to the texts of 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 www.ferc.gov/esubscribenow.htm.

Kimberly D. Bose,
Secretary

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Environmental Assessment

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ACRONYMS AND ABBREVIATIONS

$\mu g/m^3$	micrograms per cubic meter
ACHP	Advisory Council on Historic Preservation
Algonquin	Algonquin Gas Transmission Company
APE	Area of Potential Effect
AQCR	air quality control region
ATC	Appalachian Trail Conservancy
ATWS	additional temporary workspace
BA	Biological Assessment
BCC	Birds of Conservation Concern
Bcf/d	billion cubic feet per day
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practices
C1	Category 1 Water
C2	Category 2 Water
C2P2	Community Conservation Partnerships Program
CAA	Clean Air Act
Certificate	Certificate of Public Convenience and Necessity
CFR	Code of Federal Regulations
CH_4	methane
Class A/B	Wild Trout Fishery
CNYOG	Central New York Oil and Gas
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2e}	carbon dioxide equivalents
COE	U. S. Army Corps of Engineers
Commission	Federal Energy Regulatory Commission
CREP	Conservation Reserve Enhancement Program
CWA	Clean Water Act
dB	Decibels
dBA	decibels on the A-weighted scale
DOT	U.S. Department of Transportation
DRBC	Delaware River Basin Commission
Dth/d	dekatherms per day
DWGNRA	Delaware Water Gap National Recreation Area
EA	environmental assessment
ECP	TGP's *Environmental Construction Plan*
EI	environmental inspector
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FR	Federal Register
FWS	U.S. Fish and Wildlife Service
GHG	greenhouse gas
gpm	gallons per minute
GWP	global warming potential
HAP	hazardous air pollutant
HCA	high-consequence area

HCHO	formaldehyde
HDD	horizontal direction drill
HDD Plan	TGP's *Horizontal Directional Drill Contingency Plan*
Highlands Act	New Jersey Highlands Water Protection and Planning Act of 2004
Highlands Council	New Jersey Highlands Water Protection and Planning Council
Highlands Region	New Jersey Highlands Planning and Preservation Areas
hp	horsepower
HPA	Highlands Preservation Area
IBA	Important Bird Area
ISMP	TGP's *Invasive Species Management Plan*
ISO	International Standards Organization
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
LWCF	Land and Water Conservation Fund
MAOP	maximum allowable operating pressure
MBTA	Migratory Bird Treaty Act
Memorandum	*Memorandum of Understanding on Natural Gas Transportation Facilities*
MLV	mainline valve
MP	milepost
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESHAPs	National Emission Standards for Hazardous Air Pollutant
NGA	Natural Gas Act
NHPA	National Historic Preservation Act
NJ SHPO	New Jersey Historic Preservation Office
NJAC	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NJDWSC	North Jersey District Water Supply Commission
NJGS	New Jersey Geological Survey
NJNHP	New Jersey Natural Heritage Program
NNRA	No Net Loss Reforestation Act
NNSR	Non-attainment New Source Review
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO_x	nitrogen oxides
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSA	Noise-Sensitive Area
NSD Project	Northeast Supply Diversification Project
NSPS	New Source Performance Standards
NSR	New Source Review
NY SHPO	New York State Historic Preservation Office
NYSDEC	New York State Department of Environmental Conservation
O_3	ozone
OEP	Office of Energy Projects
OTR	Ozone Transport Region
PA SHPO	Pennsylvania Bureau for Historic Preservation
PADCNR	Pennsylvania Department of Conservation and Natural Resources

PADEP	Pennsylvania Department of Environmental Protection
PAFBC	Pennsylvania Fish and Boat Commission
PAGC	Pennsylvania Game Commission
PASDA	Pennsylvania Spatial Data Access
PATGS	Pennsylvania Topographic and Geologic Survey
Pb	lead
PHMSA	Pipeline and Hazardous Materials Safety Administration
Plan	FERC Staff's *Upland Erosion Control, Revegetation, and Maintenance Plan*
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PNDI	Pennsylvania Natural Diversity Inventory
PPL	PPL Electric Utilities, Inc.
Procedures	FERC Staff's *Wetland and Waterbody Construction and Mitigation Procedures*
Project	Northeast Upgrade Project
PSD	Prevention of Significant Deterioration
PSE&G	Public Service Electric and Gas
PTE	Potential-To-Emit
RMP	Regional Master Plan
Secretary	Secretary of the Commission
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	sulfur dioxide
SPCC Plan	TGP's *Spill Prevention, Control and Countermeasure Plan*
Spectra	Spectra Energy
SRBC	Susquehanna River Basin Commission
SSA	sole source aquifer
TCP	Traditional Cultural Property
TDS	total dissolved solids
TGP	Tennessee Gas Pipeline Company
tpy	tons per year
USC	United States Code
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
USGCRP	U.S. Global Change Research Program
VOC	volatile organic compound
WHPA	wellhead protection area

1.0 PROPOSED ACTION

1.1 INTRODUCTION

The staff of the Federal Energy Regulatory Commission (Commission or FERC) has prepared this environmental assessment (EA) to assess the environmental impact of the natural gas pipeline facilities proposed by Tennessee Gas Pipeline Company (TGP). We[1] prepared this EA in compliance with the requirements of the National Environmental Policy Act (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.

On March 31, 2011, TGP filed an application in Docket No. CP11-161-000 under section 7 of the Natural Gas Act (NGA) and the certificate procedures of Part 157, Subpart F of the Commission's regulations for a Certificate of Public Convenience and Necessity (Certificate) authorizing construction and operation of natural gas pipeline facilities in various counties in Pennsylvania and New Jersey. These proposed facilities are collectively referred to as the Northeast Upgrade Project (Project) and are described in section 1.5. Prior to filing its application, TGP participated in the Commission's pre-filing process under Docket No. PF10-23-000.

The assessment of environmental impacts is an important and integral part of the FERC's decision on whether to issue TGP a 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 that would result from the implementation of the proposed action;
- assess reasonable alternatives to the proposed action that would avoid or minimize adverse effects to the environment; and
- identify and recommend specific mitigation measures, as necessary, to minimize environmental impacts.

The FERC is the lead federal agency for the preparation of this EA. The U.S. Army Corps of Engineers (COE) and the U.S. Fish and Wildlife Service (FWS) are federal cooperating agencies who elected to assist us in preparing this EA because they have jurisdiction by law or special expertise with respect to environmental impacts associated with TGP's proposal. The roles of the cooperating agencies in the NEPA review process are described in section 1.3. The major federal, state, and local permits, approvals, and consultations required for the Project are presented in section 1.9.

1.2 PROJECT PURPOSE AND NEED

TGP's stated purpose of the Project is to expand the natural gas delivery capacity to the northeast region of the United States by up to 636,000 dekatherms per day (Dth/d). TGP has signed binding precedent agreements with two shippers, Chesapeake Energy Marketing, Inc., and Statoil Natural Gas, LLC, for all of the additional firm transportation capacity resulting from the Project, demonstrating that the additional firm capacity would be immediately utilized. TGP contends that, without construction of the Project, it would be unable to meet the shippers' expressed need for additional capacity on TGP's system.

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

TGP also states the Project would help alleviate the already constrained pipeline capacity in the region and would contribute to the Commission's goal of transporting more natural gas to markets by providing access to diversified and newly developed natural gas supplies. Currently, there is approximately 7 billion cubic feet per day (Bcf/d) of natural gas pipeline capacity on four interstate pipeline systems, including TGP, to transport gas through Pennsylvania into the northeast region of the United States. However, all four pipeline systems, including TGP, are currently fully subscribed in this region during the peak heating season. Even when underground storage in northwestern Pennsylvania and New York is used to meet peak day requirements for the northeast region, pipeline capacity must still be used to reach market areas. TGP asserts that increasing natural gas production within Pennsylvania would further exacerbate the constrained pipeline capacity situation in the northeast as natural gas production in Pennsylvania approaches 2.5 Bcf/d in 2011 and is projected to exceed 13 Bcf/d by 2020. According to TGP, volumes delivered into TGP's system from the region have increased from about 25 million cubic feet per day to 1 Bcf/d within the last 2 years.

The Project facilities are described in section 1.5 and maps depicting the Project facilities are included in appendix A.

1.3 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

The topics addressed in this EA include alternatives; geology; soils; groundwater; surface waters; wetlands; vegetation; wildlife and aquatic resources; special status species; land use, recreation, special interest areas, and visual resources; socioeconomics (including transportation and traffic); cultural resources; air quality and noise; reliability and safety; and cumulative impacts. The EA describes the affected environment as it currently exists, discusses the environmental consequences of the Project, and compares the Project's potential impact with that of various alternatives. The EA also presents our recommended mitigation measures.

The environmental consequences of constructing and operating the Project would vary in duration and significance. Four levels of impact duration were considered: temporary, short-term, long-term, and permanent. Temporary impact generally occurs during construction with the resource returning to preconstruction condition immediately after restoration or within a few months. Short-term impact could continue for up to 3 years following construction. Impact was considered long-term if the resource would require more than 3 years to recover. A permanent impact could occur as a result of any activity that modifies a resource to the extent that it would not return to preconstruction conditions during the life of the Project, such as the construction of aboveground facilities. An impact would be considered significant if it would result in a substantial adverse change in the physical environment.

We received comments during the scoping period recommending that an Environmental Impact Statement (EIS), rather than an EA, be prepared to assess the impact of the Project. An EA is a concise public document for which a federal agency is responsible that serves to provide sufficient evidence and analysis for determining a finding of no significant impact. Pursuant to 18 CFR 380.6(a)(3) of the Commission's regulations, an EIS would normally be prepared first for "[m]ajor pipeline construction projects under section 7 of the NGA using right-of-way in which there is no existing natural gas pipeline." The regulations continue on under 18 CFR 306(b) to state that "If the Commission believes that a proposed action…may not be a major federal action significantly affecting the quality of the human environment, an EA, rather than an EIS, will be prepared first. Depending on the outcome of the EA, an EIS may or may not be prepared." In preparing this EA, we are fulfilling our obligation under NEPA to consider and disclose the environmental impacts of the Project. As noted above, this EA addresses the impacts that could occur on a wide range of resources should the Project be approved and constructed. Also, the FWS and COE, with special expertise with respect to certain environmental impacts associated with TGP's proposal, assisted in preparing this EA. Based on our analysis, the extent and content of

comments received during the scoping period, and considering that the Project would primarily involve pipeline looping and modifications to existing facilities, we conclude in section 4 that the impacts associated with this Project can be sufficiently mitigated to support a finding of no significant impact and, thus, an EA is warranted.

Commentors also recommended that the impacts associated with producing natural gas from the Marcellus Shale be included in the environmental review of the Project. Our authority under the NGA and NEPA review requirements relate only to natural gas facilities that are involved in interstate commerce. Thus, the facilities associated with the production of natural gas are not under FERC jurisdiction. The development of the Marcellus Shale, which is regulated by the states, continues to drive the need for takeaway pipeline capacity to allow the gas to reach markets. Therefore, FERC jurisdictional (interstate) transmission facilities are being built in response to this new source of gas supply. In addition, many production facilities have already been permitted and/or constructed in the region, creating a network through which natural gas may flow along various pathways to local users or the interstate pipeline system, including TGP's existing 300 Line system.

That is not to say that the environmental impact of individual production facilities is not assessed. In Pennsylvania, the permitting of oil and gas production facilities is under the jurisdiction of the Pennsylvania Department of Environmental Protection (PADEP), and other agencies, such as the COE or the Susquehanna and Delaware River Basin Commissions. Although we do not examine the impacts of Marcellus Shale production facilities to the same extent as the Project facilities in this EA, we have identified existing and proposed Marcellus Shale production facilities in proximity to the Project and have considered them within the context of cumulative impacts in the Project area (see section 2.10).

We also received comments that our analysis should consider the environmental impacts associated with the end use customer's combustion of the natural gas transported by the proposed facilities. The Commission has determined that indirect impacts of end gas usage and end use combustion as a connected action are not subject to our review under NEPA.[2] As indicated in section 1.2, the purpose of the Project is to increase pipeline capacity into northeast regional markets, with no specific end users identified, such as a natural gas-fired power plant, residential use, or as a raw material in a manufacturing process. In addition, the actual volume and energy characteristics of the natural gas may vary. As such, the location and quantity of emissions from the combustion of natural gas transported by the Project are not reasonably foreseeable. The emissions from the combustion of natural gas are regulated as large combustion units subject to state and federal permitting under provisions of the Clean Air Act (CAA) or as smaller combustion units subject to local permitting or required to meet certain efficiency standards. Air emissions associated with construction and operation of the Project itself are discussed in section 2.7.

The New Jersey Department of Environmental Protection (NJDEP) cited deficiencies in information it had received from TGP for processing various state permits and approvals and federally delegated permitting under section 401 and of the Clean Water Act (CWA), and requested that we delay this environmental analysis until all of the requested information was submitted and reviewed by the NJDEP and other applicable agencies. While we recognize the state's need for complete information for its permitting purposes, we note that biological and cultural resource field surveys have been completed for approximately 92 percent of the total proposed pipeline facilities, and no more than 9 percent of the proposed facilities in New Jersey remains to be surveyed due to lack of survey access permission from landowners. Furthermore, a substantial amount of environmental information (e.g., vegetation cover, land use, soils, geology, waterbody classifications, documented rare species habitat, previously recorded cultural resource sites) was obtained from other sources for the entire Project, including those areas not

[2] North Baja, LLC 123 FERC ¶ 61,073

accessible for survey. Therefore, we conclude that the information presented in this EA is adequate for the purpose of our NEPA analysis. If the Commission authorizes the Project and TGP gains survey access, we would require TGP to complete and file the results of all remaining surveys with the appropriate state and federal agencies. Also, as indicated in section 4.0, TGP must file documentation that all authorizations required under federal law (or waivers thereof) have been received as well as details concerning Project alterations, including those recommended by state regulatory authorities, before commencing construction.

1.3.1 U.S. Army Corps of Engineers

The Project crosses areas within the Philadelphia, Baltimore, and New York Districts of the COE, with the Philadelphia District acting as the lead District for the Project.

Wetlands in the Project area are regulated at the federal and state levels. The COE elected to cooperate in preparing this EA because it has jurisdictional authority pursuant to section 404 of the CWA (33 United States Code [USC] 1344), which governs the discharge of dredged or fill material into waters of the United States, and section 10 of the Rivers and Harbors Act (33 USC 403), which regulates any work or structures that potentially affect the navigable capacity of a waterbody. In New Jersey, the U.S. Environmental Protection Agency (EPA) approved the state's assumption of the federal section 404 permit program from the COE. For this Project, the COE retains permitting authority over the Delaware River and those wetlands that are partially or entirely located within 1,000 feet of the ordinary high water mark of the river. The COE retains full permitting authority in Pennsylvania.

The COE must comply with the requirements of NEPA before issuing permits under these statutes. In addition, when a section 404 discharge is proposed and a standard permit is required, the COE must consider whether the proposed section 404 discharge represents the least environmentally damaging, practicable alternative pursuant to the CWA section 404(b)(1) guidelines. The COE must also carry out its public interest review process before a standard permit can be issued. Although this EA addresses environmental impacts associated with the Project as they relate to the COE's jurisdictional permitting authority, it does not serve as a public notice for any COE permits or take the place of the COE's permit review process.

At the request of the COE, the FERC expanded the scope of the EA to discuss four wetland mitigation parcels identified by TGP in Pennsylvania and New Jersey (see section 2.2.4). This was done to assist the COE in its obligation to insure compliance with section 7 of the Endangered Species Act (ESA) and section 106 of the National Historic Preservation Act (NHPA). Therefore, information regarding federal threatened and endangered species and cultural resources reviews and consultations for these parcels are included in sections 2.3 and 2.6, respectively.

1.3.2 U.S. Fish and Wildlife Service

As the lead federal agency for the Project, the FERC consulted with the FWS pursuant to section 7 of the ESA to determine whether federally listed endangered or threatened species or designated critical habitat are found in the vicinity of the Project, and to evaluate the proposed action's potential effects on those species or critical habitats. The FERC also coordinates with the FWS regarding other federal trust wildlife resources, such as migratory birds. The FWS elected to cooperate in preparing this EA because it has special expertise with respect to environmental impacts associated with TGP's proposal. We also consulted with the New Jersey and Pennsylvania Field Offices of the FWS regarding the Bald and Golden Eagle Protection Act (BGEPA), the Migratory Bird Treaty Act (MBTA), the Fish and Wildlife Coordination Act, the CWA, and NEPA.

1.4 PUBLIC REVIEW AND COMMENT

On July 6, 2010, TGP filed a request to utilize our pre-filing process; we approved TGP's request on July 20, 2010, in Docket No. PF10-23-000. We participated in four public open houses sponsored by TGP in the Project area in September 2010 to explain our environmental review process to interested stakeholders. On October 8, 2010, the FERC issued a *Notice of Intent to Prepare an Environmental Assessment for the Planned Northeast Upgrade Project, Request for Comments on Environmental Issue, and Notice of Public Scoping Meetings* (NOI). The NOI was published in the Federal Register[3] and was sent to over 1,500 parties including federal, state, and local officials; agency representatives; conservation organizations; local libraries and newspapers; Native American groups; and property owners affected by the proposed facilities.

We conducted three public scoping meetings in the Project area to provide an opportunity for agencies and the general public to learn more about the Project and to participate in the environmental analysis by identifying issues to be addressed in the EA. The first meeting was held in Ringwood, New Jersey, on November 1, 2010; the second meeting was in Milford, Pennsylvania, on November 3, 2010; and the third meeting was in Wyalusing, Pennsylvania, on November 4, 2010. The transcripts of the public scoping meetings and all written scoping comments are part of the public record for the Project and are available for viewing on the FERC Internet website (http://www.ferc.gov).[4]

During the review process, we also conducted interagency scoping meetings either in person or via conference call with representatives of the National Park Service (NPS) on September 14 and November 11, 2010; the NJDEP and New Jersey Highlands Water Protection and Planning Council (Highlands Council) on November 10, 2010; the FWS, PADEP, and Pennsylvania Department of Conservation and Natural Resources (PADCNR) on November 2, 2010; and the NJDEP, COE, and EPA on February 2, 2011. Additionally, we conducted a site visit of the Project route in conjunction with the open houses, public scoping meetings, and interagency meetings. On September 15, 2010, we also conducted an aerial inspection of the Project.

After TGP filed its application for the Project, we issued a notice on July 27, 2011 requesting comments from landowners and other stakeholders potentially affected by route alternatives for proposed Loop 323 in Montague Township, Sussex County, New Jersey. In a supplemental filing on August 31, 2011, TGP revised the proposed alignment of Loop 323 in Montague Township to incorporate one of these route alternatives (Revised TGP Alternative B). This EA describes the Project with Revised TGP Alternative B incorporated, and discusses route alternatives in Montague Township in section 3.3.2.

Table 1.4-1 lists the issues identified during the scoping process.

[3] See Federal Register Volume 75, Number 201, dated Tuesday, October 19, 2010, pages 64,303-64,306.

[4] Using the "eLibrary" link, select "General Search" from the eLibrary menu and enter the docket number excluding the last three digits in the "Docket Number" field (i.e., PF10-23 and CP11-161). Select an appropriate date range.

TABLE 1.4-1

Issues Identified in Comments Received During the Public and Agency Scoping Process

Issue/Summary of Comment	EA Section Addressing Comment
GENERAL/PROJECT DESCRIPTION	
Project purpose and need	1.2
Project requires Environmental Impact Statement	1.3
End use of natural gas transported by the Project must be assessed	1.3
Project's relationship to Marcellus Shale development	1.3, 2.10
Use horizontal directional drill to avoid environmentally sensitive areas	1.7.1.2, 2.2.2.3
Width of right-of-way should be limited to extent possible	1.8, 2.4.1.1
GEOLOGY AND SOILS	
Project could result in increased erosion	2.1.2.2
Blasting could impact wells and structures	2.1.1.4, 2.2.1.2
WATER RESOURCES, FISHERIES, AND WETLANDS	
Construction could impact wells	2.2.1.1, 2.2.1.2
Construction could increase sedimentation into surface waterbodies	2.2.2.1, 2.2.2.3
Project crosses Delaware River, Monksville Reservoir, and watersheds	2.2.2.1, 2.2.2.3
Project could impact springs and streams	2.2.2.3
Minimize wetland/riparian impacts	2.2.4.2
Wetland restoration	2.2.4.2
VEGETATION	
Right-of-way revegetation	2.3.1
Impacts on forest	2.3.1.2
Minimize/control invasive species	2.3.1.2
WILDLIFE AND THREATENED AND ENDANGERED SPECIES	
Project impacts on wildlife habitat, habitat fragmentation	2,3.1.2, 2.3.2.2
Project could impact eastern small-footed myotis, bald eagles, rattlesnake, turkey, brown bat	2.3.2, 2.3.3
Control of black bear	2.3.2.2
LAND USE, VISUAL RESOURCES, AND RECREATION	
Impact on horse pasture	2.4.1.1
Preclusion of future property development	2.4.1.6
Project location near populated areas, residences	2.4.2
Impacts on Highlands Region, Appalachian Trail, protected agricultural lands, Delaware State Forest, Delaware River, and state and county parks	2.4.3
Impacts on users of state lands and parks	2.4.3
Visual impacts resulting from permanent right-of-way	2.4.6
SOCIOECONOMICS	
Impact on property values	2.5.6
Disproportionate impacts on Ramapough Lenape Indian community	2.5.8, 2.6.2
CULTURAL RESOURCES	
Impact on Native American tribes, including Ramapough Lenape Indian community	2.6.2
Project could impact Cross Farm Cemetery	2.6.3
Impact on culturally significant and historic areas	2.6.7
AIR QUALITY AND NOISE	
Greenhouse gas emissions must be assessed	2.7.4
Noise from machinery and construction activities	2.8.1
Noise from additional compression at Compressor Stations 321 and 323	2.8.2

TABLE 1.4-1 (cont'd)

Issues Identified in Comments Received During the Public and Agency Scoping Process

Issue/Summary of Comment	EA Section Addressing Comment
RELIABILITY AND SAFETY	
Natural gas leaks and human health concerns	2.9.1
Construction and operational safety in congested residential areas	2.9.1
Proximity of relief valves to residential areas	2.9.1
Safety of existing pipeline facilities due to age	2.9.2, 2.9.3
ALTERNATIVES	
Consider No Action and System Alternatives	3.1
Alternatives and impacts on new right-of-way to avoid Delaware Water Gap National Recreation Area (Loop 323)	3.3.1
Alternative along State Route 23 in northwestern New Jersey (Loop 323)	3.3.2
Alternatives to avoid the Monksville Reservoir	3.3.3
Alternatives to avoid or reduce impacts in the Highlands Region (Loop 325)	3.3.4
Alternatives to avoid /reduce impacts on residential areas	2.4.2, 3.4

In response to the Notice of Application issued on April 13, 2011 under Docket No. CP11-161-000, we received 26 motions to intervene by entities claiming to have substantial interests that may be directly affected by the Commission's action in the proceeding. The intervenors include the U.S. Department of the Interior acting on behalf of the NPS; the NJDEP; the public utility commissions of New York and New Jersey; a non-governmental organization; an affected landowner; the 2 Project shippers; 14 existing TGP customers; and 4 other parties. Five intervenors offered comments including supportive comments from the two Project shippers and environmental comments from the NJDEP, the non-governmental organization, and the affected landowner. We note that, due to the adoption of Revised TGP Alternative B, the property of the intervening landowner would no longer be affected by the Project. Substantive environmental issues raised by the commentors and intervenors are addressed in the appropriate sections of this EA.

1.5 PROPOSED FACILITIES

The Project would consist of the following:

- installation of approximately 40.3 miles of new 30-inch-diameter pipeline loop[5] in five separate segments in Bradford, Wayne, and Pike Counties, Pennsylvania; and Sussex, Passaic, and Bergen Counties, New Jersey;
- modifications of four existing compressor stations in Bradford, Susquehanna, and Pike Counties, Pennsylvania; and Sussex County, New Jersey;
- abandonment of an existing meter station and construction of a new meter station in Bergen County, New Jersey;
- installation of associated appurtenant aboveground facilities including mainline valves and pig[6] launchers and receivers; and
- use of contractor/pipe yards and access roads.

All of the proposed facilities would be owned and operated by TGP. Figure 1.5-1 shows the general location of the proposed facilities. U.S. Geological Survey (USGS) maps showing the locations of the Project are included in appendix A.

1.5.1 Pipeline Facilities

The proposed pipeline loop segment locations are listed in table 1.5.1-1. The pipeline loops would be collocated with TGP's existing 24-inch-diameter 300 Line pipeline for 33.8 miles (84 percent) of the proposed 40.3-mile-long total, with an approximate offset of 25 feet between the existing and proposed loop pipeline centerlines. The remaining 6.4 miles (16 percent) would be installed outside of existing rights-of-way and is limited to Loop 323 (see section 3.4 for a discussion of those areas where the existing and proposed pipelines would not be collocated).

[5] A loop is a segment of pipe that is usually installed adjacent to an existing pipeline and connected to it at both ends. The loop allows more gas to be moved through the system.

[6] A pig is an internal tool that can be used to clean and dry a pipeline and/or to inspect it for damage or corrosion.

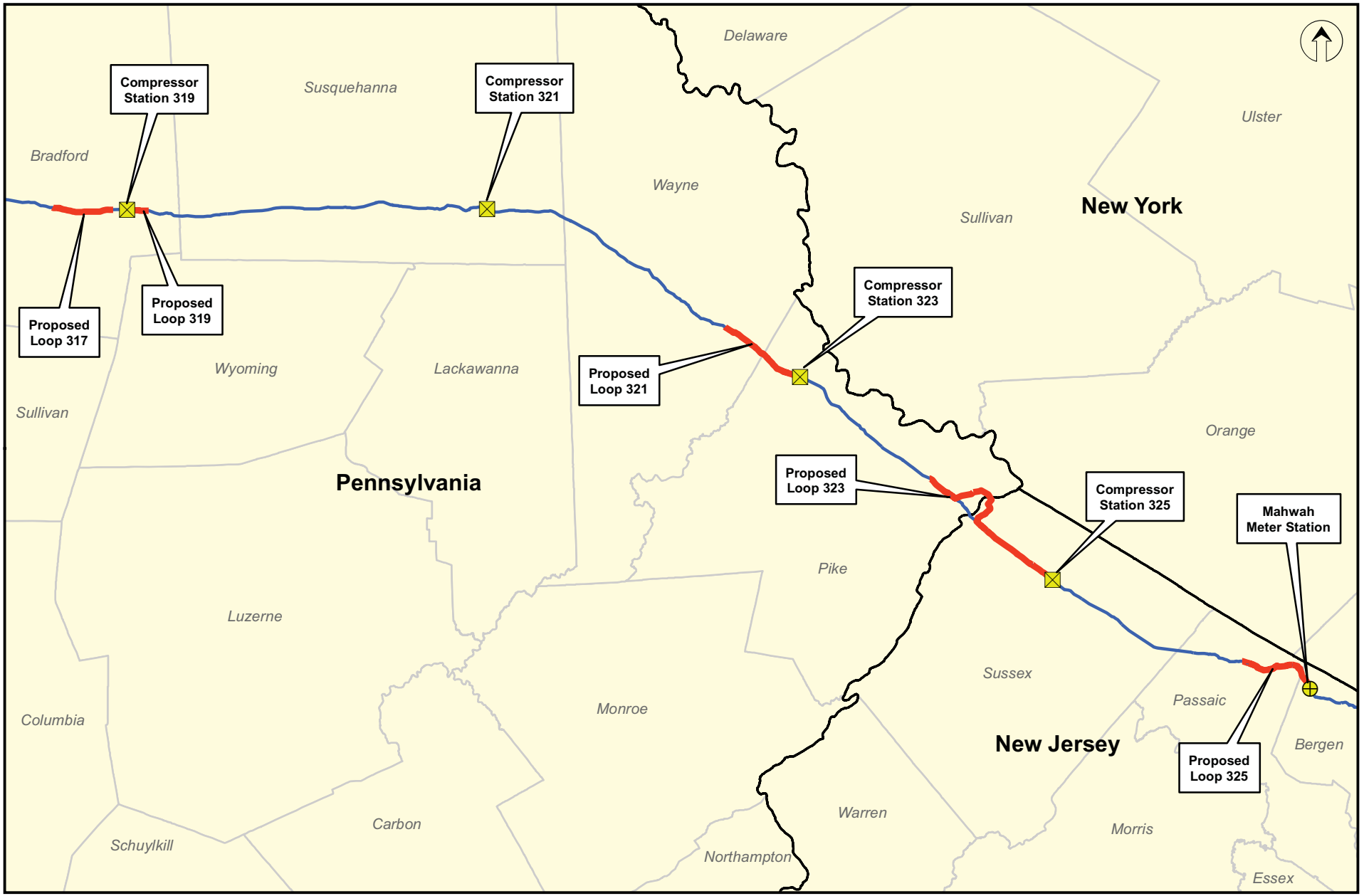


Figure 1.5-1

Northeast Upgrade Project

Overview Map

TGP proposes to generally use a 100-foot-wide construction right-of-way in upland areas and a 75-foot-wide construction right-of-way in wetlands. TGP would use a 25-foot-wide portion of the existing 300 Line operational right-of-way as part of the construction rights-of-way for the proposed loops, thus reducing construction-related impacts. The permanent right-of-way would typically be 50 feet wide, consisting of 25 feet of existing right-of-way already retained for operation of the 300 Line and 25 feet of new right-of-way for the loop.

TABLE 1.5.1-1

Proposed Pipeline Facilities

State, Loop	County	Milepost Begin	Milepost End	Length (miles)
Pennsylvania				
317	Bradford	0.0	5.4	5.4
319	Bradford	0.0	2.0	2.0
321	Wayne	0.0	4.2	4.2
	Pike	4.2	8.1	4.0
Subtotal				**8.1**
323	Pike	0.0	6.3	6.3
New Jersey				
323	Sussex	6.3	16.4	10.9 [a]
325	Passaic	0.0	6.0	6.0
	Bergen	6.0	7.6	1.6
PROJECT TOTAL				**40.3**

[a] Due to the adoption of a reroute, the length of Loop 323 was increased by approximately 0.9 mile; however, mileposts were not revised and, therefore, the length reported is the actual length and may not be determined by subtracting end milepost from begin milepost.

1.5.2 Aboveground Facilities

1.5.2.1 Modified Compressor Stations

Equipment addition, modification, and restaging activities proposed at TGP's existing compressor stations would provide approximately 22,310 horsepower (hp) of new compression on TGP's system. Table 1.5.2-1 lists the major modifications proposed at TGP's existing compressor stations; additional details regarding compressor station modifications are discussed in section 1.7.3.

USGS maps depicting the locations of the compressor stations modifications are included in appendix A.

TABLE 1.5.2-1

Proposed Major Modifications at Existing Compressor Stations

State, County	Facility	Activity	Horsepower		
			Current	Additional	Total
Pennsylvania					
Bradford	Station 319	• Install additional yard piping, gas filter, over-pressure protection device, blowdown silencer, and valve building extension. • Modify driveway and parking area.	9,000	--	9,000
Susquehanna	Station 321	• Install natural gas-driven centrifugal compressor unit. • Install inlet gas filter-separator, case vent, and over-pressure protection device.	14,100	10,310	24,410
Pike	Station 323	• Install electric motor-driven compressor unit. • Restage existing compressor unit. • Install inlet gas filter-separator, silencer, electric substation, and new compressor and variable frequency drive buildings. • Modify driveway and parking area.	13,400	12,000	25,400
New Jersey					
Sussex	Station 325	• Install inlet gas filter-separator and over-pressure protection device. • Modify yard piping and driveway and parking area.	20,620	--	20,620
TOTAL			**57,120**	**22,310**	**79,430**

Horsepower presented in International Standards Organization units.

1.5.2.2 Meter Station Equipment Removal and New Meter Station

TGP would remove the majority of equipment within the fenceline of the existing Mahwah Meter Station in Bergen County, New Jersey, which is located on land TGP leases from Algonquin Gas Transmission Company (Algonquin). Algonquin would own, operate, and maintain the remaining equipment, which would include valves, station piping, and interconnecting piping located downstream of TGP's flow control valve.

TGP proposes to install a new meter station adjacent to the existing meter station. The new meter station would include two new taps, three ultrasonic meters, two gas filter-separators, and communications and gas quality equipment, as well as a perimeter road around the fenced site.

1.5.2.3 Appurtenant Aboveground Facilities

TGP would install new 30-inch-diameter mainline valve (MLV) assemblies and a pig launcher or receiver, as appropriate, to accommodate internal cleaning and inspection of the proposed pipeline loops (with the exception of Loops 317 and 321). Table 1.5.2-2 provides the locations of all appurtenant aboveground facilities associated with the Project. USGS maps depicting the locations of the appurtenant aboveground facilities are included in appendix A.

TABLE 1.5.2-2

Proposed Appurtenant Aboveground Facilities

State, County	Loop[a]	Facility	Approximate Milepost[b]
Pennsylvania			
Bradford	319	Mainline Valve (MLV) 319-2	0.0
		Pig Receiver	0.0
		Pig Launcher	0.0
Wayne	321	MLV 322-2A	0.1
Pike	323	MLV 324-2A	1.7
New Jersey			
Sussex	323	MLV 324-2B	7.5
		MLV 325-2	16.4
		Pig Receiver	16.4
Passaic	325	MLV 328-2	3.4
Bergen		Pig Receiver	7.6

[a] No new aboveground facilities are associated with Loop 317.
[b] Milepost designations measured against the individual proposed loop pipeline facility.

TGP's pig launcher/receiver facilities would typically consist of aboveground 36-inch-diameter trap barrels with 30-inch-diameter trap valves, 24-inch-diameter side valves, 8-inch-diameter kicker valves, and other miscellaneous safety and isolation piping and valves (e.g., blow-down valves). The pig launcher and receiver facilities would consist of discrete aboveground enclosures installed within the compressor station or meter station fencelines and would include a gravel or grass base, site access, chain-link fence enclosure for security purposes, and identification and emergency signage.

TGP would install each MLV assembly within the fencelines of the compressors stations (MLV 319-2 and MLV 325-2), adjacent to and within a fenced enclosure at the same locations as its existing MLV sites located along the 300 Line pipeline (MLV 324-2A and 328-2), or within the area affected by the permanent right-of-way (MLV 322-2A and MLV 324-2B).

1.5.3 Contractor/Pipe Yards and Access Roads

In addition to the construction right-of-way, TGP would require 12 areas during construction of the Project for equipment staging, pipe and material storage, temporary field offices, and pipe preparation/field assembly. Each of these contractor/pipe yards would be located outside of the pipeline construction right-of-way. Four yards would be required in Bradford County, Pennsylvania for Loop 317; three areas in Wayne County, Pennsylvania for Loop 321; one area in Orange County, New York and one area in Sussex County, New Jersey for Loop 323; and three areas in Passaic County, New Jersey for Loop 325 (see table 2.4.1-2). The locations of proposed contractor/pipe yards are shown on the USGS maps in appendix A.

In general, TGP would use existing public and private roadways to temporarily access the construction right-of-way. The locations of temporary and permanent access roads required for the Project are shown on the USGS maps in appendix A and listed in appendix C.

1.6 NONJURISDICTIONAL FACILITIES

Under section 7 of the NGA, the FERC is required to consider, as part of its decision to certificate natural gas facilities, all factors bearing on the public convenience and necessity. The jurisdictional

facilities for the Project include the proposed pipeline and compression facilities previously described in section 1.5.

Occasionally, proposed projects have associated facilities that do not come under the jurisdiction of the FERC. These "nonjurisdictional" facilities may be integral to the need for the Project (e.g., a new or expanded power plant at the end of a pipeline that is not under the jurisdiction of the FERC) or they may be merely associated as a minor, non-integral component of the jurisdictional facilities that would be constructed and operated as part of the Project. In order to deliver the proposed volume of natural gas, the Project shippers may need to upgrade their existing metering facilities on TGP's system downstream of Compressor Stations 317 and 319. The need to upgrade the existing metering facilities has not been determined at this time, but TGP has committed to keeping the Commission informed of any plans to upgrade the facilities. No other nonjurisdictional facilities were identified for the Project. An evaluation of cumulative impacts associated with potential upgrades to the Project shipper's existing metering facilities is in section 2.10.2.

Some facilities are examined within the context of our NEPA documents as non-jurisdictional connected actions that are required as a result of the FERC regulated activity. As previously mentioned in the case of Marcellus Shale activities, the production is driving the need for additional interstate transmission pipeline capacity and, therefore, these facilities are not connected non-jurisdictional actions. Although we do not specifically address the Marcellus Shale development in terms of a FERC-regulated activity, we analyze well development, non-regulated natural gas pipelines and facilities, and other energy projects within the context of cumulative impacts in the Project area (see section 2.10).

1.7 CONSTRUCTION PROCEDURES

Standard pipeline construction is composed of specific activities that make up a linear construction sequence. This section describes the general procedures proposed by TGP for the construction of the pipeline facilities. TGP would construct, restore, and maintain the Project in accordance with its *Environmental Construction Plan* (ECPs) for Pennsylvania, New Jersey, and New York.[7] TGP's ECPs include measures that would avoid or minimize environmental impacts resulting from construction and operation of the Project, for example:

- environmental inspection;
- installation of erosion control devices;
- topsoil segregation;
- specialized construction methods (e.g., residential areas);
- wetlands and waterbody crossing methods;
- revegetation and restoration specifications;
- spill prevention and control; and

[7] Draft plans have been filed with FERC but are too voluminous to include in this EA and can be viewed on the FERC website at http://www.ferc.gov. Using the "eLibrary" link, select "General Search" from the eLibrary menu and enter CP11-161 in the "Docket Number" field. In the "Date Range" field, input 09/01/2011 to 09/30/2011. To locate the Pennsylvania and New Jersey ECPs, on the "Results" page that appears, locate "Category/Accession 20110901-5014" on "Doc Date/Filed Date 09/01/11." On the far right side, select "FILE." The plans were filed as "Sec5_NJ ECP.PDF" and "Sec5_PA ECP.PDF." To locate the New York ECP, using the same date range and on the "Results" page that appears, locate "Category/Accession 20110902-5122" on "Doc Date/Filed Date 09/02/11." On the far right side, select "FILE." The plan was filed as "NY ECP (20110901).PDF." Direct access can be obtained by entering the Accession Number (20110901-5014 or 20110902-5122) into the "Numbers" field of the "Advanced Search" option from the eLibrary menu. They are also available for public inspection at the FERC's Public Reference Room in Washington, DC (call (202) 502-8317 for instructions). Other documents referenced in this EA are also available from eLibrary and can be accessed using the general search instructions listed above.

- post-construction maintenance requirements.

TGP's ECPs are based on our *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and *Wetland and Waterbody Construction and Mitigation* Procedures (Procedures). TGP proposed certain modifications to our Plan and Procedures due to site-specific conditions or potential construction constraints (see table 1.7-1).

TABLE 1.7-1

Proposed Modifications to the FERC's Plan and Procedures

Section	Proposed Modification	Discussion	Approval Status
Modifications to the FERC's Plan			
IV.B.1	TGP proposes a modification of the requirement to strip topsoil from either the full work area or from the trench and subsoil storage area. TGP would not strip topsoil in areas used for subsoil storage within 10 feet of its existing pipeline.	TGP proposes the modification to avoid shallow grading and the use of heavy construction equipment over and near the existing, active high pressure natural gas pipeline. TGP would place straw or mulch over the topsoil within 10 feet of the existing pipeline to visibly discern the subsoil from the underlying topsoil.	Approved
Modifications to the FERC's Procedures			
V.B.2.a	TGP proposes a modification of the requirement to locate extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet way from specific waterbodies.	Specific locations and justifications provided in table 2.2.2-3.	Approved
V.B.4.a	At West Falls Creek only, TGP proposes a modification of the requirement to store spoil from an intermediate waterbody crossing in the construction right-of-way at least 10 feet from the water's edge.	TGP proposes to cross West Falls Creek and associated wetlands using the push-pull method and would temporarily place spoil in the flooded zone surrounding West Falls Creek due to insufficient right-of-way and equipment within the right-of-way to ferry spoil away.	Approved
VI.B.1.a	TGP proposes a modification of the requirement to locate extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet way from specific wetland boundaries.	Specific locations and justifications provided in table 2.2.4-3.	Approved
VI.A.3	TGP proposes a modification of the requirement to limit the width of the construction right-of-way in wetlands to 75 feet or less at specific locations.	Specific locations and justifications provided in table 2.2.4-2.	Approved
VI.C.2	TGP stated that permanent slope breakers may not always be appropriate for installation at wetland boundaries. TGP therefore proposes that, at the discretion of the Environmental Inspector (EI), Lead EI, and its contractor, to not install permanent slope breakers that may alter the permanent overland flow characteristics consequently altering the wetland's characteristics. TGP proposes that hay/straw bales be used as temporary slope breakers at the wetland boundaries until restoration is complete to ensure the wetland characteristics would remain intact at locations where permanent slope breakers are not used. This exception applies only to the use of a permanent slope breaker.	The EI may approve, on a site-specific basis, the elimination of permanent slope breakers at wetland boundaries. The EI shall document the locations and site-specific justifications where permanent slope breakers are not installed.	Approved

In addition to the ECPs, TGP would implement a *Spill Prevention Control and Countermeasure Plan* (SPCC Plan), a *Waste Management Plan*, a *Horizontal Directional Drill Contingency Plan* (HDD Plan), *Traffic Control Plans* for Pennsylvania and New Jersey, a *Blasting Plan, Invasive Species Management Plans* (ISMPs) for Pennsylvania and New Jersey, and *Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains*. The *SPCC Plan* describes hazardous materials management protocols, preventative measures to avoid spills, and mitigation measures that would be employed in the event of a spill. The *Waste Management Plan* describes waste identification,

characterization, and handling procedures for various types of waste. The HDD Plan describes the horizontal directional drill (HDD) process and drilling fluid system, monitoring, and actions to implement in the event of a release of drilling fluid. The *Traffic Control Plans* describe temporary traffic control measures (e.g., signage, speed limits, road closures) that would be implemented during construction in Pennsylvania and New Jersey. The *Blasting Plan* describes the blasting procedures and safety, and use, storage, and transportation of explosives that TGP's contractor would adhere to, and would be consistent with minimum safety requirements. The ISMPs describe the steps that TGP would implement to avoid and control the establishment of invasive plant species within the areas disturbed by construction in Pennsylvania and New Jersey. The *Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains* describes the steps that TGP would implement in the event that previously unidentified cultural resources are discovered during Project construction, including appropriate regulatory notifications.

TGP proposes to begin some of its proposed pipeline loop segment preparation and construction activities in 2012, such as winter tree clearing to avoid Indiana bat breeding periods and to reduce impacts on some migratory birds, installing HDD segments, and crossing of sensitive commercial and/or residential areas. Other construction activities would occur during 2013. TGP anticipates that the Project would go into service in November 2013.

1.7.1 Pipeline Facilities

1.7.1.1 General Construction Sequence

TGP would construct the natural gas pipeline loop segments using typical construction techniques as described below. Figure 1.7-1 shows the typical steps of cross-country pipeline construction. Prior to construction, TGP would survey the route and stake the proposed pipeline loop centerlines, foreign pipeline and utility crossings, and workspace limits, along with wetland boundaries and other environmentally sensitive areas. Clearing crews would cut vegetation and remove it from construction workspaces. These crews would also remove trees from the right-of-way and would take the trees off-site for timber, chip them on-site, and either remove or spread the chipped vegetation across the right-of-way within upland areas in a manner that would not inhibit revegetation. After clearing, the grading crew would grade upland portions of the construction right-of-way to create a safe and level work surface. Environmental crews would install temporary erosion controls, where necessary, to minimize erosion and maintain these controls throughout construction.

The trenching crews would generally store spoil next to the trench on the opposite side of the working area construction right-of-way. The stringing crew would deliver the pipe to the cleared and graded right-of-way where the pipe would be placed on skids adjacent to the trench. Once the pipe is strung, welding crews would weld the pipe together prior to lowering it into the ditch. Inspectors would check the entire pipe for defects in the coating and repair the coating as needed before installation in the trench. Next, the crews would dewater the trench as necessary in accordance with applicable permits and the trench would be cleaned of debris. The crews would lower the pipeline into the trench, and install trench barriers or breakers as required before backfilling at specified intervals to prevent water movement along the pipeline. After the pipe is positioned in the trench, crews would backfill the trench with the previously excavated material. In accordance with U.S. Department of Transportation (DOT) regulations at 49 CFR 192.327, the typical depth of cover would vary between 30 inches in Class 1 areas and between 36 to 48 inches in Class 2, 3, and 4 areas. In consolidated rock areas, TGP would install the pipeline with 18 to 24 inches of cover. In active agricultural areas and navigable rivers and streams, the pipeline depth would be 48 inches, except where rock prevents this depth.

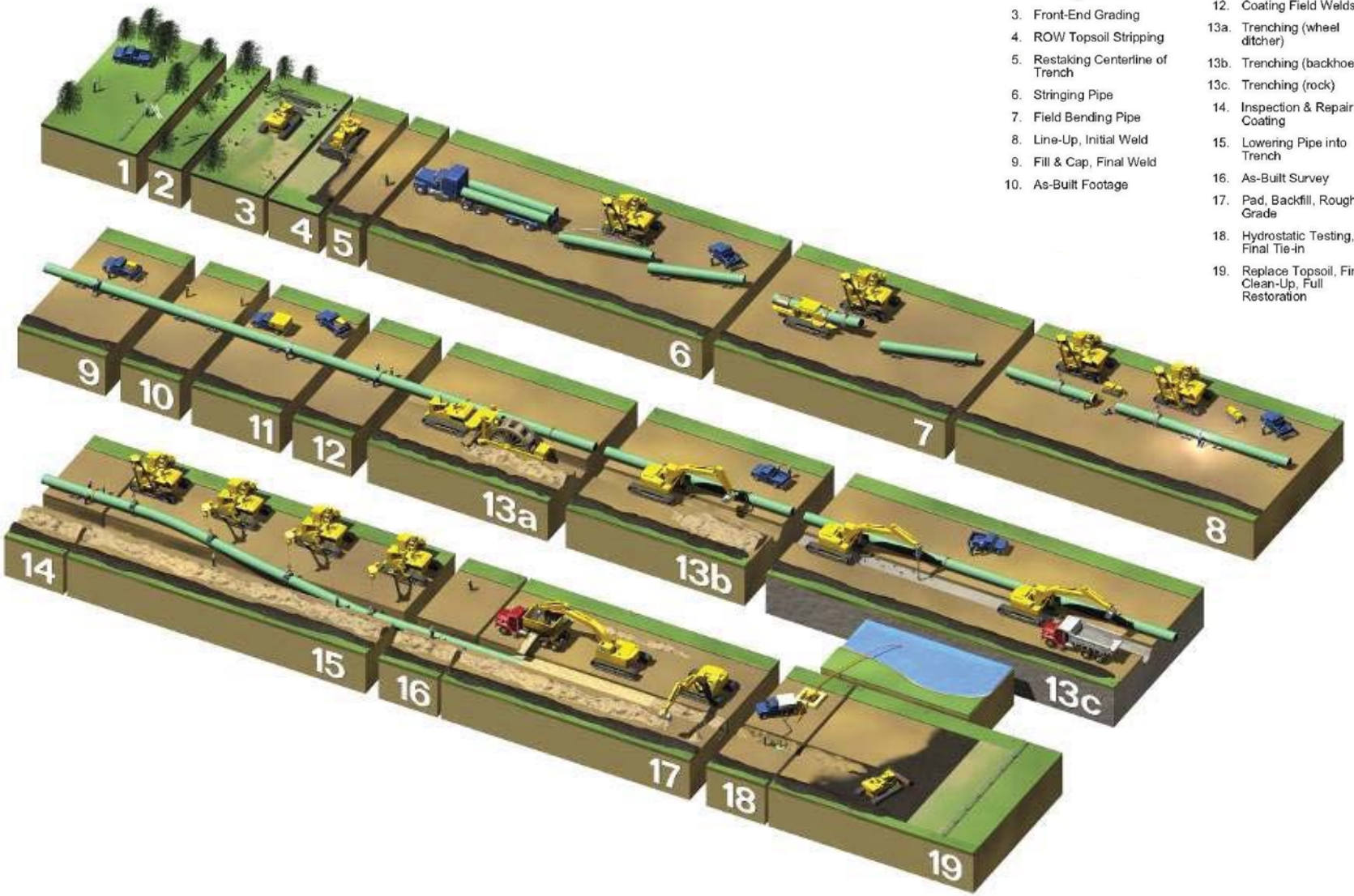


Figure 1.7-1

Northeast Upgrade Project

Typical Pipeline Construction Sequence

Where topsoil is stored separately from subsoil, the crews would backfill the subsoil first and then replace the topsoil on top of the subsoil. In upland areas, a crew would leave a soil mound over the trench to allow for soil settlement, unless otherwise requested by the landowner.

After construction and before placing the Project in service, TGP would hydrostatically test the completed pipeline loops in accordance with the requirements in 49 CFR 192 for natural gas pipelines, and in accordance with TGP's testing specifications, applicable code, and permits. TGP would grade all work areas as nearly as practical to their pre-construction contours as described in its ECPs. Restoration would begin as soon as possible upon completion of final grading. Crews would remove surplus construction material and debris and dispose of this material at appropriate disposal sites. Finally, crews would install permanent erosion controls within the right-of-way, if necessary, and initiate revegetation efforts in accordance with TGP's ECPs.

1.7.1.2 Special Construction Procedures

Wetlands

Depending on the site-specific conditions present during construction, TGP would cross wetland areas using one of the following three wetland crossing methods:

- the standard pipeline construction method;
- the conventional wetland construction method; or
- the push/pull wetland construction method.

Figures depicting the various wetland crossing methods are included in TGP's ECPs. TGP also provided alignment sheets showing wetland crossings and site-specific wetland crossing plans. Additional information regarding wetlands affected by the Project and wetland crossing procedures is discussed in section 2.2.4.

Waterbodies

TGP would construct the proposed pipeline loops across waterbodies in accordance with the methods described in their state-specific ECPs (with the modifications listed in table 1.7-1) and state and federal permit requirements. TGP would use one of the following methods to cross waterbodies:

- the wet or open-cut crossing method;
- the dry crossing method, which would consist of either a flume or a dam and pump; or
- the HDD method, which is a special construction technique that involves drilling under a feature (e.g., waterbody and banks) to avoid sensitive environmental resource areas and challenging conventional construction areas.

These crossing methods are described in further detail in section 2.2.2.3.

Figures depicting typical waterbody crossing methods are included in TGP's ECPs. TGP also provided alignment sheets showing waterbody crossings and site-specific waterbody crossing plans. Additional information regarding waterbodies affected by the Project and waterbody crossing methods is discussed in section 2.2.2.

Hydrostatic Testing

TGP would hydrostatically test the new pipeline loops prior to placing them in service in accordance with the DOT's pipeline safety regulations in 49 CFR 192. All discharges would meet the requirements of the Pennsylvania and New Jersey National Pollution Discharge Elimination System Hydrostatic Test Wastewater General Permit. Hydrostatic testing and discharge locations are discussed further in section 2.2.2.2.

Residential Areas

TGP would implement special methods to reduce construction-related impacts in close residential areas. These methods, referred to as the stove-pipe or drag-section pipeline construction methods, are described below and depicted on figures included in TGP's ECPs. Additional information regarding residential areas affected by the Project is discussed in section 2.4.2.

Stove-pipe Construction Method – The stove-pipe construction method is typically used when the pipeline is installed very close to an existing structure or when an open trench would adversely impact a commercial/industrial establishment. The technique involves installing one joint of pipe at a time; the welding, weld inspection, and coating activities are all performed in the open trench, thereby reducing the width of the construction right-of-way. At the end of each day after the pipe is lowered-in, the trench is backfilled and/or covered with steel plates or timber mats. The length of excavation performed each day cannot exceed the amount of pipe installed.

Drag-section Method – The drag-section construction method is another method that reduces the width of the construction right-of-way. This technique involves the completion of trenching, installation, and backfill of a prefabricated length of pipe containing several segments all in one day. As in the stove-pipe method, the trench is backfilled and/or covered with steel plates or timber mats at the end of each day after the pipe is lowered in. Use of the drag-section technique typically requires adequate staging areas outside of the residential and/or commercial/industrial congestion for assembly of the prefabricated sections.

Railroad and Road Crossings

The Project would cross roads and one railroad. The railroad crossing is associated with an HDD area and, therefore, avoids direct impacts. TGP would typically use either the open-cut or bore method at road crossings. In the open-cut method, the trench is excavated and the pipe installed using the standard cross-country construction methods described above. Temporary closure of the road to traffic and establishment of detours may be required. If no reasonable detour is feasible, at least one lane of the road being crossed is kept open to traffic.

The bore crossing method, as well as the HDD method, allows the roadway or railroad to remain in service while the installation process takes place. As a result, there is little or no disruption to traffic at roadway and railroad crossings that are crossed by HDD or bore.

Steep Side Slopes

During grading in areas of steep, rugged topography where the pipeline is installed generally perpendicular to the slope, the up-slope side of the pipeline right-of-way is cut and the material removed from the cut is used to fill the down-slope edge of the right-of-way to provide a safe and level surface from which to operate the heavy equipment. During grade restoration, the spoil is placed back in the cut and compacted. TGP would begin restoration within 10 days of final pipeline installation to minimize

potential erosion and sedimentation control problems in steep sloped or rugged topography areas. A figure depicting the two-tone method is included in TGP's ECPs.

1.7.2 Additional Temporary Workspaces, Contractor/Pipe Yards, and Access Roads

TGP would require the use of additional temporary workspace (ATWS) along the pipeline rights-of-way for various road, railroad, wetland, and waterbody crossings; at the HDD entrance and exit locations; and for specialized construction technique areas (e.g., steep side slopes). A list of ATWS associated with the Project is included in appendix B. In addition, 12 areas are proposed for use as contractor/pipe yards (as discussed in section 1.5.3).

TGP would use existing public and private roads to the greatest extent practical, thereby reducing environmental impacts associated with new road construction or improvements to existing roads. TGP would require modifications to some existing roads as part of the Project. A list of access roads associated with the Project is included in appendix C.

1.7.3 Aboveground Facilities

1.7.3.1 Modified Compressor Stations

The proposed modifications at four of TGP's existing compressor stations (see table 1.5.2-1) would require equipment additions, modifications, and/or re-staging activities.

All of the proposed activities at Compressor Station 319 would occur within an approximately 23-acre area on TGP's existing 29.2-acre site and an adjacent 5.6-acre area, which includes the compressor station's existing fenceline and driveway and parking modifications. TGP would install the new compressor unit at Compressor Station 321 inside a new compressor building; all of the proposed activities would occur on TGP's existing 27-acre site. At Compressor Station 323, TGP would install the new compressor unit inside an extension of the existing compressor building; all of the proposed activities would occur within TGP's existing 93.6-acre site and within an approximately 9.0-acre area, which includes the existing fenceline and driveway and parking modifications. All of the proposed activities for Compressor Station 325 would occur within TGP's existing 98.5-acre site and within an adjacent 7.1-acre area, which includes the existing fenceline and driveway and parking modifications.

1.7.3.2 Meter Station Equipment Removal and New Meter Station

TGP would remove the majority of equipment within the fenceline of the existing Mahwah Meter Station, which is located on land TGP leases from Algonquin. TGP would then construct a new meter station adjacent to the existing facility. Meter station construction would include clearing and grading, pouring of concrete foundations, building design and construction, equipment testing, and final grading and landscaping.

1.7.3.3 Pig Launchers and Receivers

Pig launcher and receiver construction would include clearing and grading, installing underground piping, testing the piping, testing the control equipment, cleaning up the work area, graveling the site, and fencing the facilities.

1.7.3.4 Mainline Valves

MLV construction would be similar to pig launcher/receiver construction and would include clearing and grading, installing underground piping, testing the piping, testing the control equipment, cleaning up the work area, graveling the site, and fencing the facilities.

1.8 LAND REQUIREMENTS

Construction of the Project would impact a total of approximately 810.3 acres of land, including pipeline construction rights-of-way, ATWS, aboveground facility sites, access roads, and contractor/pipe yards. Following construction, TGP would allow a total of about 689.7 acres of land to revert to previous conditions. TGP would retain the remaining 120.6 acres of land for aboveground facilities and maintained pipeline rights-of-way. Table 1.8-1 identifies the land requirements for each Project facility.

TABLE 1.8-1

Summary of Land Requirements

Facility	Land Affected During Construction (acres)	Land Affected During Operation (acres)
Pipeline Loops		
Loop 317	58.8	14.2
Loop 319	23.0	5.2
Loop 321	91.3	21.8
Loop 323	193.5	63.4
Loop 325	83.4	14.8
Pipeline Loop Subtotal	**450.1**	**119.4**
Additional Temporary Workspace	**46.8**	**0.0**
Aboveground Facilities [a, b]		
Compressor Station 319	5.6	0.0
Compressor Station 321	20.4	0.0
Compressor Station 323	8.9	0.0
Compressor Station 325	7.1	0.0
Mahwah Meter Station	2.2 [c]	1.1
Aboveground Subtotal	**44.2**	**1.2**
Access Roads	**53.1**	**0.0**
Contractor / Pipe Yards	**216.1**	**0.0**
PROJECT TOTAL	**810.3**	**120.6**

[a] Compressor station and meter station facilities only. Mainline valves and pig launcher/receivers would be constructed and operated within the area associated with the existing compressor station or meter station or the permanent pipeline right-of-way.

[b] Includes driveway and parking modifications.

[c] Includes approximately 0.2 acre of land associated with removal of equipment at an existing meter station on land leased by TGP from Algonquin Gas Transmission Company.

Construction of the proposed 30-inch-diameter natural gas pipeline loops would typically require a 100-foot-wide construction right-of-way in upland areas, which would generally consist of 25 feet of existing, permanently maintained right-of-way, 25 feet of new permanent right-of-way, and 50 feet of temporary construction workspace. In wetlands, TGP would reduce the construction right-of-way to 75 feet. Drawings depicting typical pipeline construction cross sections are located in TGP's ECPs.

Following construction, TGP would typically retain 25 feet of new permanent right-of-way for the pipeline loop segments.

As noted in section 1.7.3, all of the proposed modifications to existing compressor stations would occur within TGP's existing property lines.

1.9 PERMITS, APPROVALS, AND REGULATORY REQUIREMENTS

TGP has committed to obtaining all the necessary environmental permits and would construct, operate, and maintain the proposed facilities in compliance with the required permits and other applicable federal and state regulations and guidelines. Table 1.9-1 identifies the major federal, state, and local environmental permits, approvals, and regulatory clearances that TGP would obtain.

1.10 ENVIRONMENTAL COMPLIANCE INSPECTION AND MITIGATION MONITORING

In preparing construction drawings and specifications for the Project, TGP would incorporate all mitigation measures identified in its permit applications, as well as additional requirements of federal, state, and local agencies. TGP would provide the construction contractors with copies of applicable environmental permits as well as copies of "approved for construction" environmental construction alignment sheets and construction drawings and specifications. TGP would be required to have copies of the permits issued by the COE at each COE jurisdictional wetland and waterbody crossing.

TGP would conduct training for its construction personnel regarding proper field implementation of its ECPs and other Project-specific plans and mitigation measures. Prior to construction, TGP would conduct environmental training for the Environmental Inspectors (EIs), contractors, and their employees to familiarize them with the Project. The training would cover Project environmental documents and all Project-specific conditions contained in the Commission Order and other applicable federal, state, and local permits and approvals.

TGP would be represented by a Lead EI, who would be responsible for quality assurance and compliance with mitigation measures, other applicable regulatory requirements, and company specifications. The Lead EI would be assisted by at least one full-time EI for each of the two anticipated pipeline spreads. The EIs would be on-site during active construction and would have peer status with all other activity inspectors. The EIs would have authority to stop activities that violate the measures set forth in the Project documents and authorizations and would have the authority to order corrective action. See the ECPs for the additional responsibilities of the EI. We would also conduct routine inspections during construction.

After construction, TGP would conduct follow-up inspections of all disturbed upland areas after the first and second growing seasons to determine the success of restoration and would monitor the success of wetland revegetation annually for the first 3 years (or as required by permit) after construction, or longer, until wetland revegetation is successful. To ensure the restoration of all areas affected by the Project, we would continue to conduct oversight inspection and monitoring following construction. If it is determined that any of the proposed monitoring timeframes are not adequate to assess the success of restoration, TGP would be required to extend its post-construction monitoring programs.

TABLE 1.9-1

Permits, Licenses, Approvals, and Certificates Required for Construction, Operation, and Maintenance of the Project

Permit/Approval	Administering Agency	Submittal Date *(Anticipated)*	Receipt Date *(Anticipated)*
Federal			
Certificate of Public Convenience and Necessity	Federal Energy Regulatory Commission	March 31, 2011	*(January 2012 (Requested))*
Section 404 Individual or General Permit	U.S. Army Corps of Engineers (COE), Baltimore District COE, Philadelphia District	September and October 2011	*(March 2012)*
Section 10 Authorization, Rivers and Harbors Act	COE, Baltimore District COE, Philadelphia District	September and October 2011	*(March 2012)*
U.S. Fish and Wildlife Service (FWS) Clearance	FWS, Pennsylvania Field Office FWS, New Jersey Field Office FWS, New York Field Office	July 2010; March 2011; May 2011; October 2011 *(November 2011)*	*(December 2011)*
Pennsylvania State			
Section 401 Water Quality Certification Chapter 105 Water Obstruction and Encroachment Permits	Pennsylvania Department of Environmental Protection (PADEP), Regional Bureaus of Watershed Management	September 2011	*(March 2012)*
Section 402 National Pollution Discharge Elimination System (NPDES) – Hydrostatic Test Water Discharge General Permit (PAG 10) or Individual Permit	PADEP, Bureau of Water Quality Protection	(*4th Quarter 2011*)	*(1st Quarter 2012)*
Section 402 NPDES – Chapter 102 Erosion and Sediment Control General Permit for Construction Activities	PADEP	(*November 2011*)	*(April 2012)*
Submerged Land License Agreement	PADEP, Bureau of Waterways Engineering	September 2011	*(1st Quarter 2012)*
State Forest Environmental Review	Pennsylvania Department of Conservation and Natural Resources (PADCNR)	May 2011	*(March 2012)*
Plan Approval (Air Quality Permit) for Station 321	PADEP, Bureau of Air Quality, Northeast Region	August 2011	*(April or August 2012)*
Highway Occupancy Permit	Pennsylvania Department of Transportation	*(December 2011)*	(*December 2012*)
Clearance (Rare Species)	PADCNR Pennsylvania Fish and Boat Commission Pennsylvania Game Commission	March 2011; May 2011; October 2011	*(December 2011)*
Clearance (Cultural Resources)	Pennsylvania Historic Preservation Office	August 2011	*(December 2011)*
Consumptive Use and Water Allocation Permit	Susquehanna River Basin Commission	(*November 2011*)	*(March 2012)*
Consumptive Use and Water Allocation Permit	Delaware River Basin Commission	(*November 2011*)	*(March 2012)*
Pennsylvania Local / County			
Erosion & Sedimentation Control Plan Review	County Conservation Districts	(*November 2011*)	*(April 2012)*

TABLE 1.9-1 (cont'd)

Permits, Licenses, Approvals, and Certificates Required for Construction, Operation, and Maintenance of the Northeast Upgrade Project

Permit/Approval	Administering Agency	Submittal Date (*Anticipated*)	Receipt Date (*Anticipated*)
New Jersey State			
Highlands Applicability and Water Quality Management Plan Consistency Determination Application Form (Highlands Applicability Determination)	New Jersey Department of Environmental Protection (NJDEP), Division of Watershed Management Program (with consideration of recommendation from New Jersey Highlands Council)	July 2011; October 2011	*(December 2011)*
Letter of Interpretation	NJDEP, Land Use Regulation Program (LURP)	Loop 323 - May 2011; Loop 325 July 2011	*(Loop 323 – December 2011; Loop 325 – November 2011*)
Section 401 Water Quality Certification	NJDEP, LURP	Loop 323 – August 2011; *(Loop 325 – November 2011)*	*(Loop 323 – February 2012; Loop 325 – March 2012)*
Freshwater Wetlands and Flood Hazard Area Permits, Transition Area Waivers, and Associated General Permits	NJDEP, LURP	Loop 323 – October 2011; *(Loop 325 – December 2011)*	*(Loop 323 – February 2012; Loop 325- March 2012)*
SPDES General Construction Stormwater Permit (processed by counties)	NJDEP, LURP (approved through County Soil Conservation Service)	(*November 2011*)	*(January 2012)*
Short Term Water Use Permit By Rule	NJDEP, Bureau of Water Allocation	(*November 2011*)	(*December 2011*)
Temporary Dewatering and Water Allocation (Construction Dewatering General Permit)	NJDEP, Division of Water Quality	(*November 2011*)	*(December 2011)*
Minor/Major Disposal or Diversions of Parkland	NJDEP, Green Acres Program	September 2011	*(March 2012)*
No Net Loss Reforestation Act Reforestation Plan	NJDEP, Division of Parks and Forestry	May 2011; June 2011	*(February 2012)*
Clearance (Rare Species)	New Jersey Natural Heritage Program	Ongoing	*(Loop 323 – March 2012, Loop 325 – May 2012)*
Clearance (Cultural Resources)	New Jersey State Historic Preservation Office	August 2011	*(January 2012)*
New Jersey Local / County			
NJPDES Stormwater Discharge General Permit (NJG0088323)	County Soil Conservation Districts	Loop 323 – October 2011; (*Loop 325 – December 2011*)	(*Loop 323 – December 2011; Loop 325 – January 2012*)
New York State			
SPDES General Construction Stormwater Permit	New York State Department of Environmental Conservation	*(December 2011)*	*(January 2012)*
Clearance (Rare Species)	New York Natural Heritage Program	Not applicable – field surveys not required by agency	
Clearance (Cultural Resources)	New York State Historic Preservation Office	Not applicable – field surveys not required by agency	

1.11 OPERATION, MAINTENANCE, AND SAFETY CONTROLS

TGP currently operates and maintains its existing system in compliance with DOT regulations provided in 49 CFR 192, the Commission's guidance at 18 CFR 380.15, and the maintenance provisions of its ECPs. When completed, the Project would be operated in conjunction with the existing system and subject to the same operation and maintenance procedures. The maximum allowable operating pressure of the Project would be 1,170 pounds per square inch (gauge). TGP would not add any new permanent employees to operate and maintain the new pipeline loops or modified aboveground facilities.

TGP would conduct aerial and/or ground patrols of the Project facilities between two to four times a year, depending upon the size, operating pressure, class, terrain, weather, and other relevant factors. Vegetation on the upland portions of the permanent right-of-way would be maintained no more frequently than once every 3 years with the exception of a 10-foot-wide corridor centered over the pipeline that may be maintained annually in an herbaceous state. Similarly, a 10-foot-wide herbaceous corridor would be maintained in wetland areas. In addition, trees and shrubs greater than 15 feet in height that are located within 15 feet of the pipeline would be removed from the permanent right-of-way in wetland areas. Riparian areas adjacent to all waterbodies would be allowed to permanently revegetate with native species to at least 25 feet from the mean high water mark.

The pipeline facilities would be clearly marked at line-of-sight intervals and at road crossings and other key points.

1.12 FUTURE PLANS AND ABANDONMENT

TGP states that the Project has been designed to efficiently meet the market need as expressed by the binding precedent agreements with Chesapeake Energy Marketing, Inc., and Statoil Natural Gas, LLC, for the entire amount of additional capacity that would be provided by the Project. TGP has no current plans to abandon the Project facilities. In the event that any abandonment activities are proposed in the future, TGP would be required to seek the appropriate approvals from the Commission and other applicable state and federal agencies.

In 2010, TGP executed binding precedent agreements with three parties for the Northeast Supply Diversification (NSD) Project, for up to 250,000 Dth/d of incremental firm transportation capacity from the Marcellus Shale region to existing markets in the Northeast and Niagara.[8] The NSD Project has a proposed in-service date of November 2012. For the NSD Project, TGP is proposing to loop one segment and modify existing facilities on TGP's 300 Line, all of which would be located to the west of the proposed facilities for this Project. The NSD Project would not require any modifications to the pipeline loop segments or compressor station or meter station modifications being proposed as part of this Project. TGP submitted a certificate application, including an environmental report, for the NSD Project on November 12, 2010 in Docket No. CP11-30-000, and subsequently received a Certificate on September 15, 2011.

TGP is also in the conceptual stage of a possible backhaul project for the 300 Line, in which supply would initially be transported east to west on TGP's system. TGP has held preliminary discussions with producers in the Marcellus Shale production area regarding the connection of new gas supplies from that production area to TGP's system for transportation to northeast markets. TGP has conducted a non-binding open season to gauge potential interest in such a future project. The anticipated

[8] TGP provided information regarding the NSD Project in section 1.5 of Resource Report 1 as part of the Environmental Report submitted with the 300 Line Project Certificate application in Docket No. CP09-444-000 on July 17, 2009. The information provided above updates that previously provided information.

in-service date for such a project is expected to be November 2013 or later. TGP is in the process of evaluating the bids received in that open season to determine if such a project is economically justified, and, if so, to determine the proposed scope and facilities needed for a future project. Although this evaluation process is not yet completed, TGP believes that any facilities required for such a future project would not require any modifications to the pipeline looping facilities that are being proposed as part of the Project. However, depending upon the results of the evaluation process and if deemed necessary to meet the needs of shippers participating in that open season, TGP may consider making additional modifications at existing compressor stations.

TGP would design any facilities (which may consist of pipeline looping, compression, and/or cooling facilities) needed for a future expansion to be compatible with TGP's existing facilities, including the Project facilities, and would undergo the applicable federal, state, and local regulatory review (including the filing of a separate Certificate application) for any such future expansion.

As an open access pipeline, TGP's FERC Gas Tariff, consistent with Commission policy, provides a process by which shippers may request an interconnection with TGP's pipeline system. TGP has had numerous requests from producers in the Project area for interconnections on TGP's system. Several of these interconnections have already been completed, while other requests are being processed. This effort is ongoing and TGP expects additional interconnection requests from producers. The producers that have connected to TGP have the opportunity to transport gas production using interruptible capacity, backhaul capacity, or firm released capacity, or may sell gas production to existing capacity holders on TGP's system. The requests for interconnections on TGP's 300 Line are being processed separately from the Project facilities, under applicable Commission regulations and policies governing interconnections.

2.0 ENVIRONMENTAL ANALYSIS

2.1 GEOLOGY AND SOILS

2.1.1 Geology

2.1.1.1 Geologic Setting

The Pennsylvania portion of the Project is located in the Appalachian Plateaus Physiographic Province. This area is characterized by rounded hills and broad to narrow valleys that have been modified by glacial activity. Bedrock in the area consists of metamorphic rock and sedimentary rock. The more erosion resistant bedrock forms the hills while the less resistant bedrock forms the valleys. Unconsolidated glacial till, sand, and gravel are found mainly in the valley bottoms and margins. Elevations along the proposed loops range from 420 feet on Loop 323 to 1,400 feet on Loop 321.

In New Jersey, Loop 323 is located in the Valley and Ridge Physiographic Province, which is characterized by steep sided linear ridges and broad valleys. The western portion of Loop 325 is also within the Valley and Ridge Physiographic Province; whereas the eastern portion of the loop occurs within the Highlands Physiographic Province, characterized by discontinuous rounded ridges separated by deep, narrow valleys. Bedrock in both provinces consists of metamorphic and igneous rock including very hard gneiss and granite and sedimentary rock. Unconsolidated glacial till, sand, and gravel are found mainly in the valley bottoms and margins. Elevations along the proposed loops range from 340 feet on Loop 325 to 1,380 feet on Loop 323.

The aboveground facilities, contractor/pipe yards, and access roads associated with the Project would be located within the same general physiographic and geologic setting as the proposed pipeline loops described above. Construction and operation of the Project facilities would not materially alter existing geologic conditions in the area.

2.1.1.2 Mineral Resources

Mineral resources in Pennsylvania include crushed stone, sand, gravel, coal, oil, and natural gas. TGP identified four active oil and gas facilities and two active surface mining operations within 0.25 mile of the proposed pipeline loops. Five of the six identified mineral resource operations are located in the vicinity of Loop 317 and one is located near Loop 321. In New Jersey, the primary mineral resources include crushed stone, sand, and gravel. Three abandoned surface mines were identified within 0.25 mile of Loop 325 and one inactive surface mine would be used as a contractor and pipe yard near milepost (MP) 0.0. Proposed modifications at existing compressor stations and removal and construction activities at the meter station would not impact mineral resource operations. The Project would not cross any underground mines or mine tailing areas.

Although portions of the proposed pipeline loops would be located in proximity to active surface mines and potentially extractable mineral deposits, 84 percent of the proposed loops would be constructed directly adjacent to the existing 300 Line facilities, which are not currently impacted by surface mining operations. Therefore, construction and operation of the proposed loops would not result in a significant restriction to current or future mining operations in the area.

2.1.1.3 Geologic Hazards

Geologic hazards are natural, physical conditions that can result in damage to land and structures or injury to people. In the Project area these hazards include seismicity (e.g., earthquakes, surface faults,

and soil liquefaction), landslides, flash flooding, and ground subsidence. In general, the potential for geologic hazards to affect construction or operation of the Project facilities is low and TGP has stated that the existing 300 Line facilities in the Project area have not been impacted by geologic hazards.

There is a low probability of an earthquake of significant intensity in the Project area. In addition, the Project does not cross any recently active fault zones. The risk of damage to the proposed facilities from seismic activity is, therefore, negligible.

Soil liquefaction is a phenomenon in which saturated, non-cohesive soils temporarily lose their strength when subjected to forces such as intense and prolonged ground shaking. Soil and shallow groundwater conditions necessary for liquefaction to occur would likely be present in portions of the Project area. However, due to the low potential for strong and prolonged ground shaking associated with a seismic event to occur, the potential for soil liquefaction to occur is also low.

Landslides involve the down slope movement of earth materials under a force of gravity due to natural or man-made causes. The majority of the Project area is located in an area considered to be moderately to highly susceptible to landslides (Radbruch-Hall et al., 1982). Areas susceptible to landslides would be identified through field surveys to assess the potential risk for slope failure during construction and operation of the pipeline. If areas with a high potential for landslides are identified, methods such as installing slope gauges to monitor slope movement and installing drainage systems to divert stormwater from the right-of-way would be implemented to minimize the potential for landslides to occur. The erosion control measures specified in TGP's ECP would be implemented to minimize the impacts associated with erosion and reduce the potential for slope failure. As summarized below, some of these measures include:

- installing water bars/terraces diagonally across the right-of-way on slopes, except in cultivated areas and lawns, to control erosion by reducing and shortening the length and concentration of runoff;

- installing trench breakers within the pipeline trench to prevent the subsurface flow of water along the pipeline;

- inspecting erosion control devices on a daily basis in areas of active construction or equipment operation, on a weekly basis in areas with no construction or equipment operation, and within 24 hours of the end of a storm event that is 0.5 inch or greater. Repairs would be made as soon as possible after a problem, if any, is noted; and

- reestablishing vegetative cover as soon as possible following final grading.

The greatest potential for flash flooding to occur along waterbodies in the Project area would be during or after a large storm event with significant precipitation over a short period of time. However, based on regional conditions, the potential for flash flooding to occur and significantly impact construction or operation of the Project is low. TGP would monitor local weather conditions during construction to anticipate significant weather events.

Common causes of localized ground subsidence include dissolution and collapse of near-surface carbonate rocks (karst terrain) and collapse of underground mine workings. As noted in section 2.1.1.2, the Project would not cross any underground mine operations. Based on the geologic conditions in the Pennsylvania portion of the Project, the development of karst terrain is not likely. TGP consulted with the New Jersey Geological Survey (NJGS) regarding the potential for karst features in the vicinity of the Project. NJGS staff stated that carbonate rocks such as limestone, dolomite, and marble, which are prone

to sinkhole development, are present in the Project area. According to TGP, nearly all of Loop 323 and portions of Loop 325 would traverse areas of potential karst terrain. If karst features are identified during construction, TGP would implement measures to stabilize the trench and minimize impacts associated with surface water runoff, erosion, and the discharge of hydrostatic test water. The Project area would be restored to pre-construction contours and elevations to maintain the existing drainage at the site, and to prevent diversion of stormwater to areas prone to sinkhole development. TGP would also monitor the area identified by the NJGS on an annual basis following construction to identify any evidence of sinkhole development and implement mitigation measures as needed.

2.1.1.4 Blasting

Approximately 32.7 miles (82 percent) of the proposed pipeline loops would cross areas of shallow bedrock (see section 2.1.2.1) that may require blasting or some other special construction techniques during installation. TGP has prepared a *Blasting Plan* to minimize the effects of blasting and ensure safety during blasting operations. All blasting techniques would comply with federal, state, and local regulations governing the safe storage, handling, firing, and disposal of explosive materials. Some of these measures include:

- using qualified, licensed personnel to conduct blasting;
- installing blasting mats in congested areas, in shallow waterbodies, or near structures that could be damaged by fly-rock;
- posting warning signals, flags, and barricades;
- notifying landowners of the impending blasting activities;
- following procedures for safe storage, handling, loading, firing, and disposal of explosive materials; and
- manning adjacent pipelines at valves for emergency response.

Prior to blasting, an independent contractor would inspect structures within approximately 200 feet of blast areas and at the request of affected landowners. The contractor would monitor ground vibrations at the nearest structure or well within 200 feet of the construction work area and TGP would either repair any blasting-related damage or compensate the affected landowner for the damage.

2.1.1.5 Paleontological Resources

TGP consulted with the Pennsylvania Topographic and Geologic Survey (PATGS) and the NJGS regarding identification of important or recognized fossil assemblages that may be located in the Project area. PATGS stated that there is a potential for uncovering rare or unique fossils, but did not identify any documented, significant paleontological sites associated with the Pennsylvania portion of the Project. NJGS staff identified several geologic formations with the potential for paleontological resources within the first mile of Loop 323 and indicated that, due to fossil rarity, it would be important to document any uncovered fossils. To minimize impacts on paleontological resources, TGP would notify the PATGS or NJGS, depending on the location of the occurrence, and other relevant state agencies in the event that a rare or unique fossil is uncovered during construction.

2.1.2 Soils

2.1.2.1 Existing Soil Resources

In accordance with our guidelines, the soils crossed by the Project were identified and assessed using the Natural Resource Conservation Service (NRCS) Soil Data Mart and the National Cooperative Soil Survey Web Soil Survey information by county (NRCS, U.S. Department of Agriculture [USDA], 2010).

Pipeline Facilities

Soils in the Project area are highly variable, ranging from shallow to very deep, nearly level to very steeply sloping, very poorly to somewhat excessively drained, very slowly to very rapidly permeable sandy and loamy soils.

The soils along the proposed pipeline loops were evaluated to identify prime farmland and major soil characteristics that could affect construction or increase the potential for construction-related soil impacts (see table 2.1.2-1). Individual soil characteristics and the potential mitigation measures that would be employed to reduce impacts on soils are discussed separately below.

Prime Farmland – According to the USDA, prime farmland soils consist of soils classified as those best suited for production of food, feed, forage, fiber, and oilseed crops. This designation includes cultivated land, pasture, woodland, or other lands that are either used for food or fiber crops, or are available for these uses. Prime farmland is designated independently of current land use; however, urbanized land, built-up land, and open water cannot be designated as prime farmland.

Prime farmland soils generally meet the following criteria: have an adequate water supply, either from precipitation or irrigation; contain few or no rocks; are permeable to water and air; are not excessively erodible or saturated for long time periods; and either do not flood frequently or are protected from flooding. Approximately 19 percent (7.6 miles) of the soils that would be crossed by the proposed pipeline loops are considered prime farmland.

Soils designated as prime farmland in table 2.1.2-1 include unique farmland, which is land other than prime farmland that is used for the production of specific high value food and fiber crops such as citrus, tree nuts, olives, cranberries, fruit, and vegetables; and farmland of statewide importance, which is land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops.

TABLE 2.1.2-1

Soil Characteristics Crossed by the Project Loops (miles) [a]

Loop	Total Length	Prime Farmland [b]	Highly Erodible		Hydric [b]	Compact. Prone [e]	Stony/ Rocky [f]	Shallow to Bedrock [g]	Droughty [h]	Unstable Soils
			Water [c]	Wind [d]						
Loop 317	5.4	2.4	0.9	0.0	2.9	1.8	4.4	3.7	0.3	0.2
Loop 319	2.0	1.5	0.2	0.0	1.5	1.3	1.8	1.9	0.0	0.0
Loop 321	8.1	1.4	0.1	0.0	5.2	0.3	7.9	7.6	0.9	3.4
Loop 323	17.1	2.5	2.5	<0.1	3.5	0.5	7.7	13.3	1.9	9.7
Loop 325	7.6	0.4	0.0	0.3	2.2	0.3	0.5	6.4	4.5	7.2
Pipeline Total	**40.3**	**8.3**	**3.6**	**0.3**	**15.4**	**4.2**	**22.3**	**32.9**	**7.6**	**20.5**

[a] An area may have more than one characteristic.

[b] Includes soils classified as prime farmland, unique farmland, or farmland of statewide importance.

[c] Includes land in capability subclasses 4E through 8E and soils with an average slope greater than 8 percent.

[d] Includes soils in wind erodibility group designation of two or less.

[e] Includes soils in somewhat poor to very poor drainage classes with surface textures of sandy clay loam and finer.

[f] Includes soils with a cobbley, stony, bouldery, shaly, channery, very gravelly, or extremely gravelly modifier to the textural class of the surface layer and/or that have a surface layer that contains greater than 5 percent by weight rock fragments larger than 3 inches.

[g] Includes soils identified as containing bedrock at a depth of 5 feet or less from the surface.

[h] Includes soils with a surface texture of sandy loam or coarser that are moderately well to excessively drained.

Source: U.S. Department of Agriculture, Natural Resources Conservation Service, 2010.

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

Erosion by Wind and Water – Erosion is a natural process where surface soils are worn away, typically by wind or water. This process can be accelerated by human disturbance, such as tillage, over-grazing, or timber harvesting. Soils most susceptible to erosion by water are typified by bare or sparse vegetative cover, non-cohesive soil particles with low infiltration rates, and moderate to steep slopes. Soils typically more resistant to erosion by water include those that occupy low relief areas, are well vegetated, and have high infiltration capacity and internal permeability. Approximately 9 percent (3.6 miles) of the soils along the proposed pipeline loops are considered highly susceptible to erosion by water.

Wind erosion processes are less affected by slope angles than water erosion processes. Wind-induced erosion often occurs on dry soil where vegetative cover is sparse and strong winds are prevalent. Less than 1 percent (0.3 mile) of the soils along the proposed pipeline loops are considered highly susceptible to erosion by wind.

Hydric Soils – Hydric soils are defined as "soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part" (Federal Register [FR], 1994). Construction through hydric soils and wetlands is discussed in section 2.2.4.2 of this EA. Approximately 38 percent (15.4 miles) of the soils crossed by the proposed pipeline facilities are considered hydric.

Compaction Potential – Soil compaction modifies soil structure and can result in a reduction in the porosity and moisture-holding capability of the soil, thus restricting rooting depth. Compaction also decreases infiltration and thus increases runoff and the potential for water erosion. In general, the potential for soil compaction in the Project area is low due to the sandy nature of the soils found along the proposed loops. Approximately 10 percent (4.2 miles) of the soils crossed by the proposed pipeline facilities are considered prone to compaction.

Stony/Rocky and Shallow-to-Bedrocks soils – Stony/rocky soils are identified as soils that have a very gravelly, extremely gravelly, cobbley, stony, boulder, or shaly modifier to the textural class of the surface layer, or have a surface layer that contains greater than 5 percent (weight basis) rock fragments larger than 3 inches in diameter. The presence of stony-rocky soils could interfere with agricultural practices and inhibit revegetation efforts. Approximately 55 percent (22.3 miles) of the proposed loops would be underlain by stony/rocky soils.

The proposed pipeline loops would cross approximately 32.9 miles (82 percent) of soils with bedrock less than 5 feet from the surface. These areas may require blasting or other special construction techniques during installation of the proposed pipeline loops.

Revegetation Concerns – Successful restoration and revegetation are important for maintaining soil productivity and protecting the underlying soil from potential damage, such as erosion. The revegetation potential of soils crossed by the Project was evaluated based on the soil surface texture, slope, and drainage class. Droughty soils that have a coarse surface texture (i.e., sandy loam or coarser) and are moderately well to excessively drained may prove to be difficult to revegetate because drier soils have less water to aid in seed germination and the eventual establishment of new vegetation. The coarser-textured soils also have a lower water holding capacity following precipitation, which could result in moisture deficiencies in the root zone and create unfavorable conditions for many plants. About 19 percent (7.6 miles) of the proposed pipeline loops would cross droughty soils. An additional 60 percent (24.2 miles) of the soils that would be crossed have an average slope of greater than 8 percent, which may make the establishment of vegetation difficult.

Unstable Soils – An unstable soil is one that cannot be depended upon to remain in place without extra supports. No direct criteria have been developed to identify unstable soils. However, the potential to encounter an unstable soil can be inferred from the NRCS ratings for soil slippage and shallow excavations. The proposed pipeline loops would cross approximately 20.5 miles (51 percent of the proposed loops) of soils that could be considered unstable.

Aboveground Facilities

Modifications to four existing compressor stations and work at the existing Mahwah Meter Station site would affect 42.0 acres of soils. With the exception of ATWS adjacent to roads at each compressor station location, all the proposed compressor station modification activities would be within existing facilities.

TGP's proposed removal of equipment at the existing Mahwah Meter Station would occur within the facility fence line, and construction of the new, adjacent meter station would affect 2.0 acres of soils, of which 1.1 acres would be permanently converted to commercial/industrial uses. None of the soil permanently affected by the new Mahwah Meter Station is considered prime farmland.

Mainline Valves and Pig Launchers/Receivers

Construction and operation of MLVs and launchers/receivers would not impact soils outside of existing compressor station sites or the temporary and permanent right-of-way.

Contractor/Pipe Yards

TGP has identified 12 contractor/pipe yards that would be used during construction, the majority of which have been previously disturbed by commercial/industrial activities. Twenty-seven percent (58.4 acres) of the soils within these yards are considered prime farmland, and an additional 48 percent (105.4 acres) of the soil is considered farmland of statewide importance. None of the soils identified within the proposed contractor/pipe yards are considered highly susceptible to erosion by wind or water. Approximately 10 percent (21.4 acres) of the soils are considered prone to compaction. The proposed contractor/pipe yards would be returned to preconstruction conditions following construction and would not result in new permanent impacts on prime farmland.

Access Roads

TGP proposes to modify 52 non-public, existing roads for access during construction of the Project (see appendix C). Modifications of these roads would impact 53.1 acres of soils.

2.1.2.2 General Impacts and Mitigation

Construction activities such as clearing, grading, trench excavation, backfilling, and the movement of construction equipment along the right-of-way may impact soil resources. Clearing removes protective vegetative cover and exposes the soil to the effects of wind, rain, and runoff, which increases the potential for soil erosion and sedimentation in sensitive areas. Grading, spoil storage, and equipment traffic can compact soil, reducing porosity and increasing runoff potential. Trenching of stony/rocky or shallow-to-bedrock soils can bring stones or rock fragments to the surface that could interfere with agricultural practices and hinder restoration of the right-of-way. Construction activities can also affect soil fertility and facilitate the dispersal and establishment of weeds. In addition, contamination from spills or leaks of fuels, lubricants, and coolant from construction equipment could adversely affect soils.

To reduce construction impacts on soils, TGP would implement its Project-specific ECPs, which include the following measures:

- installing and maintaining proper erosion and sediment control measures during construction to reduce the velocity of and redirect runoff;
- minimizing the duration and quantity of soil exposure and reestablishing vegetative cover as soon as possible following grading;
- removing excess rock from at least the top 12 inches of soil to the extent practicable in agricultural fields, hayfields, pastures, residential areas, and other areas at the landowner's request;
- restoring the construction work area to preconstruction contours, with a small crown of soil left over the pipeline trench to compensate for settling without interfering with natural drainage; and
- removing, segregating, and replacing topsoil up to 12 inches deep in all residential areas and in annually cultivated or rotated agricultural land, cultivated pastures, hayfields, and other areas at the landowner's or land managing agency's request. For safety purposes, TGP would not remove topsoil from spoil storage areas within 10 feet of its existing 24-inch-diameter natural gas pipeline. We have approved this modification to our requirement to remove topsoil from spoil storage areas in uplands (see section 1.7).

TGP's ECPs include the following measures to control erosion and sedimentation during construction and to ensure proper revegetation for erosion control following construction:

- installing temporary erosion control barriers immediately after the initial soil disturbance in any areas that are downslope of stockpiled soil, between the construction workspace and the edges of wetlands or waterbodies, at the base of slopes adjacent to road and railroad crossings, and at sideslope and downslope boundaries of the construction workspace;
- maintaining temporary erosion control barriers throughout construction and until revegetation of the area has been successful;
- preparing the seedbed to a depth of 3 to 4 inches and amending the soil with lime and fertilizers to ensure successful revegetation of the area; and
- applying mulch to reseeded areas to further ensure successful revegetation. In areas of steep slopes and on streambanks, mulch would be anchored immediately following placement.

The ECPs also includes measures to reduce the potential impacts on soils from spills of hazardous materials used during construction. Previously existing contaminated soils could be encountered at historic landfills and other hazardous waste sites during Project construction. A discussion of hazardous waste sites that would be crossed by the pipeline loops and the measures TGP would implement to minimize potential impacts in the event contaminated soils are encountered is included in section 2.4.5.

We have reviewed the ECPs and find that adherence to the measures in the plans would minimize erosion and sedimentation on this Project.

2.2 WATER RESOURCES, FISHERIES, AND WETLANDS

2.2.1 Groundwater

2.2.1.1 Existing Groundwater Resources

In Pennsylvania, the majority of the proposed facilities would be underlain by Devonian-age siltstone, shale, and sandstone aquifers that produce sufficient water for domestic and commercial supplies, especially where the rocks are fractured. Wells within these aquifers yield from 5 to 200 gallons per minute (gpm).

Bedrock aquifers underlying the Project in New Jersey consist of Paleozoic-age carbonate rock and Precambrian-age crystalline metamorphic and igneous rocks of varying types. Wells within the carbonate aquifers yield from less than 1 to 1,400 gpm depending on the degree of dissolution that has occurred. Well yields in the crystalline aquifers vary but generally range from 70 to 215 gpm (Trapp and Horn, 1997). Surficial aquifers in the New Jersey Project area consist of glacial sand and gravel deposits within bedrock valleys that yield from 130 to 2,200 gpm. Groundwater quality in the Project area is generally very good.

Sole Source Aquifers

The EPA defines a principal, or sole source aquifer (SSA) as one that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. These areas have few to no alternative drinking water source(s) that could physically, legally, and economically supply all those who depend upon the aquifer for drinking water.

The Project would cross four SSAs. Loop 323 would cross the New Jersey Coastal Plain SSA, the principal source of drinking water for Mercer and Middlesex Counties, New Jersey between MPs 6.3 and 6.6. Loop 323 would also cross the New Jersey Coastal Plain SSA's stream flow source zone, an EPA-designated upstream headwater area, which drains into the New Jersey Coastal Plain recharge area, from MP 2.5 to MP 9.8. Loop 323 would also cross the Northwest New Jersey 15 Basin SSA between approximate MPs 6.4 and 16.5. The Northwest New Jersey 15 Basin SSA was designated under the Federal Safe Drinking Water Act (52 FR 37213) in June 1988 and encompasses approximately 1,735 square miles in northwest New Jersey.

Loop 325 would cross the Highlands SSA between MPs 0.0 and 5.3 and MPs 5.9 to 6.4. The Highlands SSA is defined by the outer boundary of the Wanaque and Pequannock River drainage basins. Groundwater in the Highlands SSA is approximately 40 feet below ground surface and occasionally intersects the ground surface in waterbodies and wetlands (EPA, 2010a). Loop 325 would also cross the Ramapo SSA between MPs 5.3 and 5.9 and MPs 6.4 and 7.6. The Ramapo SSA covers the northeast portion of Passaic County (EPA, 2010b).

Public and Private Water Supply Wells

TGP reviewed available GIS data from the PADEP and NJDEP and consulted with the PADEP, NJDEP Division of Water Supply, township authorities, and private landowners to identify public water supply wells, wellhead protection areas (WHPAs), and private wells within 150 feet of the Project, as listed in table 2.2.1-1.

TABLE 2.2.1-1

Public and Private Water Supply Wells and Wellhead Protection Areas within 150 Feet

State/Facility	Approximate Milepost	Site Name	Township, County	Approximate Distance from Centerline (feet)	Approximate Distance from Construction Work Area (feet)
Pennsylvania					
Loop 317	0.9	Private Well	Wyalusing, Bradford	160	135
Loop 321	6.6	Private Well	Lackawaxen, Pike	145	120
	6.8	Private Well	Lackawaxen, Pike	30	5
	6.8	Private Well	Lackawaxen, Pike	85	60
Loop 323	6.2	Three private wells	Westfall, Pike	<150	<150
Towanda Pipe Yard	--	Private Well	Wysox, Bradford	--	66
Wysox Pipe Yard	--	Private Well	Wysox, Bradford	--	126
New Jersey					
Loop 323	8.7-10.0	Community WHPA	Montague, Sussex	Crosses	Crosses
	8.3	Private Well	Wantage, Sussex	31	6
	15.3	Private Well	Wantage, Sussex	65	40
	15.3	Private Well	Wantage, Sussex	80	55
Loop 325	1.1	Private Well	Ringwood Borough, Passaic	65	40
	1.1	Private Well	Ringwood Borough, Passaic	100	75
	1.1	Private Well	Ringwood Borough, Passaic	52	27
	1.1	Private Well	Ringwood Borough, Passaic	125	75
	1.3	Non-Community WHPA	Ringwood Borough, Passaic	31	9
	2.2-2.4	Non-Community WHPA	Ringwood Borough, Passaic	Crosses	Crosses
	3.3	Community WHPA	Ringwood Borough, Passaic	Crosses	Crosses
	4.3	Private Well	Ringwood Borough, Passaic	0.5[a]	Crosses
	4.3	Private Well	Ringwood Borough, Passaic	65	Crosses
Montague Pipe Yard	--	Public Non-Community well and WHPA	Montague, Sussex	--	70
Montague Pipe Yard	--	Public Non-Community well and WHPA	Montague, Sussex	--	100
Montague Pipe Yard	--	Public Non-Community	Montague, Sussex	--	125

[a] TGP has committed to avoiding or replacing the well.

Nine private water supply wells were identified within 150 feet of the Project in Pennsylvania. We received a comment regarding the potential for the Project to impact a public non-community well near MP 6.2 of Loop 323 in Westfall Township, Pike County, Pennsylvania. The well is in the basement of a commercial building, 234 feet from the proposed construction work area. Based on this distance, the 7-foot excavation depth of the pipeline trench, and TGP's implementation of its SPCC Plan, we do not anticipate that the Project would impact this well. The Project would not cross any WHPAs in Pennsylvania.

In New Jersey, nine private wells, three public non-community wells, two community WHPAs, and two non-community WHPAs were identified within 150 feet of the Project. Loop 323 would cross a public non-community WHPA near MP 2.3 and a community WHPA associated with a public water supply well operated by the Montage Water Company near MP 9.2. The workspace for Loop 325 would be just outside a public non-community WHPA near MP 1.3 (NJGS, 2010a) and the pipeline would cross a community WHPA associated with a public water supply well operated by the Ringwood Water Company near MP 3.3 (NJGS, 2010b). Three public non-community wells and two associated WHPAs are located within 150 feet of the proposed Montague Pipe Yard.

Loop 325 would also cross the New Jersey Highlands Planning and Preservation Areas (Highlands Region), which provides the majority of potable water used in northern and central New Jersey (New Jersey Highlands Council, 2010). TGP would develop a Comprehensive Mitigation Plan for implementation during construction and operation of the Project through the Highlands Region. The Comprehensive Mitigation Plan would be submitted as part of a Highlands Applicability Determination and would identify the specific water resources that would be affected by the Project and the measures designed to avoid, minimize, and mitigate adverse impacts on water resources.

Potential Contaminated Groundwater

As discussed in section 2.4.5, TGP reviewed regulatory databases to identify known and potential hazardous waste sites within 0.25 mile of the proposed loop segments (Environmental Data Resources [EDR], 2010). No mapped sites were identified for proposed pipeline Loops 317, 319, and 321. Twelve and 23 sites have been identified within 1,700 feet of Loops 323 and 325, respectively.

The potential for contamination from any of these sites to impact the construction work area is based primarily on the distance, the type of chemical released, and the relative hydrologic position between the release site and the Project. Of the 35 identified sites within 1,700 feet of Loops 323 and 325, 3 are within 200 feet of the construction work area. Two of these sites have been cleaned-up and their status is closed and the remaining site was associated with a small vehicle release on a roadway. In general, chemical releases that occurred nearby and upgradient from the Project would be more likely to impact the construction work area than would more distant releases or releases located sidegradient or downgradient from the work area. Thus, TGP does not expect to encounter any issues associated with contamination or hazardous waste during construction.

We received comments regarding the potential for the Project to encounter contamination associated with the Ringwood Mines/Landfill site approximately 500 feet north of Loop 325 near MP 3.0. The site is listed on the EPA's National Priority List. The EPA has reported that human exposure and groundwater migration is under control (EPA, 2011a), and TGP's research indicates that there is no risk of encountering contaminated soils or groundwater. However, TGP has committed to continue review of EPA and NJDEP information to assess the potential to encounter contaminated groundwater during Project construction.

2.2.1.2 General Impacts and Mitigation

Project construction would not result in significant groundwater impacts because the majority of construction would involve shallow, temporary, and localized excavation. The depth to groundwater in the Project area would generally be below the trench excavation depth. However, shallow aquifers could sustain impacts from changes in overland water flow and recharge caused by clearing and grading of the proposed right-of-way. During construction, local water table elevations could be affected by trench dewatering and, in areas where groundwater is near the surface, trench excavation may intersect the water table causing localized increases in turbidity. These impacts would be minor, temporary, and localized to the construction area. TGP would further minimize the likelihood of these impacts by the use of construction techniques contained in its ECPs.

Shallow groundwater could be vulnerable to contamination caused by inadvertent surface spills of hazardous materials used during construction. TGP's SPCC Plan includes preventative and corrective measures that would be used to minimize the potential for groundwater impacts associated with an inadvertent spill of fuel, oil, and other hazardous fluids. TGP does not anticipate encountering previously existing contamination but would dispose of or mitigate for any hazardous materials uncovered during construction in accordance with applicable federal, state, and local requirements.

Project construction, including blasting, fueling activities, and accidental spills of hazardous substances could potentially impact the water quality and capacity of nearby water supply wells. TGP would implement the measures in its *Blasting Plan*, SPCC Plan, and ECPs to avoid or minimize potential Project impacts on water wells. In addition, our regulations prohibit fueling within 200 feet of a private water well and 400 feet of a public water well. TGP would offer pre- and post-construction well testing of water quality and yield to the owner of any well within 200 feet of construction and would provide an alternative water source or other compensation to landowners whose wells are temporarily impacted by construction. TGP has stated that any wells that are permanently damaged would be repaired or replaced. In order to ensure that any impacts on wells are properly mitigated, we **recommend that:**

- **Within 30 days of placing the facilities in service, TGP should file a report with the Secretary of the Commission (Secretary) identifying all water supply wells/systems damaged by construction and how they were repaired. The report should also include a discussion of any other complaints concerning well yield or water quality and how each problem was resolved.**

We believe that implementation of the above-listed construction procedures, TGPs mitigation measures, and our recommendation would adequately protect groundwater resources, including wells, because disturbances would be temporary, erosion controls would be implemented, and natural ground contours would be restored. Further, our recommendation would ensure that any impacts on water supply systems would be repaired. Thus, the Project should not result in any significant long-term or permanent impacts on groundwater resources or users of groundwater in the Project area.

2.2.2 Surface Water

2.2.2.1 Existing Surface Water Resources

Perennial and Intermittent Waterbodies

The pipeline loops would cross 50 perennial waterbodies and 52 intermittent waterbodies (see appendix D). An additional 25 waterbodies would be located within the construction workspace but would not be crossed by the pipelines. TGP would cross three of the perennial waterbodies (Susquehanna River, Delaware River [main channel only], and Monksville Reservoir) using the HDD method.

Surface waters are located adjacent to the workspace associated with the Mahwah Meter Station and adjacent to the Highway 6 Pipe Yard and Tilcon Contractor and Pipe Yard. However, no direct alteration of the waterbodies would be required for construction of the meter station facility or use of the pipe and contractor yards. No other surface waters are near aboveground facilities. Eight of TGP's proposed access roads would cross or be adjacent to waterbodies. According to TGP, six of the access roads may need to be improved or widened to accommodate construction equipment. Road improvements along access roads could impact a waterbody if improvements occur at the waterbody crossing point. TGP would minimize temporary impacts on waterbodies by implementing the erosion control measures described in its ECPs.

Sensitive Waterbodies

Waterbodies may be considered sensitive for a number of reasons including, but not limited to, high quality or exceptional value designations, the presence of impaired water (CWA section 303d) or contaminated sediments, its use as a potable water source, or the presence of sensitive species or critical habitat. Waterbodies may also be considered sensitive if they are of special interest to a land management agency. Appendix D identifies sensitivity issues related to the waterbodies crossed by the Project.

Public Watershed Areas

The EPA stated that the Susquehanna River (Loop 317, MP 0.3) and the Delaware River (Loop 323, MP 6.4) provide public drinking water supplies; however, no EPA-known surface water intakes are within 3 miles downstream of these or any waterbody crossing in Pennsylvania (Petal, 2011). The Milford Township Water Authority (Gartner, 2010) identified Valentine Brook as a public water supply in Milford Township, Pike County, Pennsylvania. Loop 323 would cross the headwaters of Valentine Brook near MP 2.0, approximately 1.7 miles upstream of the Milford Water Authority water withdrawal facility.

The Monksville and Wanaque Reservoirs are surface impoundments on the Wanaque River in Passaic County, New Jersey, with the Monksville Reservoir located immediately upstream from the larger Wanaque Reservoir. The reservoirs are used by the North Jersey District Water Supply Commission (NJDWSC) to supply water to over 3 million people in northern New Jersey (Jesse-Hunte, 2010; NJDWSC, 2010). TGP proposes to cross the Monksville Reservoir via the HDD method from approximate MP 0.2 to MP 0.5 and has developed a site-specific plan for the crossing. Loop 325 would not cross the Wanaque Reservoir. The NJDEP confirmed that no surface water intakes are within 3 miles of any waterbody crossing in New Jersey (Apalinski, 2010).

2.2.2.2 Hydrostatic Testing

TGP would verify the integrity of the pipelines before placing them into service by conducting hydrostatic testing as required by DOT regulations. TGP's estimated hydrostatic test water requirements, potential sources, and discharge locations are listed in table 2.2.2-1. TGP would also require approximately 266,000 gallons of water to hydrostatically test facilities installed or modified at the existing compressor stations and the Mahwah Meter Station. TGP would obtain water for the compressor station hydrotests from existing water wells at the stations and would obtain water for the Mahwah Meter Station hydrotest from existing public or municipal water supplies.

TABLE 2.2.2-1

Potential Surface Water Sources of Hydrostatic Test Water for the Pipeline Facilities

State/Facility	Potential Source(s) / Locations	Quantity of Water Required (gallons)	Discharge Location / Milepost[a]
Pennsylvania			
Loop 317 Susquehanna River (HDD Pre-test)	Susquehanna River / 0.2	88,100	Susquehanna River / 0.2
Loop 317	Susquehanna River / 0.2	1,032,000	Susquehanna River / 0.2
	and/or		
	Wyalusing Creek / 5.1		Wyalusing Creek / 5.1
Loop 319	Wyalusing Creek / 5.1 (Loop 317)	380,000	Wyalusing Creek / 5.1 (Loop 317)
	and/or		
	Compressor Station 319 water well / 0.0		
	and/or		
	Undetermined offsite[b]		
Loop 321	West Falls Creek / 6.3	1,550,000	West Falls Creek / 6.3
	and/or		
	Compressor Station 319 water well / 8.2		Compressor Station 319 / 8.2
	and/or		
	Undetermined offsite[b]		
Loop 323 Delaware River (HDD Pre-test)	Delaware River / 6.4	88,100	Delaware River / 6.4
New Jersey			
Loop 323	Delaware River / 6.4	3,120,000	Delaware River / 6.4
	and/or		
	Rosetown Creek / 6.3		Rosetown Creek / 6.3
Loop 325 Monksville Reservoir (HDD Pre-test)	Monksville Reservoir / 0.3	180,000	Monksville Reservoir / 0.3
Loop 325	Monksville Reservoir / 0.3	1,538,000	Monksville Reservoir / 0.3
	and/or		
	Ringwood Creek / 3.3		Creek by Sloatsburg Rd. / 3.3
Pipeline Facilities Total		**7,976,200**	

[a] Location of hydrostatic discharge to be determined based on consultation with the applicable municipalities.

[b] Offsite means that no major rivers are in the vicinity of the pipeline facility and source water may be trucked in or obtained from commercial wells or other sources.

To the maximum extent possible, TGP would transfer hydrostatic test water from one pipeline test segment to another within a loop to reduce the volume of test water needed. TGP does not anticipate the need to use additives prior to use in the test water, but would provide the Commission with detailed information on any additives if subsequently found to be necessary due to source water quality. Upon completion of testing, the test water would be discharged to a well-vegetated upland area or the surface waterbodies identified in table 2.2.2-1 through an energy dissipation device and filtration device, and as approved by state regulatory authorities.

TGP would obtain the state permits necessary to conduct hydrostatic testing and would inform the Commission if it has any changes in source or discharge locations. Hydrostatic test water would not be obtained from or discharged to any high quality surface waters unless approved by the applicable state agency. Withdrawal and discharge of water for hydrostatic testing could result in erosion, increased turbidity in surface waters, changes in water temperature and oxygen levels, or entrainment of aquatic species. The withdrawal of large volumes of water from surface water sources could also temporarily affect the downstream designated recreational and biological uses of the resource if the diversions constitute a large percentage of the source's total flow or volume. By implementing the hydrostatic testing procedures summarized above and detailed in TGP's ECPs, and obtaining and complying with required state permits, we conclude that the impacts associated with hydrostatic test water withdrawal and discharge would be minor and temporary.

2.2.2.3 Waterbody Crossing Methods, General Impacts, and Mitigation

Waterbodies would be crossed in accordance with TGP's ECPs (with the modifications listed in table 1.7-1) and state and federal permit requirements. TGP would use one of the following methods to cross waterbodies (TGP's ECPs include drawings depicting the typical crossing methods):

- Method 1, the open-cut crossing method, is a standard wet crossing method that involves trench excavation, pipeline installation, and backfilling in a waterbody without controlling or diverting streamflow (i.e., the stream would flow through the work area throughout the construction period). The trench would be excavated across the stream using equipment working within the waterbody, on equipment bridges, and/or from the streambanks. Trench plugs would be installed on each side of the waterbody. Next, a prefabricated section of pipe would be promptly lowered into the trench, the trench would then be backfilled with the previously excavated material, and the pipe section tied into the pipeline. The streambanks would be re-established to approximate preconstruction contours and stabilized. Erosion and sediment control measures would be installed across the right-of-way to reduce streambank and upland erosion and sediment transport into the waterbody.

  TGP would use the open-cut method to cross streams that are dry and expected to remain dry at the time of construction.

- Method 2A, the flume crossing method, is a standard dry waterbody crossing method that involves diverting the flow of water across the construction work area through one or more flume pipes placed in the waterbody. First, a sufficient number of adequately sized flume pipes would be placed in the waterbody to accommodate the highest anticipated flow during construction. Next, sand bags or equivalent dam diversion structures would be placed in the waterbody upstream and downstream of the trench area to dam the stream and divert the water flow through the flume pipes, thereby isolating the water flow from the construction area between the dams. Water flow would be maintained while the

pipeline is installed and the trench backfilled. After backfilling, the dams and flume pipe would be removed and the banks restored and stabilized.

- Method 2B, the dam-and-pump crossing method, is a standard dry waterbody crossing method that may be used as an alternative to the flume method. This method is similar to the flume crossing method except that pumps and hoses would be used instead of flumes to move water across the construction work area. Water flow would be maintained while the pipeline is installed and the trench backfilled. After backfilling, the dams, pumps, and hoses would be removed and the banks restored and stabilized.

  TGP has committed to use dry crossing Methods 2A or 2B on all waterbodies with perceptible flow at the time of crossing and have been given a sensitive or high quality designation by state agencies, expect for those that would be crossed by Method 3, discussed below, or as approved by federal and state agencies (see appendix D).

- Method 3, the HDD method, is a special construction technique that is used to avoid sensitive environmental resource areas and challenging conventional construction areas. The HDD method involves drilling a pilot hole under the feature (e.g., waterbody and banks), then enlarging that hole through successive reamings until the hole is large enough to accommodate the pipe. Throughout the process of drilling and enlarging the hole, a slurry made of naturally occurring non-toxic materials, such as bentonite clay and water, would be circulated through the drilling tools to lubricate the drill bit, remove drill cuttings, and hold the hole open. This slurry is referred to as drilling mud. TGP stated that the HDD drilling mud would meet National Science Foundation/American National Standards Institute Standard 60 for safe drinking water requirements. Pipe sections long enough to span the entire crossing would be staged and welded along the construction work area and then pulled through the drilled hole. TGP proposes to use the HDD method to install the 30-inch-diameter pipeline under the Susquehanna River, Delaware River, and Monksville Reservoir (see table 2.2.2-2). Three intermittent waterbodies adjacent to the Delaware River would also be crossed by the Delaware River HDD.

TABLE 2.2.2-2

Horizontal Directional Drill Crossings

Loop	County, State	Milepost Range	Length[a] (feet)	Feature Crossing
317	Bradford, Pennsylvania	0.2 – 0.6	2,400	Susquehanna River
323	Pike, Pennsylvania Sussex, New Jersey	6.2 – 6.6	2,300	Delaware River
325	Passaic, New Jersey	0.0 – 0.5	2,870	Monksville Reservoir
Project Total			7,570	

HDD Contingency Methods

TGP's site-specific geotechnical study and engineering review indicate that conditions are favorable for successful HDD crossings of the Susquehanna River and Monksville Reservoir, but TGP has developed contingency crossing methods for these waterbodies should the HDD crossings fail. Third-party geotechnical studies indicate conditions are highly favorable for a successful HDD crossing of the Delaware River, thus TGP has not developed a contingency crossing method for the Delaware River HDD crossing.

TGP would implement a dry crossing of the Susquehanna River should the proposed HDD fail. TGP has defined HDD failure as either two unsuccessful attempts to complete a pilot hole, the failure to complete reaming due to a lodged reamer that cannot be removed, or if the pullback pipe string becomes stuck during pullback and is not retrievable. At the Loop 317 crossing location, the Susquehanna River is approximately 1,240 feet wide, consisting of a 500-foot-wide western channel, a 530-foot-wide island, and a 210-foot-wide eastern channel. The contingency crossing plan would be accomplished in two stages. In the first stage, coffer dams would be installed along the upstream and downstream limits of the construction workspace within the east channel, creating a dry work space in which the trench would be excavated and pipeline installed; an equipment bridge would be constructed across the west channel, with flume pipes to maintain river flow. Upon installation of the pipeline in the east channel, the trench would be backfilled and the coffer dams removed to restore flow within the east channel. The second stage would involve similar operations to install the pipeline in the west channel, with coffer dams used to prevent flow in the west channel during trenching and pipeline installation, and an equipment bridge with flume pipes to maintain flow in the east channel. The pipeline would be concrete-coated and buried with a minimum of 5 feet of cover at an offset of 50 feet from TGP's existing 24-inch-diameter pipeline.

Should the Monksville Reservoir HDD fail, TGP would implement a combination dry crossing and direct bottom lay crossing of the Monksville Reservoir. The reservoir is approximately 1,500 feet wide at the Loop 325 crossing location. TGP's proposed alignment for the contingent crossing extends west-to-east across the waterbody and crosses a narrow point of land that extends into the reservoir approximately one-third of the distance from the western shore. The maximum water depths along the alignment to the west and east of the land point are approximately 15 feet and 45 feet, respectively. To the west of the land point, TGP would install coffer dams along the limits of construction workspace to create a dry work area in which the trench would be excavated and pipeline installed beneath the reservoir floor. The coffer dams would be removed after the pipeline is installed and the trench is backfilled. To the east of the land point, the pipeline would be installed by direct lay on the reservoir floor. Concrete-coated pipe would be used for the entire length of the crossing and concrete blankets would cover the direct lay segment where it would enter and exit the reservoir.

If TGP deems that an HDD and subsequent attempt to re-drill the crossing have failed, it would notify the Commission and consult with the applicable state and federal agencies to obtain applicable permits and approvals prior to initiating any of the contingent crossing methods.

Potential Impacts and Mitigation

Project construction could affect surface waters in several ways, and the degree of impact would depend on a number of factors including the size of the waterbody, flow at the time of crossing, and crossing method and duration. Clearing and grading of streambanks, in-stream blasting and trenching, trench dewatering, and backfilling could affect waterbodies through an increased sediment loading and turbidity levels, reduced dissolved oxygen concentrations, stream warming, and introduction of chemical discharges from spills of fuels/lubricants. The Project could also impact aquatic resources including fisheries as discussed in section 2.2.3.

The greatest potential impacts of construction on surface waters would result from an increase in sediment loading and turbidity. The highest levels of sediment would be generated by use of the wet open-cut method. However, as noted above, TGP would not use the wet open-cut method to cross any waterbodies with perceptible flow at the time of the crossing, unless a dry crossing is impractical due to site-specific conditions.

Where the flume or dam-and-pump methods are used, temporary construction-related impacts would be limited primarily to short periods of increased turbidity before installation of the pipeline,

during the installation of the upstream and downstream dams, and following installation of the pipeline when the dams are pulled and flow across the restored work area is re-established. Following installation of pipelines using either wet or dry crossing methods, stream banks and riparian areas would be re-contoured and stabilized. Banks would be stabilized with an herbaceous seed mixture, as described in TGP's ECPs, and erosion control fabric such as jute netting. Rock riprap may be used to stabilize erosive or unstable areas at the approval of the state agencies and the COE.

TGP identified areas where it would locate ATWS within 50 feet of a waterbody and provided justification for each workspace (see table 2.2.2-3). TGP would implement the measures contained within its ECPs (with the modifications listed in table 1.7-1) to control erosion and avoid or minimize other impacts that could result from the use of the ATWS. We have determined that TGP's proposed locations of ATWS within 50 feet of a waterbody are justified.

TABLE 2.2.2-3

Additional Temporary Workspace Located In and Within 50 Feet of Waterbodies

State/Facility	County	Milepost	Justification[a]	Waterbody	Distance of Temporary Workspace to Waterbody (feet)
Pennsylvania					
Loop 317	Bradford	0.0	g	Unnamed tributary to Susquehanna River	15
	Bradford	0.1	h	Unnamed tributary to Susquehanna River	Waterbody within workspace
	Bradford	0.1	h	Unnamed tributary to Susquehanna River	Waterbody within workspace
	Bradford	3.1	b, f	Unnamed tributary to Susquehanna River	Waterbody within workspace
	Bradford	3.2	b, f	Unnamed tributary to Susquehanna River	20
	Bradford	5.0	c	Unnamed tributary to Wyalusing Creek, Wyalusing Creek	10
	Bradford	5.0	c	Unnamed tributary to Wyalusing Creek, Wyalusing Creek	Waterbody within workspace
	Bradford	5.1	c	Unnamed tributary to Wyalusing Creek, Wyalusing Creek	Waterbody within workspace
Loop 319	Bradford	0.8	a	Unnamed tributary to Little Tuscorora Creek	15
	Bradford	0.8	a, i	Unnamed tributary to Little Tuscorora Creek	<50
	Bradford	0.9	a	Tributary 29502 to Little Tuscorora Creek	10
Loop 321	Wayne	7.5	a, e, d	Tributary 05460 to West Falls Creek	25

[a] a=road crossing; b=road crossing with bore pits; c=waterbody crossing; d=utility crossing; e=swap working side; f=narrow construction; g=interconnect; h=HDD site; i=wetland staging area.

No impacts on the bed or banks would occur for the three locations where TGP proposes to use the HDD method. However, the primary impact that could occur as a result of an HDD is an inadvertent release of drilling mud (frac-out) directly or indirectly into the waterbodies. Although drilling mud is a mix of naturally occurring nontoxic materials, such as bentonite clay and water, in larger quantities the release of drilling mud into a waterbody could affect fisheries or other aquatic organisms by settling in and temporarily inundating the habitats used by these species. TGP developed site-specific plans that describe how each HDD would be conducted to minimize the potential for an inadvertent release of drilling mud to occur and a HDD Contingency Plan that establishes procedures to follow in the event of a drilling fluid release. TGP would:

- schedule construction during the months when historical data indicate lower streamflows;
- provide an engineer experienced in HDD construction to monitor the HDD contractor's performance at the jobsite;
- conduct the HDD in a manner to either prevent lost circulation or regain circulation;
- periodically walk and visually inspect land-based segments of the HDD drill path and visually inspect waterways from the banks for signs of frac-outs; and
- contact the appropriate regulatory and environmental agencies no later than 24 hours after detection of a frac-out.

We have reviewed these plans and believe they would reduce the potential for and impact of a drilling fluid release.

Riparian cover on affected stream banks would be expected to recover over several months to several years. A strip of riparian vegetation at least 25 feet wide adjacent to waterbodies would be allowed to revegetate to pre-construction condition over the entire width of the right-of-way except for a 10-foot-wide strip centered over the pipeline that may be maintained in an herbaceous state. In addition, trees would not be allowed to grow within 15 feet of the pipeline. TGP would monitor for successful restoration of these areas for at least two growing seasons after construction or until restoration is complete, and would take additional restoration measures if necessary.

The potential for a chemical pollutant to impact a waterbody would be minimized by implementing TGP's SPCC Plan, which prohibits fueling and fuel storage within 100 feet of a waterbody and includes measures to contain and cleanup inadvertent fuel or chemical spills in the construction right-of-way. Because the pipeline loops would transport natural gas, operation of the loops would not pose a risk of chemical pollution to waterbodies crossed by the Project.

Because the waterbody crossings would be completed in accordance with the construction and restoration methods described above and detailed in TGP's ECPs and any site-specific measures that may be required by state permitting agencies or the COE, we conclude that impacts on waterbodies would be minor and temporary.

2.2.3 Fisheries Resources

2.2.3.1 Existing Fisheries Resources

In Pennsylvania, the Project would cross 32 waterbodies supporting warmwater fisheries and 29 waterbodies supporting coldwater fisheries. Pennsylvania also affords special protections to high quality or exceptional value waterbodies and may designate waters to be managed for trout. The Project would cross 25 high quality-designated waterbodies, 7 exceptional value-designated waterbodies, 1 Class A Trout Stream, and 2 Wild Trout-designated waterbodies in Pennsylvania. Class A Wild Trout streams support populations of wild trout of sufficient size and abundance to support long-term and rewarding sport fisheries.

In New Jersey, the Project would cross 29 waterbodies designated for trout production or trout maintenance that are considered to be coldwater fisheries, and 25 waterbodies designated as non-trout that are considered to be warmwater fisheries. Freshwaters are classified as Freshwater 1 (not subject to any man-made wastewater discharges) and Freshwater 2 waters (all other freshwaters except Pinelands

waters). For the purposes of preventing degradation of waterbodies, New Jersey has further designated waters as Category One Waters (C1) and Category Two Waters (C2). C1 waters are protected from any measurable change in water quality because of their exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resources. C2 waters consist of all other waters not designated as C1 or Outstanding National Resource Waters, which includes Freshwater 1-designated waters.

Fisheries of special concern crossed by the Project are identified in table 2.2.3-1. No known essential fish habitats classified resources exist in the Project area (Howard, 2010).

TABLE 2.2.3-1

Fisheries of Special Concern Crossed by the Project

State / Facility	Milepost	Waterbody	Fisheries Concern
Pennsylvania			
Loop 321	3.6	Unnamed tributary to Tributary 06158 to Rattlesnake Creek	Class A Wild Trout
Loop 323	2.5	Unnamed tributary Vandermark Creek	Naturally Reproducing Trout
	2.6	Vandermark Creek	Naturally Reproducing Trout
New Jersey			
Loop 323	9.3	Unnamed tributary to Shimers Brook	Trout Production
	10.0	Unnamed tributary to Shimers Brook UNT	Trout Production
	10.0	Unnamed tributary to Shimer's Brook UNT	Trout Production
	10.3	Shimers Brook	Trout Production
	10.4	Unnamed tributary to Shimer's Brook	Trout Production
	10.4	Unnamed tributary to Shimer's Brook	Trout Production
	10.6	Shimers Brook	Trout Production
	11.6	Shimers Brook	Trout Production
	12.5	Parkers Brook	Trout Production
Loop 325	0.2	Wanaque River / Monksville Reservoir	Trout Maintenance
	1.0	Unnamed tributary to Wanaque River	Trout Maintenance
	1.2	Unnamed tributary to Wanaque River	Trout Maintenance
	1.9	Unnamed tributary to Wanaque River	Trout Maintenance
	2.0	Unnamed tributary to Wanaque River	Trout Maintenance
	2.1	Unnamed tributary to Wanaque River	Trout Maintenance
	2.2	Unnamed tributary to Wanaque River	Trout Maintenance
	2.6	Unnamed tributary to Wanaque River	Trout Maintenance
	3.1	Unnamed tributary to Ringwood Creek	Trout Maintenance
	3.1	Ringwood Creek	Trout Maintenance
	3.2	Ringwood Creek	Trout Maintenance
	3.3	Ringwood Creek	Trout Maintenance
	3.7	Unnamed tributary to Ringwood Creek	Trout Maintenance
	7.5	Unnamed tributary to Haveemayer Brook	Trout Production
	7.5	Unnamed tributary to Haveemayer Brook	Trout Production

No surface waterbodies would be affected by the construction, modification, or operation of the aboveground facilities, including compressor stations, meter stations, contractor/pipe yards, MLVs, or the pig launchers and receivers.

2.2.3.2 General Impacts and Mitigation

Construction impacts on fishery resources may include: direct contact by construction equipment with fish, fish eggs, and other aquatic organisms including fish prey and forage species; alteration or removal of adjacent riparian vegetation and aquatic habitat cover; introduction of pollutants; and impingement or entrainment of fish and other biota associated with the use of water pumps, including appropriation of hydrostatic test water. Loss of riparian vegetation in forested areas could affect fish populations that may be present downstream of construction activities by reducing shade and cover and increasing water temperature. Construction could also delay migrating fish from reaching upstream spawning areas or delay downstream movement of juveniles.

The greatest potential impacts of construction on fishery resources would result from an increase in sediment loading and turbidity within and immediately downstream of the construction work area including an inadvertent HDD drilling mud release, downstream scour associated with diverting water around the work area, or discharge of hydrostatic test water. Increased levels of sedimentation could adversely affect fish eggs and juvenile fish survival, benthic community diversity and health, and spawning habitat. The highest levels of sediment would be generated by use of the open-cut method. However, TGP would not use the wet open-cut method to cross any waterbodies with perceptible flow at the time of the crossing, unless a dry crossing is impractical due to site-specific conditions.

Long-term impacts on fishery resources could occur if the stream contours are permanently modified in the area of the crossing or the adjacent riparian vegetation does not recover.

TGP proposes to reduce effects on fishery resources through the use of the various waterbody crossing methods and restoration procedures described in section 2.2.2.3 and by minimizing the duration of in-stream work in accordance with its ECPs. Section 2.2.2.2 also describes the procedures that TGP would implement during hydrostatic test water withdrawal and discharge and use of the HDD technique to minimize sedimentation and turbidity. Specifically, TGP would minimize the potential impacts associated with hydrostatic testing by screening the intake hoses to eliminate the entrainment of fingerling and small fish during water withdrawal. TGP would comply with appropriate agency requirements that consider the protection of fisheries resources on a case-by-case basis. Discharges would comply with regulatory permit conditions and would be controlled to prevent scour and excessive sedimentation. In addition, impacts on fishery resources would be further reduced by minimizing ATWS near waterbodies.

Impacts on fisheries would be reduced further by limiting in-stream work to the time periods required by federal and state agencies. Based on our consultation with the Pennsylvania Fish and Boat Commission (PAFBC), the PAFBC has established time frames for conducting in-stream work in only those waterbodies for which there is sufficient scientific information to warrant a timing restriction (FERC, 2011). The PAFBC stated that it lacks the scientific information and, thus, the regulatory authority to impose timing restrictions on other waterbodies that may contain fisheries that warrant protective construction timing restrictions. One portion of our Procedures that TGP did not include in its ECPs is section V.B.1, which states that unless expressly permitted or further restricted by the appropriate state agency in writing on a site-specific basis, instream work, except that required to install or remove equipment bridges, must occur during the following time windows: coldwater fisheries – June 1 through September 30; and coolwater and warmwater fisheries – June 1 through November 30. We believe that implementing these timing restrictions would minimize impacts on fish species in the Project area. Therefore, to minimize potential Project-related impacts on fisheries in Pennsylvania, **we recommend that:**

- **<u>Prior to construction</u>, TGP should file with the Secretary for review and written approval from the Director of Office of Energy Projects (OEP) a revised Pennsylvania ECP that includes in-stream construction timing windows consistent with section V.B.1 of the FERC's Procedures.**

We expect streambeds and banks to quickly revert to preconstruction conditions. Restoration, bank stabilization, and revegetation efforts as outlined in TGP's ECPs would minimize the potential for erosion from the surrounding landscape. TGP's adherence to its ECPs would also maximize the potential for regrowth of riparian vegetation, thereby minimizing the potential for any long-term impacts associated with lack of shade and cover. All temporary work areas would be restored and allowed to revegetate to original conditions. No long-term impacts are anticipated after restoration of stream bottoms and regrowth of stream bank and aquatic vegetation. In the event that vegetation maintenance during operation would be required along specific streambanks, impacts on fisheries would be minor.

By implementing the above measures, we believe construction-related impacts on fisheries would be minimized.

2.2.4 Wetlands

2.2.4.1 Existing Wetland Resources

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of wetland vegetation adapted for life in saturated soil conditions (COE, 1987). Wetlands can be a source of substantial biodiversity and serve a variety of functions that include providing wildlife habitat, recreational opportunities, flood control, and naturally improving water quality.

Wetlands in the Project area are regulated at the federal and state levels. On the federal level, the COE has authority under section 404 of the CWA to review and issue permits for activities that would result in the discharge of dredged or fill material into waters of the United States, including wetlands. The COE is responsible for issuing section 404 permits in Pennsylvania, but in New Jersey has delegated section 404 permitting authority for non-tidal wetlands and wetlands generally greater than 1,000 feet from the Delaware River to the NJDEP. Section 401 of the CWA requires that proposed dredge and fill activities under section 404 be reviewed and certified by the designated state agency so that the Project would meet state water quality standards. The designated state agencies in Pennsylvania and New Jersey are the PADEP and the NJDEP, respectively.

TGP field delineated wetlands that would be crossed by the Project in Pennsylvania in accordance with the COE Wetlands Delineation Manual (COE, 1987) and the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (COE, 2009). In New Jersey, wetlands crossed by the Project were field delineated in accordance with the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (Federal Interagency Committee for Wetland Delineation, 1989) and the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region. Wetlands were classified as described in Cowardin et al., (1979). In areas where wetland survey permission was denied, National Wetlands Inventory data was used to determine wetland impacts. The basic wetland types that were delineated in the Project area are discussed below.

Palustrine Forested Wetlands

Palustrine forested wetlands are characterized by woody vegetation that is 6 meters (approximately 18 feet) tall or taller and normally include an overstory of trees, an understory of young trees or shrubs, and an herbaceous layer. Forested wetland vegetation communities in Pennsylvania consist of red maple - sedge, red maple - black gum, hemlock, hemlock - mixed hardwood, and red maple - highbush blueberry associations. Forested wetland vegetation communities in New Jersey consist of eastern hemlock, eastern hemlock-great rhododendron-peatmoss, and red maple swamp associations.

Palustrine Scrub-Shrub Wetlands

Palustrine scrub-shrub wetlands are generally dominated by woody vegetation less than 6 meters (approximately 18 feet) tall. Scrub-shrub land types may represent a successional stage leading to a forested wetland and include shrubs, young trees, and trees or shrubs that are small and/or stunted due to environmental conditions. Scrub-shrub wetland vegetation communities in Pennsylvania consist of the highbush blueberry-meadowsweet and the highbush blueberry-saturated shrubland association. Scrub-shrub wetland vegetation communities in New Jersey consist of shrub swamps and the highbush blueberry-saturated shrubland alliance.

Palustrine Emergent Wetlands

Palustrine emergent wetlands are characterized by erect, rooted, herbaceous hydrophytes not including mosses and lichens. Emergent wetland vegetative communities in Pennsylvania include cattail marsh, mixed forb marsh, tussock sedge marsh associations, and herbaceous vernal pools (see the following discussion of vernal pools). Emergent wetland vegetative communities in New Jersey include the tussock sedge seasonally flooded herbaceous alliance.

Vernal Pools

Vernal pools are characterized by seasonally fluctuating water levels and may dry out completely in the summer. Many vernal pools are small, shaded, and unvegetated, and the pond bottoms are covered in dead leaves and algae. These areas can provide critical breeding habitat for several species of amphibians and are also an important habitat for many species of birds, mammals, reptiles, and invertebrates.

2.2.4.2 Wetland Crossing Methods, General Impacts, and Mitigation

Wetlands would be crossed in accordance with TGP's ECPs and state and federal permit requirements. Depending on site-specific conditions present during construction, TGP would use one of the following methods to cross wetlands (TGP's ECPs include drawings depicting the typical crossing methods):

- Method I, the standard pipeline construction method, would be used to cross wetlands where the soils are non-saturated and able to support construction equipment at the time of crossing. This method uses the same standard overland construction procedures as described in section 1.7.1.1. TGP would cut trees and brush at ground level by hand or with low ground pressure equipment or with equipment supported by timber mats. TGP would not use dirt, rock, pulled tree stumps, or brush rip-rap to stabilize the travel lane. Where grading is not required, timber mats would be placed over existing wetland vegetation if necessary. TGP would also install sediment barriers prior to grading, as needed, to protect adjacent wetland areas. In addition, TGP would implement the

wetland protective measures described in its ECPs and be consistent with the FERC's Procedures.

- Method II, the conventional wetland construction method, would be used where wetland soils are saturated or otherwise unable to support mainline construction equipment and the right-of-way would need to be stabilized during construction. Prior to crossing and movement of construction equipment through these wetlands, the right-of-way would be stabilized using timber mats to allow for a stable, safe working condition. Clearing activities are similar to those described for Method I and would be minimized and limited to only that necessary to install the pipeline. While the trench is dug, the pipeline would be assembled in an upland staging area. After the pipeline is lowered into the trench, wide-track bulldozers or backhoes supported on timber mats would be used for backfill, final cleanup, and grading. This method would minimize the amount of equipment and travel in wetland areas.

- Method III, the push-pull wetland crossing method, would be used as an alternative, or if specifically required through agency consultations, to cross large wetland areas where sufficient water is present for floating the pipeline in the trench, and grade elevation over the length of the push-pull area would not require damming to maintain adequate water levels for pipe floatation. Crossing of a wetland using the push-pull method would involve either pushing the prefabricated pipe from the edge of the wetland or pulling the pipe with a winch from the opposite bank of the wetland into the trench. Clearing and grading activities associated with Method III would be similar to those described for Method I, although grading would generally not be necessary due to the typically level topography and the absence of rock outcrops in such areas. The trench would be excavated using amphibious excavators (pontoon mounted backhoes) or tracked backhoes supported by fabricated timber mats or floats. If possible, the excavated material would be stored adjacent to the trench or in one of the following locations: 1) in upland areas of the right-of-way as near to the trench as possible; 2) in construction vehicles; or 3) transported to an approved off-site staging location until needed for backfilling. The pipe would be stored and joined at staging areas (push and pull sites) located outside the wetland. Floats may be attached temporarily to give the pipe positive buoyancy. After floating the pipe into place, the floats would be cut and the negatively buoyant pipe would settle to the bottom of the ditch. These steps (pipe sections fabricated and pushed into place) would be repeated and the pipe segments welded together until the wetland crossing is complete. The excavated material would then be placed over the pipe to backfill the trench.

TGP has identified several areas along the proposed pipeline loops as having bedrock within 5 feet of the soil surface. Should blasting be required in wetlands, TGP would follow its ECPs and Blasting Plan to minimize impacts on wetlands from blasting. In addition, TGP would develop site-specific blasting specifications to minimize the potential for adverse impacts and would require EI monitoring during and post-construction to detect potential wetland draining due to blasting activities.

Table 2.2.4-1 summarizes the potential Project acreage impacts on wetlands. Detailed information regarding each wetland that would be crossed by the proposed pipeline is included in appendix E tables.

TABLE 2.2.4-1

Summary of Wetlands Affected by Construction and Operation of the Project

State/Facility	Emergent Wetland		Scrub-Shrub Wetland		Forested Wetland		Total Wetland Impacts by Loop	
	Con [a]	Oper [b]	Con [a]	Oper [b]	Con [a]	Oper [b]	Con [a]	Oper [b]
Pennsylvania								
Loop 317	3.3	0.0	0.1	0.0	1.9	0.4	5.3	0.4
Loop 319	2.1	0.0	0.4	<0.1	0.3	0.1	2.7	0.1
Loop 321	6.4	0.0	1.3	0.1	8.0	1.8	15.7	2.0
Loop 323	1.4	0.0	0.1	<0.1	0.5	0.2	2.0	0.2
New Jersey								
Loop 323	6.5	0.0	<0.1	0.0	5.0	1.5	11.5	1.5
Loop 325	5.1	0.0	0.0	0.0	6.7	1.4	11.8	1.4
Project Total [c]	**24.9**	**0.0**	**1.9**	**0.2**	**22.4**	**5.3**	**49.1**	**5.5**

[a] Con = Construction Impacts. Construction impacts are based on a proposed nominal 75-foot-wide construction right-of-way for the pipeline facilities in wetlands and areas where the right-of-way is wider than the nominal 75-foot-wide configuration, which may include staging areas and additional temporary workspaces.

[b] Oper = Operational impacts. Operational impacts on forested wetlands were calculated based on a 30-foot-wide permanent maintenance corridor. Operational impacts on scrub-shrub wetlands were calculated based on a 10-foot-wide permanent maintenance corridor.

[c] No wetland impacts are anticipated by the construction or operation of aboveground facilities and access roads or the temporary use of pipe and contractor yards.

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

Construction of the Project would impact 49.1 acres of wetlands, consisting of 24.9 acres of emergent wetland, 1.9 acres of scrub-shrub wetland, and 22.4 acres of forested wetlands. Operation of the Project would permanently impact 5.5 acres of wetlands, consisting of 5.3 acres of forested wetlands and 0.2 acre of scrub-shrub wetlands. All of forested and scrub-shrub wetlands that would be impacted during operation would be permanently converted to emergent wetland types due to vegetation maintenance requirements along the pipeline loops. The construction, modification, or use of compressor stations, meter stations, MLVs, access roads, contractor/pipe yards, and pig launchers and receivers would not impact wetlands.

The primary impact of the Project on wetlands would be the alteration of wetland value due to vegetation clearing. Construction could also impact water quality within the wetland due to sediment loading or inadvertent spills of fuel or chemicals. In general, TGP would minimize wetland impacts by collocating the proposed loops for 33.8 miles (84 percent) of the proposed 40.3 mile total loop length and by implementing the measures outlined in its SPCC Plan and ECPs, including:

- cutting vegetation just above ground level, leaving existing root systems in place, and limiting the pulling of stumps and grading activities to directly over the trenchline except where required for safety reasons;
- installing sediment barriers immediately after initial ground disturbance within the right-of-way between wetlands and uplands, across the entire right-of-way immediately upslope of the wetland boundary, and along the edge of the right-of-way as necessary to contain spoil within the right-of-way and to protect adjacent off-right-of-way wetland areas;
- installing trench plugs at both ends of the wetland to prevent wetland drainage; large wetlands would have additional trench plugs installed every 100 feet;

- segregating up to 12 inches of topsoil from the trenchline, except in areas where standing water is present or soils are saturated or frozen;
- minimizing the length of time that topsoil is segregated and the trench is open;
- prohibiting the use of rock, soil imported from outside the wetland, tree stumps, or brush riprap to stabilize the right-of-way;
- using low ground weight equipment or operating equipment on timber riprap (cut trees), prefabricated equipment mats, or terra mats on saturated soils or where standing water is present;
- installing trench plugs as necessary to maintain the original wetland hydrology;
- prohibiting the use of fertilizer or mulch during the restoration of wetlands unless required in writing by the appropriate land management or state agency;
- conducting pre- and post-construction soil density testing in areas where Method I would be conducted and perform soil de-compaction, if necessary, to promote restoration;
- temporarily seeding wetlands with annual ryegrass at a rate of 40 lbs/acre and permanently seeding with a land managing or agency approved wetland seed mix unless standing water is present; and
- limiting vegetation maintenance in wetlands to a 10-foot-wide herbaceous corridor centered over the pipeline and the cutting and removal of trees and shrubs greater than 15 feet in height that are within 15 feet of the pipeline centerline.

In addition to the above measures, TPG would limit the width of the construction right-of-way in wetlands to 75 feet except in those areas identified in table 2.2.4-2, which includes TGP's justification for the additional construction right-of-way. TGP's proposed 75-foot-wide nominal construction right-of-way in wetlands complies with pipeline construction industry standards and our Procedures (see section VI.A.3). We reviewed TGP's alignment sheets and other mapping and have determined that the requested construction rights-of-way are justified.

TABLE 2.2.4-2

Areas that Exceed 75 Feet of Workspace Within Wetlands

State/Facility	Wetland Identification	Milepost	Justification	Width of Workspace within Wetland
Pennsylvania				
Loop 317	W015	5.0	Wyalusing Creek crossing	125
	W016	5.0	Wyalusing Creek crossing	125
Loop 319	W002	0.4	Crossover of existing pipeline	125
Loop 321	W002	0.0	Road crossing – bore	100

TGP would also locate ATWS at least 50 feet away from wetland boundaries except where site-specific conditions warrant otherwise. TGP identified areas where it would be necessary to locate ATWS within 50 feet of a wetland and provided justification for each workspace (see table 2.2.4-3). These justifications include the need for additional topsoil storage; side-slope and steep-slope construction areas;

road and railroad crossing and associated bore pits; and others. We have determined that TGP's proposed locations of ATWS within 50 feet of a wetland are justified.

TABLE 2.2.4-3

Additional Temporary Workspace Located In or Within 50 Feet of Wetlands

State/Facility	County	Milepost	Justification[a]	Wetland ID	Additional Temporary Workspace Distance from Wetland (feet)
Pennsylvania					
Loop 317	Bradford	0.0	j	L1-W001	38
	Bradford	0.0	n	L1-W001	Within Wetland
	Bradford	0.1	h	L1-W001	Within Wetland
	Bradford	0.1	h	L1-W001	Within Wetland
	Bradford	1.3	g,m	L1-W005	30
	Bradford	3.1	d,m	L1-W008	Within Wetland
	Bradford	3.2	d,m	L1-W008	Within Wetland
	Bradford	5.0	f	L1-W016	Within Wetland
	Bradford	5.0	f	L1-W015	Within Wetland
	Bradford	5.1	f	L1-W025	Within Wetland
Loop 319	Bradford	0.8	c	L2-W007	10
	Bradford	0.8	c, g	L2-W007	<50
	Bradford	0.9	c	L2-W009	40
Loop 321	Wayne	0.0	d	L3-W002	Within Wetland
	Wayne	0.1	d	L3-W003	45
	Wayne	1.2	c	L3-W008	14
	Pike	6.2	a,m,g	L3-W045	15
	Pike	6.6	d	L3-W047	Within Wetland
	Pike	6.6	d	L3-W047	Within Wetland
	Pike	7.5	c,l,k	L3-W057	Within Wetland
	Pike	7.7	a,m,g	L3-W059	45
New Jersey					
Loop 323	Sussex	9.7	a,m,g	L4-W058	35
	Sussex	9.9	d,m	L4-W034A	10
	Sussex	11.9	d	L4-W032	45
	Sussex	14.7	d	L4-W005	40
Loop 325	Passaic	0	h,i	L5-W035	40
	Passaic	3.2	a,m,e	L5-W040	Within Wetland
	Passaic	3.2	a,m,e	L5-W040	Within Wetland
	Passaic	3.5	d	L5-W001	28
	Passaic	5.3	a,m,e,g	L5-W015	40
	Bergen	7.0	a,m,g	L5-W029	40

[a] a=topsoil storage; b=steep slope construction; c=road crossing; d= road crossing with bore pits; e=creek crossing; f=waterbody crossing; g=wetland staging area; h=HDD site; i=HDD layout; j=staging area; k=utility crossing; l=swap working side; m=narrow construction; n=interconnect.

Impacts on wetlands would be greatest during and immediately following construction. The majority of these effects would be short term in nature and would cease when or shortly after the wetlands are restored and vegetated. Following revegetation, the wetland would eventually transition back into a community with functionality similar to that of the pre-construction state. In emergent wetlands, the herbaceous vegetation would regenerate quickly (typically within 1 to 3 years).

Following revegetation, there would be no permanent impact on emergent wetland vegetation in the maintained pipeline right-of-way because these areas naturally consist of and would remain as open and herbaceous communities. Revegetation would be considered successful if the cover of herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent wetland areas that were not disturbed by construction. If vegetative cover is not successful or if there is a need for noxious weed control measures, TGP would employ an experienced agronomist to determine the need for additional restoration measures. As specified in its ISMPs, TGP would monitor the Project area for a minimum 5 years after construction to eradicate and/or control invasive plants in wetland communities. Although TGP's ECPs allows annual maintenance of a 10-foot-wide strip centered over the pipeline to facilitate corrosion/leak surveys, TGP does not generally mow or otherwise maintain herbaceous wetland vegetation in the pipeline right-of-way.

The duration of the impact on scrub-shrub and forested wetlands would be longer than that of emergent wetlands. Woody vegetation may take several years to regenerate, and the re-establishment of mature woody vegetation would be precluded by the annual mowing and maintenance of a 10-foot-wide herbaceous strip centered over the pipeline and the cutting of woody vegetation that is greater than 15 feet in height within 15 feet of the pipeline centerline. This would result in a permanent conversion of previously forested wetland areas to non-forested wetland areas. The conversion from one vegetation cover type to another could result in changes in wetland functions and values by altering the amount of sunlight or other environmental conditions in the wetland, primarily wildlife habitat. In general, however, it is expected that the affected wetlands would continue to provide important ecological functions such as sediment/toxicant retention, nutrient removal, flood attenuation, groundwater recharge/discharge, and wildlife habitat.

Re-establishment of forest and shrub vegetation in forested wetlands would be performed by TGP for 3 years following construction using a combination of plantings and natural, successional processes. As required by the ECPs, TGP would conduct annual post-construction monitoring of all wetlands affected by construction to assess the condition of vegetation and the success of restoration. As a component of the monitoring program, TGP would perform quantitative sampling to determine the type and quantity of tree and shrub species naturally colonizing and resprouting in the construction right-of-way. At the end of the second growing season, the results of the field monitoring would be compared to pre-determined threshold success criteria, if any, developed in consultation with the permitting agencies. These success criteria would identify quantities of native woody species that would be considered necessary to ensure successful forested wetland restoration. If actual field stem counts fall short of the pre-determined threshold values, TGP would develop supplemental plans in conjunction with the appropriate state and federal agencies.

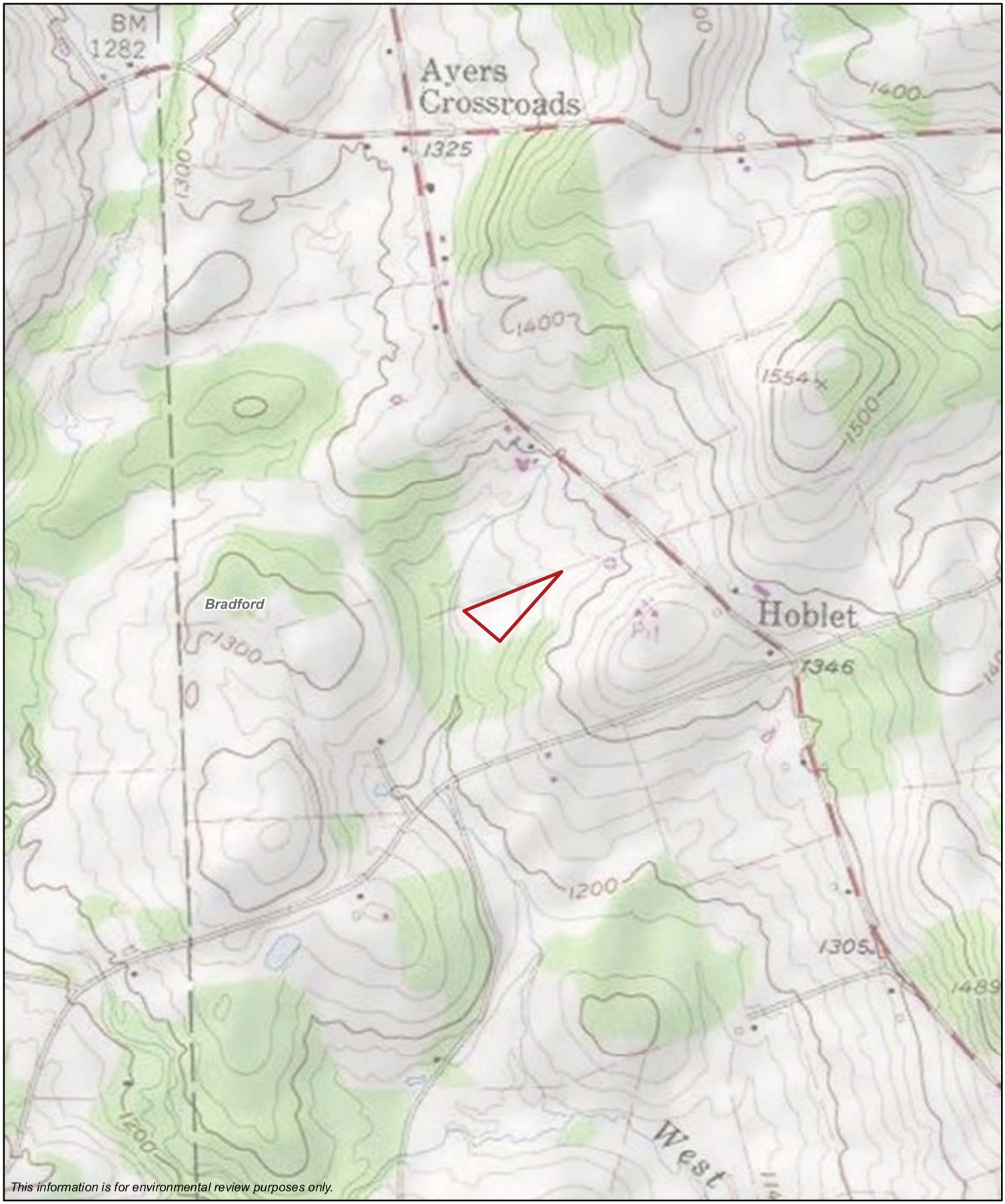
Wetland Mitigation Sites

TGP is coordinating with the COE and PADEP to identify acceptable compensation for temporary wetlands impacts associated with the Project in Pennsylvania. TGP has filed two Wetland Mitigation Plans as part of its joint permit application to the PADEP for a Pennsylvania Water Obstruction and Encroachment Permit and to the COE for a permit under section 404 of the CWA and section 10 of the Rivers and Harbors Act. Within the COE's Baltimore District regulatory area, approximately 8.1 acres of wetland would be temporarily impacted by construction of the Project. Of this

8.1 acres, 0.5 acre of forested wetland would be permanently converted to emergent or scrub-shrub wetland for operation and maintenance of TGP's pipeline rights-of-way; there would be no permanent fill of wetlands associated with construction of the Project in Pennsylvania. To minimize and mitigate temporary and permanent wetland impacts within the Baltimore District regulatory area, TGP would restore the wetlands impacted during construction in accordance with COE standards. TGP also submitted the Tomjack Creek Mitigation Plan to the COE on October 10, 2011, which provides enhancement and preservation to an existing wetlands and adjacent upland areas along a portion of an unnamed tributary to West Branch Tomjack Creek in Smithfield Township, Bradford County, Pennsylvania (see figure 2.2.4-1). The proposed off-site enhancement at the Tomjack Creek Mitigation Site would provide for improved water quality, erosion and sediment control, aesthetics, and recreation as well as compensate for the wildlife habitat modification associated with the construction of the Project, as TGP anticipates removing the active hay production and cattle pasture from the entire 3.1 acres; enhancing 0.6 acre of the 2.0 acres of existing emergent wetland; and enhancing an upland berm located within the mitigation site. Enhancement would include the planting of native trees and shrubs within the existing emergent wetland pasture. The Tomjack Creek Mitigation Site would be protected in perpetuity under the deed restriction promulgated by the COE.

Within the COE's Philadelphia District regulatory area in Pennsylvania, approximately 17.8 acres of wetland would be temporarily impacted by construction of the Project. Of these 17.8 acres, 2.0 acres of forested wetland would be permanently converted to scrub-shrub or emergent wetland as a result of operation and maintenance of TGP's pipeline rights-of-way. To minimize and mitigate temporary and permanent wetland impacts within the Philadelphia District regulatory area, TGP would restore the wetlands impacted during construction in accordance with COE standards. TGP also submitted the Van Auken Creek Mitigation Plan to the COE on October 10, 2011, which provides enhancement and preservation of wetland and upland areas along a portion of an unnamed tributary to Van Auken Creek in Clinton Township, Wayne County, Pennsylvania (see figure 2.2.4-2). The proposed off-site enhancement at the Van Auken Creek Mitigation Site would provide for improved water quality, erosion and sediment control, aesthetics, and recreation as well as compensate for the wildlife habitat modification associated with the construction of the Project, as TGP anticipates removing cattle from the entire 7.4-acre site; enhancing 3.7 acres of emergent wetlands to scrub-shrub and forested wetlands within the 4.4 acres of Wetland Buffer/Enhancement Area; and protecting 3.0 acres of existing upland/wetland forested buffer located within the mitigation site. Enhancement would include the planting of native trees and shrubs within the existing wetland pasture. A 0.1-acre area around an existing drainage ditch would be maintained for agricultural purposes. The current landowner has agreed to sell the rights of the site for purposes of wetland restoration and recording of a deed restriction. The Van Auken Creek Mitigation Site would be protected in perpetuity under the deed restriction form promulgated by the COE.

In New Jersey, the Philadelphia District of the COE has retained section 404 permitting jurisdiction over the Delaware River and those wetlands that are partially or entirely located within 1,000 feet of the ordinary high water mark of the river. TGP is evaluating potential impacts on wetlands associated with the crossing of a back channel within 1,000 feet of the Delaware River in New Jersey. To mitigate for potential impacts, TGP is negotiating with a nearby landowner to enhance a portion of a 14.2-acre site in Sussex County, New Jersey. TGP's proposed mitigation would enhance the riparian buffer along a back channel of the Delaware River and would include the addition of native seed mix as well as planting of native trees and shrubs consistent with COE wetland mitigation guidelines. The final mitigation plan, if required, would be resolved through the COE permitting process.

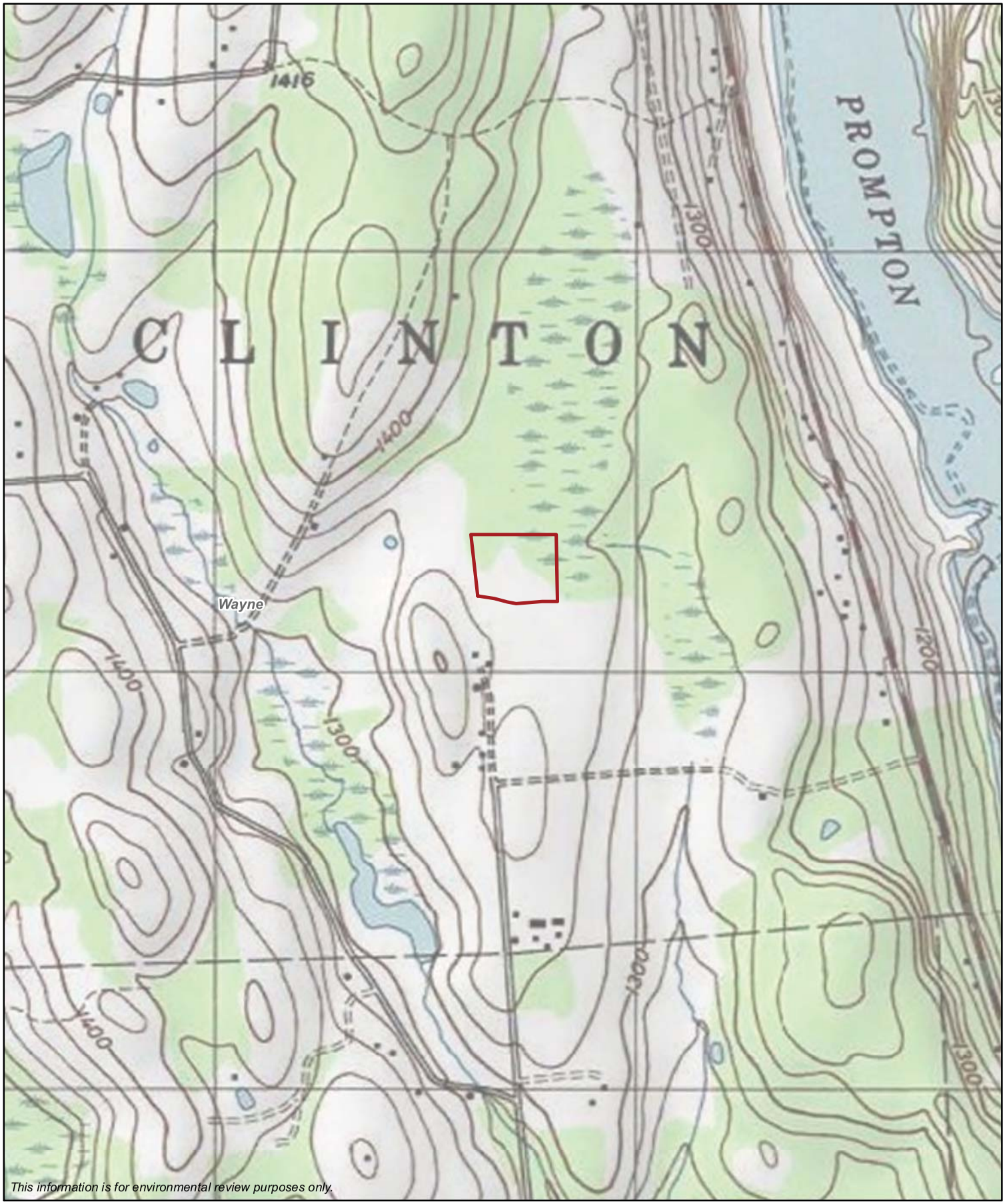


Tomjack Creek Site Boundary

0 500 1,000 Feet

N

Figure 2.2.4-1
Northeast Upgrade Project
Tomjack Creek Mitigation Site
Bradford County, PA



Van Auken Creek Site Boundary

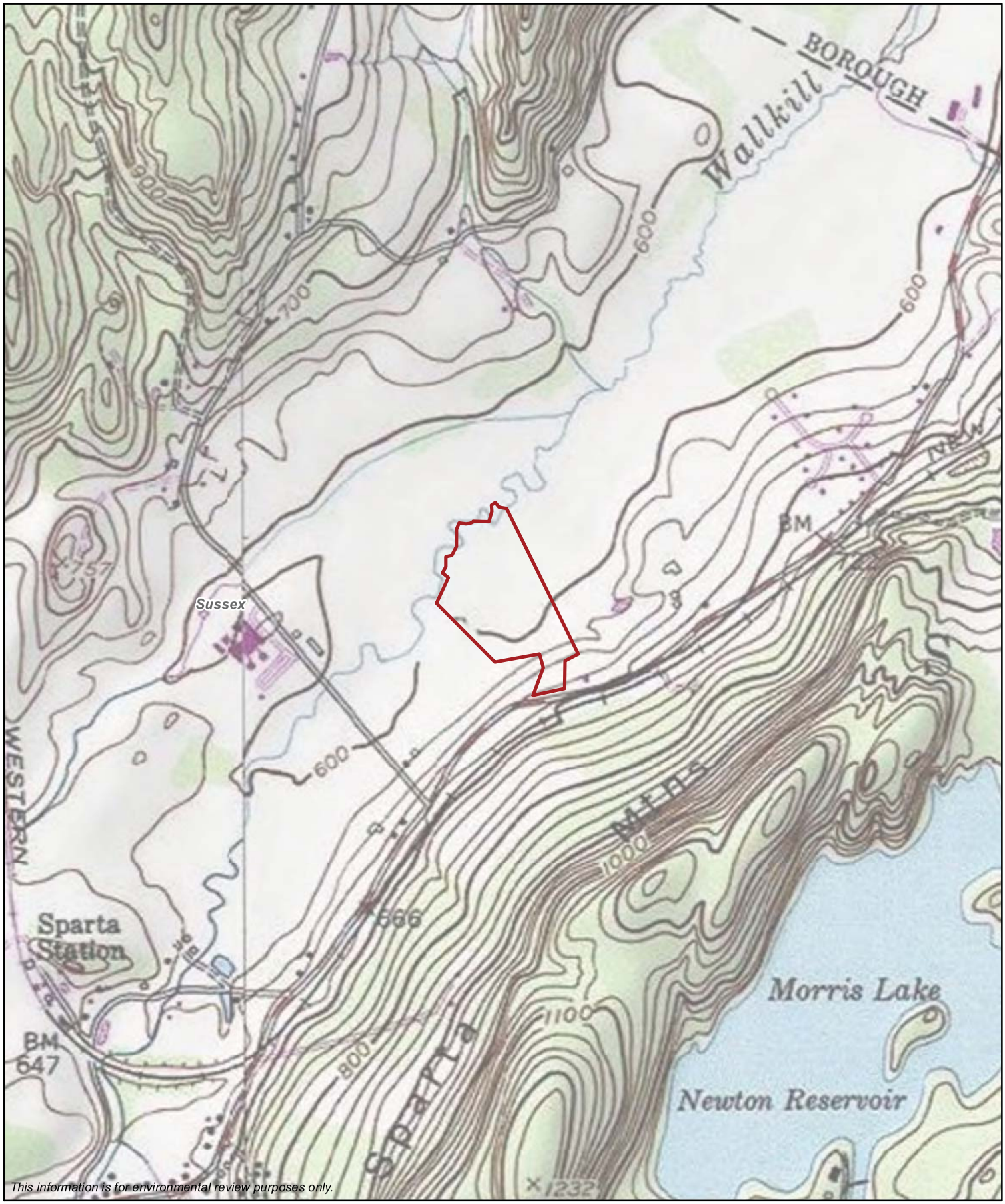
0 500 1,000 Feet

N

Figure 2.2.4-2
Northeast Upgrade Project
Van Auken Creek Mitigation Site
Wayne County, PA

TGP has also developed a draft Wetland Mitigation Plan for wetlands impacted by the Project in New Jersey for which the COE has delegated section 404 permitting authority to the NJDEP. To mitigate for forested wetland conversion of 3.0 acres located in Water Management Areas 1, 2, and 3 in New Jersey, TGP is proposing the Wallkill River Mitigation Area (see figure 2.2.4-3) located in Sparta Township, Sussex County, New Jersey. The proposal consists of the enhancement, management and preservation of the 17.5-acre site including: 8.3 acres of existing emergent/scrub-shrub wetland suitable for bog turtle habitat; 1.5 acres of associated upland; 2.3 acres of fallow field and riparian areas; wetland/riparian enhancement of approximately 1.7 acres of existing emergent wetland; and wetland/riparian preservation of 3.7 acres of existing emergent/scrub-shrub wetland. As discussed with the FWS and NJDEP, enhancement of the suitable bog turtle habitat would consist of installation of fencing and allowing cattle grazing in order to manage invasive species growth. The Wallkill River and its tributaries, classified as a Freshwater-Trout Maintenance waterbody, flows through the proposed mitigation site and eventually fans out into delineated wetlands on site. TGP stated in its Wetland Mitigation Plan that a wetland delineation was conducted on June 30, 2011 and verbally approved by an NJDEP representative. TGP met with representatives of the NJDEP and FWS on June 30, 2011 to review the site and discuss potential mitigation concepts. All parties agreed that the site has potential for use as a wetland and riparian mitigation site and that it would be desirable to implement a wildlife management plan involving the preservation and enhancement on site for the benefit of bog turtles.

In conclusion, we believe that wetland impacts associated with the construction and operation of the Project would be minimized and/or compensated for by implementing the construction, restoration, and mitigation measures proposed by TGP and as may be required by the COE and state agencies. The proposed mitigation sites would be reviewed during the COE's standard permit review process in accordance with the COE/EPA Compensatory Mitigation Rule which became effective on June 9, 2008.



Wallkill River Site Boundary

0 500 1,000 Feet

N

Figure 2.2.4-3
Northeast Upgrade Project
Wallkill River Mitigation Site
Sussex County, NJ

2.3 VEGETATION AND WILDLIFE

2.3.1 Vegetation

2.3.1.1 Existing Vegetation Resources

Existing upland conditions were documented during environmental field surveys and classified using a modified version of the USGS land cover classification system (Anderson et al., 1976) in conjunction with Fike (1999). Major upland cover types crossed by the Project include upland forest, open land, and agricultural land. The major upland cover types affected by the Project in Pennsylvania and New Jersey are summarized in tables 2.3.1-1 and 2.3.1-2, respectively. The New York portion of the Project is comprised of open and developed lands similar to that described in table 2.3.1-1. Wetland vegetation communities that would be affected by the Project are discussed in section 2.2.4.

TABLE 2.3.1-1

Upland Vegetation Cover Types Associated with the Project in Pennsylvania

Vegetation Community	General Description	Common Species
Upland forest	Northern hardwood forests, sugar maple-basswood forest, and aspen/grey birch forests. Most common forest types occurring in the Project area.	Deciduous forests type dominated by American beech, red maple, sugar maple, wild black cherry, basswood, aspen, and gray birch.
	Mixed conifer-deciduous hardwood forests. Occur in higher elevation areas.	The mixed conifer-deciduous hardwood forest type comprises at least 25 percent cover of eastern hemlock, and/or white pine mixed with common species listed for the above deciduous hardwood forest types.
	Conifer forests. Occur in lower elevation areas with steep hillsides and low sunlight.	Coniferous forests type comprises at least 75 percent cover by eastern hemlock and/or white pine intermixed with species similar to those listed for the above deciduous forests types.
	Sycamore-box elder floodplain forest. Occur along the floodplains of larger and mid-size river systems that receive periodic or seasonal flooding.	Characteristic species include sycamore and box-elder with associated species such as red maple, silver maple, American elm, red elm, red ash, and black willow.
Open land	This vegetation community consists of all non-forested, non-wetland habitats that are not in agricultural production or landscaped. This includes grasslands, successional old fields, shrublands, and maintained utility rights-of-way.	Common species found in open land habitats include gray birch and silky dogwood, multiflora rose, poverty grass, orchard grass, switchgrass, Queen Anne's lace, lowbush blueberry, sheep laurel, various goldenrod species, and forbs.
Agricultural land	Areas used for raising crops, grazing livestock, and for tree farms.	Corn and hay are the most common crops grown in farmed areas.

TABLE 2.3.1-2

Upland Vegetation Cover Types Associated with the Project in New Jersey

Vegetation Community	General Description	Common Species
Upland forest	Dry-mesic inland mixed oak forest. Sub-types include mixed oak-hardwood forest and mixed oak forest.	Forests type dominated by red oak, white oak, black oak, white ash, sugar maple, red maple, chestnut oak, American beech, and tulip tree.
	Dry-mesic calcareous forest. Forest areas occurring on calcareous soils.	Forest type dominated sugar maple, white ash, American basswood, American Hophornbeam, pignut hickory, tuliptree, and yellow or chinkapin oak.
	Chestnut oak forests. Occur on slopes and ridge tops of higher elevations with dry and poor soil conditions.	Forest type dominated by chestnut oak, red oak, white oak, scarlet oak, sweet birch, and pitch pine. Less common tree species include black oak, red maple, hickory, and black cherry.
	Shale cliff/rock outcrop community. Formed on shale cliffs that contain small ledges, crevices and talus areas that provide diverse micro habitats.	Dominated by shrubs such as common juniper, common hackberry, prickly pear cactus, and forbs such as blunt cliff-fern, maidenhair spleenwort, wild red columbine, and creeping phlox.
Open land	This vegetation community consists of all non-forested, non-wetland habitats that are not in agricultural production or landscaped. This includes grasslands, successional old fields, shrublands and maintained utility rights-of-way.	Common species found in open land habitats include gray birch and silky dogwood, multiflora rose, poverty grass, orchard grass, switchgrass, Queen Anne's lace, lowbush blueberry, sheep laurel, various goldenrod species, and forbs.
Agricultural land	Areas used for raising crops, grazing livestock, and tree farms.	Corn and hay are the most common crops grown in farmed areas.

The primary vegetation cover type that would be crossed by the proposed pipeline facilities, including MLVs and pig launcher/receiver assemblies, is upland forest. This community covers about 53 percent of the pipeline routes. The remainder of the pipeline routes are covered by open land (19 percent), agricultural land (13 percent), wetlands (9 percent), developed land (3 percent), and open water (1 percent).

Compressor station modifications would occur within the boundaries of the existing compressor station properties, which are all developed land. The activities at the Mahwah Meter Station would occur on open land (1.6 acres), commercial/industrial land (0.2 acre), and upland forest (0.2 acre). TGP's proposed contractor/pipe yards are located entirely within existing fields, quarries, or other previously disturbed areas. TGP would primarily utilize public roads to access the right-of-way; however, 52 non-public roads would be used during construction of the Project. Some access roads would require minor improvements to allow for passage of construction vehicles as described in section 2.4.1.4. These improvements would require minor modifications of existing land use.

Table 2.3.1-3 summarizes the approximate acreage of upland vegetation communities that would be affected by the Project.

TABLE 2.3.1-3

Upland Vegetation Affected by the Project (acres) [a]

Vegetation Cover Type	Pipeline Facilities [b]		Aboveground Facilities [c]		Contractor/Pipe Yards	
	Construction	Operation	Construction	Operation	Construction	Operation
Upland Forest	265.4	77.7	0.3	0.3	1.5	0.0
Open Land	92.4	15.4	1.6	1.6	18.4	0.0
Agricultural Land	64.0	13.4	0.0	0.0	144.4	0.0
Developed Land [d]	12.8	3.7	42.1	42.1	51.8	0.0
Other [e]	7.2	1.7	0.6	0.6	0.0	0.0
Project Total	**441.8**	**111.9**	**44.6**	**44.6**	**216.1**	**0.0**

[a] Excludes access roads.
[b] Includes additional temporary workspace.
[c] Includes proposed and modified compressor station sites and meter stations.
[d] Developed land includes residential land, commercial/Industrial land, and road/railroad crossings.
[e] Other land includes special use area (e.g., school land, municipal and state-owned land) crossings.

2.3.1.2 General Impacts and Mitigation

Upland Forest

The greatest impact on vegetation would be on forested areas because of the lengthy amount of time required for woody vegetation to revert to its preconstruction condition. Construction in forest lands would remove mature trees in the construction right-of-way. In addition, the canopy overhanging the right-of-way may be trimmed as needed. Trees would be cut into lengths, chipped, and/or removed. The removal of mature trees could also result in secondary impacts such as increased erosion. Fragmentation of upland forest habitat could occur due to the expansion of TGP's existing right-of-way as well as along 6.4 miles of new pipeline right-of-way that would be created by the Project. The loss of forest habitat, expansion of existing corridors, and the creation of open early successional and induced edge habitats could also decrease the quality of habitat for forest wildlife species, as discussed in section 2.3.2.2.

After construction, the forest would be allowed to recover within the construction right-of-way and ATWS; however, the impact in these areas would be long term. The Project would permanently convert about 80 acres of forested land to vegetated open land or commercial/industrial land. Permanent impacts on forest lands would occur within the maintained portion of the permanent right-of-way where ongoing vegetation maintenance during operations would preclude the re-establishment of trees, and where access roads would be improved and/or modified in previously forested land.

TGP would minimize impacts on upland forest by utilizing existing rights-of-way or previously disturbed, non-forested areas to the extent possible. Specifically, the proposed loops are located adjacent to TGP's existing pipeline for 84 percent of their lengths. TGP would limit the width of new permanent right-of-way to 25 feet in most locations and it would allow the ATWS to revert to woody vegetation. The adjacent forested land would remain available for wildlife. In addition, the proposed construction right-of-way overlaps the existing, maintained permanent right-of-way. MLVs and pig launcher/receiver assemblies would also be located within TGP's existing right-of-way or within the proposed permanent right-of-way, and work at existing compressor stations would occur within the previously disturbed fence lines of the facilities. TGP would also use non-forested areas for contractor/pipe yards, and would use existing roads for right-of-way access during construction of the facilities.

In forested areas where the right-of-way would be cleared for construction, TGP would implement measures outlined in its ECPs to minimize impacts on vegetation, including the installation of

erosion control measures following initial disturbance of the soil. Following construction, all of the previously vegetated workspace areas disturbed during construction would be seeded. In accordance with its ECPs, TGP would monitor disturbed areas to determine the post-construction revegetative success for a minimum of two growing seasons. TGP has also prepared ISMPs for both Pennsylvania and New Jersey, which would control the spread of invasive plant species in areas disturbed by construction. Some of the measures in the ISMPs include:

- the removal of invasive species from the right-of-way in coordination with landowners and applicable federal, state, and local regulatory agencies;
- the application of herbicides approved by state and federal agencies; and
- monitoring for invasive species during the first 5 years after construction, with additional annual surveys conducted if required by the FERC, COE, or applicable state agency; reapplication of herbicides would be managed on an as-needed basis.

The Project would cross numerous public lands and special interest areas. Within state-owned properties in New Jersey, TGP would comply with the No Net Loss Reforestation Act (NNRA) (New Jersey Statutes 13:1L-14 1 *et seq*) to restore all areas of forested habitat impacted by the Project. State agencies with administrative authority over other public lands may require TGP to further mitigate for the loss of trees in these areas. This is further discussed in section 2.4.3.

Open Land

Open land consists of grasslands, successional old fields, shrublands, and maintained utility rights-of-way. Vegetation would be removed from the construction work area; however, these impacts would be considered short term. After cleanup and reseeding of the right-of-way, the herbaceous components of the cover type would typically regenerate quickly considering the ample annual rainfall in the region. Impacts on these cover types during facility operation would be minor because these cover types would be allowed to recover and would not be significantly altered by right-of-way maintenance activities.

Agricultural Land

The effects of the Project on agricultural land are expected to be minor and short term. Short-term impacts on agricultural areas include the loss of standing or row crops within the construction work area and the disruption of farming operations for the growing season during the year of construction. To reduce these impacts, TGP would adhere to the measures outlined in its ECPs. These measures include testing the topsoil and subsoil for compaction at regular intervals in areas disturbed by construction activities and strictly controlling equipment traffic on agricultural land to minimize compaction and rutting. Except for those areas within 10 feet of TGP's existing pipeline, topsoil would be segregated to a maximum depth of 12 inches from either the pipeline trench and subsoil storage area or the full construction right-of-way, as stipulated in landowner agreements, and stored separately from the subsoil for replacement after backfilling the trench. TGP would monitor crops during the first and second growing seasons after seeding to determine if additional restoration is needed. If necessary, TGP would consult an experienced agronomist to determine the need for additional restoration measures.

Developed Land

Impacts on vegetative cover within developed land would include the removal of trees, ornamental shrubs, and maintained lawn areas within the construction right-of-way. These impacts would be short term as TGP would restore the landscape in the temporary construction right-of-way immediately after construction. The loss of large trees would be considered a long-term impact. However, TGP would attempt to preserve large trees if possible and may compensate the affected landowners for tree loss in accordance with individual landowner agreements. TGP would further minimize impacts in residential areas by utilizing the special construction techniques described in section 1.7.1.2, including the use of a reduced construction right-of-way width. Section 2.4.2.1 provides additional detail regarding the measures TGP would implement to minimize impacts in active residential areas.

We believe that by following the methods discussed above and the measures outlined in TGP's ECPs, there would not be a significant impact on vegetation in the Project area.

2.3.1.3 Vegetation Communities of Special Concern or Value

Vegetative communities of special concern include sensitive or protected vegetation types, natural areas, and unique plant communities. TGP's consultations with the PADCNR and the NJDEP identified sensitive and unique communities that would be crossed by the Project. These vegetative communities are listed in tables 2.3.1-4 and 2.3.1-5. No vegetative communities of special concern or value would be impacted at the proposed Port Jervis pipe yard in New York. Impacts on vegetative communities of special concern or value would be avoided or minimized by locating the proposed pipeline within existing utility corridors and by implementing TGP's ECPs.

2.3.2 Wildlife

The Project would cross upland and wetland habitats that support a diversity of wildlife species. Wildlife species are directly dependent on the existing plant communities and are attracted to an area if suitable cover and/or habitat are present.

2.3.2.1 Existing Wildlife Resources

As described in the sections below, the proposed facilities would cross several distinct upland and wetland vegetation cover types. These include upland forest, open land (grass and scrub-shrub), agricultural lands, developed land, and wetlands (forested, scrub-shrub, and emergent). Each of these cover types (i.e., vegetation communities) provides nesting, cover, and foraging habitat for a variety of wildlife species. Table 2.3.2-1 identifies the terrestrial wildlife species common to these habitats. Other resources including open water also provide habitat for wildlife species. Impacts on aquatic resources are described in sections 2.2.2 and 2.2.3.

TABLE 2.3.1-4

Special Vegetative Communities Survey Results in Pennsylvania

	Pipeline Loop				Compressor Station
Vegetative Community – Description	317	319	321	323	323
Broadleaf-Conifer Swamp – Wetland forests dominated by a mixture of conifers and hardwoods. The substrate is usually mineral soil. Eastern hemlock makes up 25 to 75 percent of the canopy.			X		X
Oligotrophic Glacial Kettlehole Bog - Nutrient poor peatlands that form in kettlehole lakes in glaciated areas.			X		X
Northern Appalachian Shale Barren - Found on steep, south-facing, eroding slopes composed of thinly bedded, fissile shales. The most representative examples occur along the Delaware River in Pike County.				X	
Red Spruce Palustrine Woodland - Typically small or may occur as part of a structurally diverse wetland complex. The substrate is usually sphagnum peat. Red spruce (*Picea rubens*) is always present and is often dominant or co-dominant.				X	
Ridgetop Dwarf-Tree Forest - Found on open canopy ridge tops and summits where low soil moisture, shallow soils, high wind, and frequent fires limit tree growth.				X	
Wyalusing Rocks Natural Area - The type of rock and resulting runoff at this site produce a very dry habitat and the state-listed sand cherry (*Prunus pumila var. susquehanae*) has been found. The proposed HDD of the Susquehanna River would avoid this site.	X				
Ackley Pond Natural Area – Consists of a hemlock swamp, kettlehole bog.		X			
Bethel Swamp Natural Area - Older growth mixed hardwood-conifer swamp that exhibits a diverse flora community that offers excellent wildlife habitat and improved flood control.			X		
Pipeline Bog - Oligotrophic kettlehole bog that provides suitable habitat for two listed plant species. The northeastern portion of the core area is a wooded wetland and Project impacts are not be expected to occur in suitable habitat for the two rare species.			X		
Little Teedyuskung Lake - Kettlehole lake community that serves as habitat for one rare plant species.			X		
Deep Brook - Scenic area noted for steep forested slopes, helps maintain water quality to the Delaware River and may contain suitable habitat for a rare plant species. TGP would conduct a rare plant survey for this species in 2011.				X	
Mashipacong Cliffs - Shale-cliff community that provides a scenic overlook of the Delaware River and contains suitable habitat for a state-listed rare species. The Project preferred route has been adjusted to avoid areas of shale-cliff habitat to the extent possible. Rare species surveys for the Mashipacong Cliffs area are planned for 2011.				X	

TABLE 2.3.1-5

Special Vegetative Communities Survey Results in New Jersey

	Pipeline Loop	
Vegetative Community – Description	323	325
Sawmill Pond Swamp Natural Heritage Priority Site - Contains a rare insect, a state-listed (threatened) bird species, and two state-listed rare plant species. Botanical surveys did not identify the state-listed plants. Three plant species protected under the Highlands Water Protection and Planning Act were identified during botanical surveys.	X	
Mashipacong Bogs Natural Heritage Priority Site - Three state-listed (endangered) plant species were previously documented in the vicinity of the Project. Botanical surveys did not identify the state-listed plants.	X	
Ursus Majus Natural Heritage Priority Site – Consists of priority sites for preserving natural diversity, including rare and endangered species and ecological communities. Site was designated for the deciduous wetland habitats along Bear Swamp Lake which contain the only known occurrence of a state critically imperiled plant species. The site is crossed by a proposed paved access road for the Project. No road improvements are anticipated.		X

TABLE 2.3.2-1

Common Wildlife Species Occurring in Major Habitat Types Traversed by the Project

	Uplands			Wetlands			
Common Name	Forested	Open & Agriculture	Developed	Palustrine Forested	Palustrine Scrub-Shrub	Palustrine Emergert	Palustrine Open Water
Reptiles and Amphibians							
American Bullfrog	X	--	--	X	--	X	X
Eastern American Toad	X	X	X	X	--	X	--
Eastern Hognose Snake	--	X	--	--	--	--	--
Eastern Milk Snake	--	--	X	--	--	--	--
Green Frog	X	--	--	X	--	X	X
New Jersey Chorus Frog	X	--	--	X	--	X	--
Northern Black Racer	--	X	--	--	--	--	--
Northern Brown Snake	--	--	X	--	--	--	--
Northern Copperhead	X	--	--	X	--	X	--
Northern Dusky Salamander	X	--	--	X	--	X	--
Northern Gray Tree Frog	X	--	--	X	--	X	--
Northern Red Salamander	X	--	--	X	--	X	--
Northern Spring Peeper	X	--	--	X	X	X	--
Red-spotted Newt	X	--	--	X	--	X	--
Spotted Salamander	X	--	--	X	X	X	--
Spotted Turtle	X	--	--	X	X	X	--
Wood Turtle	X	--	--	X	--	X	--
Mammals							
Beaver	--	--	--	X	--	X	X
Black Bear	X	--	--	X	X	X	X
Bog Lemming	--	X	--	--	--	--	--
Coyote	X	X	X	X	X	--	--
Deer Mouse	X	X	X	--	--	--	--
Eastern Chipmunk	X	X	X	--	--	--	--
Eastern Cottontail	X	X	X	X	X	--	--
Gray Squirrel	X	X	X	--	--	--	--
Little Brown Bat	X	X	X	X	--	--	--
Meadow Vole	--	X	--	--	--	--	--
Mink	--	--	--	X	X	X	--
Muskrat	--	--	--	X	--	X	X
Northern Flying Squirrel	X	--	--	X	--	--	--
Opossum	X	X	X	--	--	--	--
Porcupine	X	--	--	--	--	--	--
Raccoon	X	X	X	X	--	X	--
Red Fox	X	X	X	--	--	--	--
Red Squirrel	X	--	--	--	--	--	--
Striped Skunk	X	X	X	--	--	--	--
White-tailed deer	X	X	X	X	--	--	--
Woodchuck	X	X	X	--	--	--	--
Avian Species							
American Crow	X	X	X	--	--	--	--
American Goldfinch	X	--	X	X	X	--	--
American Kestrel	--	X	X	--	--	--	--

TABLE 2.3.2-1 (cont'd)

Common Wildlife Species Occurring in Major Habitat Types Traversed by the Project

	Uplands			Wetlands			
Common Name	Forested	Open & Agriculture	Developed	Palustrine Forested	Palustrine Scrub-Shrub	Palustrine Emergert	Palustrine Open Water
American Robin	--	X	X	--	--	--	--
American Woodcock	--	X	--	--	X	--	--
Blue Jay	X	X	X	--	--	--	--
Bobolink	--	--	--	--	--	X	--
Brown Thrasher	--	X	--	--	--	--	--
Canada Goose	--	--	--	X	--	X	X
Chipping Sparrow	X	X	X	X	X	--	--
Common Grackle	X	X	X	X	X	X	--
Common Yellowthroat	X	X	--	X	X	X	--
Downy Woodpecker	X	--	--	--	--	--	--
Eastern Screech-Owl	X	--	--	--	--	--	--
European Starling	X	X	X	--	--	--	--
Grasshopper Sparrow	--	--	--	--	--	X	--
Gray Catbird	X	X	X	X	X	--	--
Great Blue Heron	--	--	--	X	--	X	X
Great Horned Owl	X	--	--	--	--	--	--
House Sparrow	X	X	X	--	--	--	--
Indigo Bunting	X	X	--	--	--	--	--
Mallard	--	X	--	X	X	X	X
Ovenbird	X	--	--	--	--	--	--
Red-eyed Vireo	X	--	X	X	--	--	--
Ruffed Grouse	X	--	--	--	--	--	--
Savannah Sparrow	--	--	--	--	--	X	--
Sharp-shinned Hawk	X	X	--	--	--	--	--
Song Sparrow	--	X	X	--	--	--	--
Tufted Titmouse	X	X	X	--	--	--	--
Turkey Vulture	X	X	X	--	--	--	--
Wood Duck	--	--	--	X	X	X	X
Yellow-rumped Warbler	--	X	--	--	--	--	--

Source: Carnegie Museum of Natural History, 2010; New Jersey Department of Environmental Protection, 2011a, 2011b, 2011c, and 2011d; Pennsylvania Fish and Boat Commission, 2011; Pennsylvania Society for Ornithology, 2008; Atlas of Breeding Birds in Pennsylvania, 1992.

Upland Forest

The upland forests in the Project area provide moderate to high quality habitat for a variety of mammals, birds, amphibians, reptiles, and invertebrates. The predominance of oak is an important habitat component in upland forests in the Project area. Some mammals rely directly on oak mast as a food source, while amphibians and invertebrates rely on the soil chemistry of an oak forest. Predatory species, such as raptors, red fox, and timber rattlesnake, are also attracted to oak-dominated forests and their edges due to the abundance and diversity of prey species. The tree and shrub layers provide food and cover for birds and larger mammals, such as white-tailed deer. Detritus on the forest floor provides food and cover for invertebrates, amphibians, reptiles, and smaller mammals, such as woodchuck and eastern chipmunk. Black bears are common in the woodlands crossed by the Project.

Open Land

This cover type category covers all non-forested vegetation not in agricultural production or landscaped. It includes grasslands, successional old fields, shrublands, and maintained utility rights-of-way. Grassland birds rely on open fields for nesting and foraging. Rights-of-way for utility lines maintained in early successional communities provide valuable nesting and foraging habitats for grassland bird species (USDA, 1999). Grasslands and old fields can be utilized as foraging and denning habitat by mammals and also provide nesting and breeding habitat to upland game birds such as pheasants. Shrublands provide sources of food and nesting sites for various birds, as well as cover for invertebrates, reptiles, and amphibians. Open fields and shrub cover provide habitat for small mammal species such as mice, rabbits, voles, and shrews, which make them prime hunting grounds for predator species such as foxes, coyotes, and raptors.

Agricultural Land

Agricultural lands include areas actively in use for raising crops, grazing livestock, or for tree farms. Although row crops generally provide poor to moderate cover habitat, they often provide forage to a number of species. Pastures also provide grazing habitat for species such as white-tailed deer. Hayfields, small grains, fallow and old fields, pastures, and idled croplands provide nesting habitats for grassland-nesting birds (USDA, 1999). On landscapes where intensive row crop agriculture is the dominant land use, these strip habitats are extremely important for grassland birds and other wildlife.

Developed Areas

Developed lands in the Project area consist of land uses classified as industrial/commercial, residential, and road crossings. These types of lands tend to provide minimal habitat for wildlife species. Wildlife diversity is often limited to species that are adapted to human presence and the associated anthropogenic changes to the landscape, such as paved and landscaped areas.

Wetlands

Forested wetlands are dominated by woody vegetation and provide a diverse assemblage of vegetation and an abundance of food and water sources for wildlife. The forested wetland canopy is typically dominated by red maple, which is a highly desirable wildlife browse. Mammals such as mink, muskrat, raccoon, and white-tailed deer use these areas as foraging habitat. Many waterfowl and wading birds use forested wetlands adjacent to emergent wetlands for nesting and foraging. Forested wetland communities are also important habitats for reptiles and amphibians including the American bullfrog, green frog, and various salamander varieties.

Scrub-shrub wetlands supply an abundance of food and cover resources for mammals, reptiles, amphibians, and birds. Wildlife associated with scrub-shrub wetlands includes mink, waterfowl, wood frog, and American woodcock.

Emergent wetlands provide important habitat for waterfowl, muskrats, herons, frogs, and salamanders. Bird species such as bobolink, grasshopper sparrow, and savannah sparrows utilize emergent wetland habitat.

2.3.2.2 General Impacts and Mitigation

Potential impacts on wildlife from the Project include the temporary displacement of wildlife on the right-of-way. It is expected that most wildlife, such as birds and larger mammals, would temporarily relocate to adjacent available habitat as construction activities approach. Construction could result in the mortality of less mobile animals such as small rodents, reptiles, and invertebrates, which may be unable to escape the immediate construction area. Displacement impacts would be minor and short term as wildlife would be expected to return and colonize post-construction habitats.

Project construction would require clearing of vegetation from the right-of-way, temporarily decreasing the amount of wildlife habitat and reducing protective cover and foraging habitat in the immediate Project area. Depending on the season, construction could also disrupt bird courting or nesting, including destruction of nests, eggs, and chicks within the construction work area. However, this would be a short-term impact (except along the permanently maintained pipeline right-of-way) as all habitats would be allowed to reestablish in temporary construction workspace and ATWS, thus remaining available for wildlife habitat and watershed functions.

The impact of forest fragmentation on wildlife in the eastern United States has emerged as an important issue. Fragmentation generally affects birds through dispersal barriers, absence of suitable microhabitats, small population size, and edge effects (Degraaf and Healy, 1990). Migratory birds are among the best-studied groups of wildlife regarding adverse effects from fragmentation. Edge effects can result in interactions between birds that nest in the interior of forests and species that inhabit surrounding landscape, typically lowering the reproductive success of the interior species. Other evidence suggests that certain mammals, amphibians, reptiles, and plants are also adversely affected by forest fragmentation. Species that require large tracts of unbroken forest land may be forced to seek suitable habitat elsewhere. The loss of forest habitat, expansion of existing corridors, and the creation of open early successional and induced edge habitats could decrease the quality of habitat for forest interior wildlife species in a corridor much wider than the actual cleared right-of-way. The distance an edge effect extends into a woodland is variable, but most studies point to at least 300 feet (Rodewald, 2001; Jones, et al., 2000; Ontario Ministry of Natural Resources, 2000; Robbins, 1988; Rosenberg, et al., 1999).

The majority of the proposed pipeline loop routes are collocated with TGP's existing, maintained right-of-way, which would reduce fragmentation effects. During operation, previously forested habitat (including forested wetlands) would not be allowed to reestablish within the permanent right-of-way for the proposed pipeline loops. The principal impact would be a shift from those species favoring forest habitat to those using either edge habitat or areas that are more open. It is not likely that the addition of 25 feet of permanently cleared right-of-way would impede the movement of most forest interior species. The impact of the permanent conversion of forested habitat to non-forested habitat would be minimized by installing the majority of the proposed loops adjacent to TGP's existing right-of-way, which is maintained in an herbaceous state. As previously discussed, the Project would permanently convert about 80 acres of forested land to vegetated open or commercial/industrial land. We believe that the overall impact of permanent forest conversion on wildlife would be minor due to the aforementioned collocation and the large expanse of forested land available in the Project area.

Habitat impacts resulting from modifications or upgrades of existing compressor or meter stations has been significantly minimized by using existing station sites and existing roads for most access to the construction right-of-way and aboveground facilities. Approximately 1.8 acres of wildlife habitat would be permanently converted to commercial/industrial or developed land use by compressor or meter stations modifications.

We received comments regarding the presence of black bear in the Project area and the need to manage bear populations by securing garbage and avoiding illegal bear feeding. In its ECP, TGP has committed to removing construction debris from the right-of-way. Further, it is anticipated that TGP would adopt best management practices during construction, which includes proper securing and disposal of personal and construction-related garbage.

In conclusion, construction and operation of the Project would result in short- and long-term impacts on wildlife and wildlife habitat. These impacts are expected to be minor given the mobile nature of most wildlife in the area, the availability of similar habitat adjacent and near the Project, and the compatible nature of the restored right-of-way with species occurring in the area. These impacts would be minimized by collocating the proposed loops to a large extent with TGP's existing maintained right-of-way and by implementing the restoration methods outlined in TGP's ECPs.

2.3.2.3 Migratory Birds

Migratory birds are species that nest in the United States and Canada during the summer, and make short or long-distance migrations for the non-breeding season. Neotropical migrants migrate to and from the tropical regions of Mexico, Central and South America, and the Caribbean. A variety of migratory bird species, including songbirds, raptors, and waterfowl utilize the habitat found within the Project area.

Migratory birds are protected under the MBTA and Bald and Golden Eagles are additionally protected under the BGEPA. The MBTA, as amended, prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, or nests unless authorized under a FWS permit. Executive Order 13186 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 impacts on migratory birds through enhanced collaboration with the FWS, and emphasizes species of concern, priority habitats, and key risk factors, and states that particular focus should be given to population-level impacts.

Executive Order 13186 directs federal agencies to avoid or minimize adverse impacts on migratory birds and to identify where unintentional take (i.e., unintended harm, death, or harassment) is likely to have a measurable negative effect on migratory bird populations. The greatest potential to impact migratory birds would occur if Project activities such as grading, tree clearing, and construction noise take place during the nesting season. This could result in the destruction of nests and mortality of eggs and young birds that have not yet fledged. Construction would also reduce the amount of habitat available for migratory birds; the temporary loss of approximately 265.4 acres of upland forest and 22.4 acres of wetland forest associated with the pipeline loops (see table 2.3.1-3) would present a long-term impact for migratory birds that depend on forest. Construction noise and activity may also cause migratory birds to temporarily avoid the Project area or abandon nearby nests. Operation of the pipelines and aboveground facilities would permanently convert approximately 77.7 acres of upland forest land and 5.3 acres of wetland forest to an herbaceous state.

The Pennsylvania and New Jersey Field Offices of the FWS recommended that TGP conduct vegetative clearing between September 1 and March 31 in Pennsylvania and between August 1 and

March 14 in New Jersey. TGP has agreed to adopt these vegetation clearing windows during construction. Due to the linear nature of the Project, TGP's commitment to conduct vegetation clearing within the FWS-recommended timeframes, the abundance of contiguous habitat outside of the proposed right-of-way, and implementation of TGP's restoration measures, we conclude that the Project is not likely to result in the need to list any migratory birds under the ESA.

Species included on the FWS Birds of Conservation Concern (BCC) lists may also occur in the Project area (see table 2.3.2-2). Breeding habitat is present in the Project area for 25 of the 29 birds species listed in the table. The black rail does not have potential breeding habitat within the Project area, and the BCC lists indicates that the rusty blackbird, sedge wren, and short-eared owl do not breed in the Project area.

TGP would minimize impacts on BCC-listed species and other bird species by implementing tree clearing restrictions, restoring temporary workspaces, and implementing mitigation measures required by other agencies including the NJDEP and the Highlands Council.

2.3.2.4 Sensitive or Managed Wildlife Habitats and Species

Federal, state, and local agencies were consulted to identify sensitive wildlife habitats and wildlife managed lands that could be affected by the Project.

Loop 323 would cross approximately 8.5 miles of the Clove Brook Road Corridor Important Bird Area (IBA) in Sussex County, New Jersey, with 6.5 miles of the 8.5-mile crossing length being collocated with TGP's existing pipeline right-of-way. This is a 41,623-acre area that includes upland forest, scrub-shrub, grassland, and forested wetland habitats straddling Mill Brook and the northern most section of Clove Brook. The largely intact forests of this site provide valuable breeding habitat for several species of raptors including state-endangered northern goshawks and red-shouldered hawks, state-threatened barred owls, and state-special concern Cooper's hawks. The forest community also includes breeding wood thrush, Eastern wood-pewee, black-and-white warbler, scarlet tanager, yellow-throated vireo, gray catbird, and Baltimore oriole. State-listed early successional species breeding at the Clove Brook Road Corridor IBA include golden-winged warblers, Savannah sparrows, and bobolinks.

As concluded in section 2.3.2.3, TGP would minimize impacts on bird species by implementing tree clearing restrictions, restoring temporary workspaces, and implementing mitigation measures required by other agencies including the NJDEP and the Highlands Council.

TABLE 2.3.2-2

Birds of Conservation Concern Potentially Occurring Within the Project Area

Species	Primary Breeding Habitat, (Secondary Breeding Habitat)	Potentially Effected Habitat Types within Project Right-of-Way
Bachman' sparrow	Open Pine Forest	Open Pine Forest
Bald eagle	Forest (Riparian)	Forest (Riparian)
Bewick's wren	Open Woodlands (Riparian)	Forest (Riparian)
Black rail	Coastal Salt and Brackish Marshes	None
Black-capped chickadee	Forests (Open Woodlands)	Forest (Riparian)
Blue-winged warbler	Abandoned Fields, Swamp/Wetlands	Forest (Riparian)
Brown-headed nuthatch	Mature Pine Stands	Forest (Riparian)
Canada warbler	Mixed Deciduous-Coniferous Woodlands	Forest (Riparian)
Cerulean warbler	Mature Upland Oak Woods (Wooded Hillsides along Streams and Rivers)	Mature Upland Oak Woods (Wooded Hillsides along Streams and Rivers)
Golden-winged warbler	Abandoned Fields with Small Saplings (Forest Edge)	Abandoned Fields with Small Saplings (Forest Edge)
Henslow's sparrow	Ephemeral Grasslands	Ephemeral Grasslands
Kentucky warbler	Deciduous Woods of Floodplains, Swamps, and Ravines	Deciduous Woods of Floodplains, Swamps, and Ravines
Loggerhead shrike	Pasture and Cropland with Scattered Trees and Hedgerows	Pasture and Cropland with Scattered Trees and Hedgerows
Louisiana waterthrush	Wooded Ravines and Mountain Brooks	Wooded Ravines and Mountain Brooks
Northern saw-whet owl	Woodlands with Dense Undergrowth of Conifers or Shrubs	Woodlands with Dense Undergrowth of Conifers or Shrubs
Olive-sided flycatcher	Conifer Forest	Conifer Forest
Peregrine falcon	Cliffs or man-made structures (Riparian)	Cliffs or man-made structures (Riparian)
Prairie warbler	Old Fields/Pastures with Young Trees	Old Fields/Pastures with Young Trees
Red crossbill	Mature Coniferous Forests	Mature Coniferous Forests
Red-headed woodpecker	Open Woodlands with Scattered Trees	Open Woodlands with Scattered Trees
Rusty blackbird	Wet Forest	NB
Sedge wren	Moist Upland Sedge Meadow	NB
Short-eared owl	Field Stubble/Grasslands	NB
Swainson's warbler	Bottomland Forests (Cove Hardwoods with Dense Deciduous Understory)	Bottomland Forests (Cove Hardwoods with Dense Deciduous Understory)
Upland sandpiper	Agricultural Lands (Dry Grasslands)	Agricultural Lands (Dry Grasslands)
Whip-poor-will	Open Woodlands	Open Woodlands
Wood thrush	Moist, Lowland Deciduous Forest	Moist, Lowland Deciduous Forest
Worm-eating warbler	Woodlands with Dense Understory	Woodlands with Dense Understory
Yellow-bellied sapsucker	Northern Hardwood Forests	Northern Hardwood Forests

[a] NB = This species is non-breeding in the bird conservation regions crossed by the Project (Regions 28 and 29).

2.3.3 Threatened and Endangered Species

2.3.3.1 Regulatory Requirements and Species Identification

Federal agencies are required under section 7 of the ESA, as amended, to ensure that any actions authorized, funded, or carried out by the agency would 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. As the lead federal agency authorizing the Project, the FERC is required to consult with the FWS to determine whether federally listed endangered

or threatened species or designated critical habitat are found in the vicinity of the Project, and to evaluate the proposed action's potential effects on those species or critical habitats.

For actions involving major construction activities with the potential to affect listed species or designated critical habitat, the lead federal agency must report its findings to the FWS in a Biological Assessment (BA) for those species that may be affected. If it is determined that the action is likely to adversely affect a listed species, the federal agency must submit a request for formal consultation to comply with section 7 of the ESA. In response, the FWS would issue a Biological Opinion as to whether the federal action would jeopardize the continued existence of a listed species, or result in the destruction or adverse modification of designated critical habitat. NOAA Fisheries stated in a letter dated June 17, 2010 that the Project would not affect any threatened or endangered species under its jurisdiction.

Certain federally listed species under the jurisdiction of the FWS were identified as potentially occurring in the Project area and are discussed below. The development and preservation of the proposed Tomjack Creek, Van Auken Creek, and Wallkill River Mitigation Areas also require review under the ESA. Potential impacts of the Project on state-listed species under the jurisdiction of these agencies are discussed in section 2.3.3.5.

2.3.3.2 Federal Threatened and Endangered Species

TGP, acting as the FERC's non-federal representative for the purpose of complying with section 7(a)(2) of the ESA, initiated informal consultation with the FWS on March 25, 2010 regarding federally listed threatened or endangered species potentially occurring in or near the Project area. The FWS identified four federally listed threatened or endangered species and one other federally protected species under its jurisdiction that are known to occur in the Project area. These species, their protection status, and their potential location in the Project area are summarized in table 2.3.3-1. No federally protected species were identified near the Tomjack Creek and Van Auken Creek Mitigation Sites. Consultation regarding the Wallkill Mitigation Site is currently ongoing and TGP has not yet initiated regulatory consultation regarding the Delaware River Mitigation Site.

TABLE 2.3.3-1

Federally Listed and Protected Species Known or Potentially Occurring Within the Project Area

		Pipeline Loops						Compressor Stations			
Species	Federal Status [a]	317 (PA)	319 (PA)	321 (PA)	323 (PA)	323 (NJ)	325 (NJ)	319 (PA)	321 (PA)	323 (PA)	325 (NJ)
Bald Eagle [b]	N/A				X	X	X				
Bog Turtle	T					X	X				X
Dwarf Wedgemussel	E	X			X	X	X				
Indiana Bat	E	X	X	X	X	X	X	X	X	X	X
Small Whorled Pagonia	T					X					

[a] Status Key
T = Threatened
E = Endangered

[b] The bald eagle is protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

Our informal section 7 consultation with the FWS is ongoing. Thus, to comply with section 7 of the ESA, we are requesting that the FWS consider this EA as our BA for the Project.

Bog Turtle

The federally threatened bog turtle is the smallest native North American freshwater turtle, with average sizes (adult carapace length) ranging from 3.2 to 3.9 inches (Carr, 1952). Bog turtles live in shallow, spring-fed marshes; sphagnum bogs; and swamps, marshy meadows, and pastures with soft, muddy bottoms, slow-flowing water, and open canopies. In northern New Jersey, bog turtle habitats are typically found in glaciated areas of the Allegheny Plateau with limestone geology (Tesauro, 2008) that may be shrubbier than those habitats more typical of the Piedmont region.

The FWS indicated the potential for bog turtles to occur along portions of Loop 323 and near the Montague Pipe Yard in New Jersey. TGP would avoid impacts on wetland habitat at the Montague Pipe Yard and, therefore, Phase I surveys were not required in this area. TGP conducted Phase I surveys for bog turtle habitat along the majority of Loop 323 in April and November 2010 and in March 2011 in accordance with FWS protocols, and TGP identified six wetlands in the proposed construction work area as having potential habitat for bog turtles. Based on consultation with the FWS, Phase II (visual presence/absence) surveys were performed in four of the six wetlands and no bog turtles were found. TGP completed a Phase I survey of the remaining portion of Loop 323 between approximate MPs 7.6 and 9.3 in October 2011. This survey report is pending. We have reviewed TGP's wetland classifications and aerial photography for Loop 323 between MPs 7.6 and 9.3 and believe that the wetlands that would be affected by the Project in this segment are not likely to support bog turtle.

Based on the lack of construction impacts on wetlands at the Montague Pipe Yard, the negative Phase II survey results for wetlands identified as potential bog turtle habitat, and our review of the wetlands that would be impacted between MPs 7.6 and 9.3 of Loop 323, we believe that the Project is *not likely to adversely affect* the bog turtle. However, consultation would not be concluded until the FWS reviews the remaining Phase I and Phase II survey reports and concurs with this determination in writing. Further consultation would be necessary if the remaining survey reports document the presence of bog turtles or bog turtle habitat in the areas addressed in the surveys. Therefore, **we recommend that:**

- **TGP <u>should not begin construction of Loop 323 until:</u>**

    a. TGP files the results of the Phase I bog turtle survey between approximate MPs 7.6 and 9.3 of Loop 323 with the New Jersey Field Office of the FWS and the Secretary;

    b. the FERC staff completes any necessary section 7 consultation with the FWS; and

    c. TGP receives written notification from the Director of OEP that construction and/or use of mitigation (including implementation of conservation measures) may begin.

Indiana Bat

The federally endangered Indiana bat is relatively small, with a wingspan of 9 to 11 inches. Indiana bats hibernate during winter in caves or abandoned mines from October through April. For hibernation, they require cool, humid caves with stable temperatures, under 50 degrees Fahrenheit but above freezing. The hibernacula typically contain large numbers of bats and often have large rooms and vertical or extensive passages.

When active, the Indiana bat roosts in dead trees, dying trees, or live trees with exfoliating bark. During the summer months, most reproductive females occupy roost sites that receive direct sunlight for more than half the day. Roost trees are generally found within canopy gaps in a forest, fence line, or along a wooded edge. Maternity roosts are found in riparian zones, bottomland and floodplain habitats, wooded wetlands, as well as upland communities. Indiana bats forage in semi-open to closed forested habitats, forest edges, and riparian areas (FWS, 2007a).

TGP prepared and implemented Summer Mist Net Survey Study Plans for both Pennsylvania and New Jersey along portions of the Project. TGP conducted mist net surveys along the proposed pipeline loops between July 29 and August 15, 2010; however, the proposed route around the Delaware Water Gap National Recreation Area (DWGNRA) and portions of Loop 321 were not included in these surveys. One Indiana bat was captured along Loop 321 in Pike County, Pennsylvania but escaped before a radio-transmitter could be attached. Follow-up mist net surveys for the proposed route around the DWGNRA and Loop 321 were conducted in June and July 2011. These survey reports are pending.

The New Jersey Field Office of the FWS stated that no seasonal restrictions on tree clearing are required along the proposed pipeline route in New Jersey with the exception of the eastern 2.5 miles of proposed Loop 325 that is within foraging range of a known maternity colony of Indiana bat. The FWS indicated that the waiver of the seasonal restriction on tree clearing is only valid for 2 years from the date of the survey, and that if tree clearing is not completed within that timeframe, additional consultation would be necessary. In the eastern 2.5 miles of proposed Loop 325, the FWS has recommended the following:

- a seasonal restriction on tree clearing greater than 5-inch-diameter breast height from April 1 to September 30;
- minimizing the acreage of tree clearing;
- flagging and preferentially preserving high-quality potential roost trees where possible; and
- TGP provide a plan for minimizing habitat impacts around the known maternity colony.

While TGP has committed to prohibiting vegetation clearing within 2.5 miles of known roosts or capture sites from April 1 to September 30, it has not committed to the additional aspects of the FWS' recommended mitigation measures. Therefore, **we recommend that:**

- **TGP should adopt a seasonal restriction for clearing trees greater than 5-inch-diameter breast height from April 1 to September 30 along the eastern 2.5 miles of Loop 325.**

The New Jersey Field Office of the FWS also requested that TGP submit a plan to offset permanent and temporary loss of Indiana bat habitat as part of on-site reforestation and off-site compensatory mitigation required by other authorities (e.g., NJDEP, Highlands Council) and that the plan include preferential planting of tree species suitable for bat roosts. TGP has submitted proposed forest mitigation plans to the Highlands Council for impacts on forested areas within the Highlands Preservation Area (all of Loop 325) and to the NJDEP for impacts on forested areas within state-owned lands in New Jersey. In these proposed plans, TGP has committed to replant forested areas within all temporary workspace and to acquire and convey land to further mitigate for temporary and permanent impacts on forest resources. The tree planting schedules in these plans include species identified by the FWS as

suitable roost habitat for Indiana bat including silver maple, shagbark hickory, white ash, white oak, and red oak.

TGP's Project design would minimize impacts on forested areas to the extent practicable by collocating the proposed pipeline adjacent to existing rights-of-way. However, survey information is pending for the Project. Therefore, **we recommend that:**

- **TGP <u>should not begin construction of Loops 321, 323, and 325 until</u>:**

  a. TGP files with the Secretary the results of mist net surveys for Indiana bats along the unsurveyed portions of Loops 321 and Loop 323;

  b. TGP files with the New Jersey Field Office of the FWS and the Secretary the final mitigation plans for forest resources in the Highlands Preservation Area and on state-owned lands in New Jersey, that specifies the approximate number of each tree species it would replant that are suitable for Indiana bat roost habitat;

  c. the FERC staff completes any necessary section 7 consultation with the FWS; and

  d. TGP receives written notification from the Director of OEP that construction and/or use of mitigation (including implementation of conservation measures) may begin.

By implementing our recommendation and TGP's commitments identified above, we believe the Project *is not likely to adversely affect* the Indiana bat.

Dwarf Wedgemussel

The federally endangered dwarf wedgemussel is a small freshwater mussel, usually less than 45 millimeters long and 25 millimeters high. The species is typically found in waterbodies of various size and depth on cobble, fine gravel, or on firm silt or sandy bottoms, within submerged aquatic plants, and underneath overhanging tree limbs near stream banks (NatureServe, 2010).

The FWS indicated the dwarf wedgemussel has been known to inhabit the Delaware River near the proposed HDD crossing location of Loop 323 (Riley, 2010). In addition, the PAFBC indicated that this species has known occurrences in the location where Loop 317 and Loop 323 cross the Susquehanna River, Wyalusing Creek, and the Delaware River (Urban, 2010). In New Jersey, there are only a few known occurrences including one along a portion of the upper Delaware River and at location downstream of Big Flat Brook (Popowski, 2010).

TGP conducted surveys for the dwarf wedgemussel in the Susquehanna River, Wyalusing Creek, Delaware River, and Big Flat Brook in August and September 2010. Ringwood Creek was surveyed September 2010 and August 2011. No live or dead specimens of the dwarf wedgemussel were identified during the survey efforts. The New Jersey Field Office of the FWS concurred with TGP's survey results and indicated no additional surveys for the dwarf wedgemussel are necessary in these waterbodies as long as the crossing of the Delaware River can be completed using the HDD crossing method.

The New Jersey Field Office of the FWS requested a habitat assessment and, where suitable habitat is present, presence/absence and distribution surveys at all proposed stream crossings (at least 500

feet upstream and 1,000 feet downstream of crossing) along the alignment in New Jersey. Information filed by TGP indicates that habitat assessments and associated stream assessments have been completed for all streams crossed in New Jersey except for the segment of Loop 323 between MPs 7.6 and 10.5. No dwarf wedgemussels were identified in the assessed streams. TGP stated it would complete the assessment of the remaining 2.9-mile-long segment of Loop 323 in fall 2011. We reviewed the 2.9 miles of Loop 323 that has not been assessed and identified one waterbody that would be crossed by the Project. The intermittent waterbody (MP 9.3) is 7 feet wide and is not likely to support dwarf wedgemussel.

Based on the negative survey results for the Susquehanna River, Wyalusing Creek, Delaware River, Ringwood Creek, and Big Flat Brook, the negative habitat assessments that have been completed to date, and our review of the unassessed streams within New Jersey, we believe the Project *is not likely to adversely affect* the dwarf wedgemussel. However, consultation will not conclude until TGP completes the remaining habitat assessments and the FWS concurs with this determination in writing. Further consultation will be necessary if the remaining habitat assessment documents the presence of potential dwarf wedgemussel habitat at any streams crossed by the Project. Therefore, **we recommend that:**

- **TGP <u>should not begin construction of Loop 323 until</u>:**

  a. TGP files the results of the outstanding habitat assessments for the dwarf wedgemussel to the New Jersey Field Office of the FWS and the Secretary;

  b. the FERC staff completes any necessary section 7 consultation with the FWS; and

  c. TGP receives written notification from the Director of OEP that construction and/or use of mitigation (including implementation of conservation measures) may begin.

Small Whorled Pogonia

The small whorled pogonia is a perennial herbaceous plant species in the orchid family that generally flowers from mid-May into June. This species may occur in a variety of upland, mid-successional wooded habitats, usually mixed deciduous or mixed deciduous-coniferous forests that are in second or third-growth successional stages. Characteristics of this species' preferred habitat include a sparse herb and shrub layer, a relatively open understory canopy, thick leaf litter on the forest floor, and gently sloping ground.

The small whorled pogonia could occur along proposed Loop 323 in Montague Township, Sussex County, New Jersey. The FWS indicates that many areas of New Jersey, including the Project area, have not been thoroughly surveyed for endangered and threatened rare plants and that there could be occurrences of small whorled pogonia within upland woods within the Project area (Popowski, 2010).

TGP surveyed forested habitat along Loop 323 for small whorled pogonia in June 2010. The surveys followed FWS protocols and focused on forested slopes adjacent to small streams and braided channels of vernal streams. TGP reported that no small whorled pogonia were found, although the survey report has not been provided to the FWS. In addition, the FWS requested on July 7, 2011 that TGP assess Loop 323 TGP Alternative B for small whorled pogonia; TGP would conduct these surveys between mid-May and early June 2012. Therefore, **we recommend that:**

- **TGP <u>should not begin construction of Loop 323 until</u>:**

a. TGP files the results of all outstanding small whorled pogonia surveys to the New Jersey Field Office of the FWS and the Secretary. If small whorled pogonia are identified in any of the proposed construction work spaces, TGP should consult with the FWS for measures that avoid impacts on this species;

b. the FERC staff completes any necessary section 7 consultation with the FWS; and

c. TGP receives written notification from the Director of OEP that construction and/or use of mitigation (including implementation of conservation measures) may begin.

By implementing our recommendation above, we believe the Project *is not likely to adversely affect* the small whorled pogonia.

2.3.3.3 Federally Petitioned Species

Although candidate and petitioned species do not receive federal protection through the ESA, the FWS specifically requested that the FERC consider the potential effects on four petitioned species so that section 7 consultations could be facilitated in the event one or more of these species become listed before or during Project construction. These species include the Eastern small-footed bat, Northern long-eared bat, golden-winged warbler, and the American eel.

The Pennsylvania Game Commission (PAGC) requested TGP conduct surveys for the Eastern small-footed bat along a 2.8-mile portion of Loop 321 in Wayne and Pike Counties, Pennsylvania. TGP conducted mist net surveys in August 2010 as part of Indiana bat regulatory compliance (see section 2.3.3.2). One Eastern small-footed bat was captured at approximate MP 0.5 on Loop 317. No suitable habitat was located near this capture site within the Project workspace; however, natural rock outcrops and cliffs were present in several locations to the south of Loop 317 along the Susquehanna River. TGP documented moderate to low value roosting habitat along the 2.8-mile portion of Loop 321. Four Eastern small-footed bats were captured in New Jersey. Mist net surveys conducted in August 2010 captured 35 and 8 Northern long-eared bats in Pennsylvania and New Jersey, respectively. No bat hibernacula were identified near the Project area. TGP has committed to clearing vegetation between September 1 and March 31 in Pennsylvania and August 1 and March 14 in New Jersey to avoid impacts on Northern long-eared bats that may roost in the Project area.

The golden-winged warbler is a migratory bird that overwinters in southern Central America and the northern Andes and breeds in the Eastern United States during the summer. During the summer, the golden-winged warbler prefers deciduous woodlands with low cover, hillside scrub, overgrown pasture, and abandoned farmland, power line rights-of-way, logged sites, bogs, and forest openings. TGP's existing right-of-way would be considered habitat for the warbler. TGP proposes to clear vegetation between September 1 and March 31 in Pennsylvania and August 1 and March 14 in New Jersey, which would minimize impacts on nesting warblers during construction. The maintenance of the pipeline right-of-way may create preferred habitat for the warbler.

The American eel is known to inhabit the Susquehanna and Delaware Rivers. TGP proposes to cross the Susquehanna and Delaware using the HDD crossing method and, therefore, impacts on the eel are not anticipated.

2.3.3.4 Bald and Golden Eagle Protection Act

Bald Eagle

The bald eagle is a large bird of prey whose range covers virtually all of North America. Optimal habitats for the bald eagle include areas near waterbodies, such as lakes, rivers, and forested wetlands. Bald eagles typically prefer large trees for roosting and nesting. Bald eagles can be sensitive to human activity and disturbance and may abandon otherwise suitable habitat if disturbance is consistent (Fraser et al., 1985).

Although no longer federally listed under the ESA, the bald eagle is protected under the BGEPA and the MBTA. The BGEPA and MBTA prohibit killing, selling, or harming eagles or their nests, and the BGEPA also protect eagles from disturbances that may injure them, decrease productivity, or cause nest abandonment.

As of February 2011, two bald eagle nests have been identified by TGP's field surveys in the Project area. One nest is approximately 350 feet to the southwest of Loop 323 in Pennsylvania near the Delaware River. The second nest location is approximately 2,450 feet to the south-southwest of Loop 323 in Pennsylvania near the Delaware River. TGP anticipates continuation of the ongoing field surveys for bald eagle nest locations prior to construction. TGP has committed to continue to work with the Pennsylvania and New Jersey Field Offices of the FWS, PAGC, NJDEP Land Use Regulation Program, and Endangered and Non-game Species Program, as well as the New York State Department of Environmental Conservation (NYSDEC) to determine whether potential adverse effects on bald eagle populations and habitat may result from the Project. To minimize direct impacts on the bald eagle, TGP would limit construction activities and other disturbances within buffers specified under the National Bald Eagle Management Guidelines (FWS, 2007b). Additionally, TGP would restrict seasonal tree clearing from March 15 to July 31.

2.3.3.5 State Threatened and Endangered Species

Pennsylvania, New Jersey, and New York have regulatory requirements for state-listed species. In Pennsylvania, three agencies are responsible for protecting threatened and endangered species: 1) the PAGC has jurisdiction over state-listed birds and mammals; 2) the PAFBC monitors state-listed fish, reptiles, amphibians, and aquatic organisms; and 3) the PADCNR has jurisdiction over state-listed plants, natural communities, terrestrial invertebrates, and geological features. In New Jersey, the New Jersey Natural Heritage Program (NJNHP), the Endangered and Nongame Species Program, and the Division of Land Use Regulation are responsible for administering the state endangered species laws. In New York, rare species are protected under the New York Endangered Species Act (N.Y.ECL § 11-0535 amended 1979, 1981), which is administered by the NYSDEC.

Pennsylvania

The PAFBC, PADCNR, and PAGC have identified 19 state-listed threatened, endangered, rare, or candidate species that may occur in the Project area in Pennsylvania (Bowen, 2010; Urban, 2010, 2011; Rohrbaugh, 2010; Havens, 2010, 2011). These include 1 reptile, 1 mammal, 1 bird, 5 mussels, and 11 plants. Of these, one is also a federally listed species (dwarf wedgemussel), which is discussed in section 2.3.3.2. An additional eight plants are proposed for listing in Pennsylvania.

TGP has conducted targeted state-listed rare plant surveys in identified suitable habitat along the Project alignment in Pennsylvania. To date, no state-listed plants have been identified during botanical surveys. TGP proposes to conduct additional surveys in summer 2011 at additional areas that exhibit

habitat suitable for state-listed plants. TGP would attempt to avoid direct impacts on state-protected plant species through reduction of workspace to avoid individuals or by route deviations to avoid populations. In areas where direct impacts are unavoidable, TGP would mitigate impacts by preserving seed banks and rootstocks through segregation and restoration of topsoil within the workspace. Where necessary, TGP would transplant individuals to locations outside the construction workspace or permanent right-of-way. TGP would also implement its ISMPs to prevent colonization of proposed workspaces and permanent right-of-way with invasive species.

TGP conducted Phase II presence/absence gestation surveys for timber rattlesnakes during the appropriate survey window between June 1 and September 15, 2010. Timber rattlesnakes were documented along portions of Loop 321 in Wayne and Pike Counties; however, all gestating snakes were found outside of the proposed workspace. TGP stated it would conduct Phase II denning surveys in identified potential habitat during the appropriate survey window between April 15 and May 31, 2011. Results of the Phase II surveys have not been completed. TGP would avoid direct impacts on known timber rattlesnake dens through workspace reductions or route deviations. TGP would employ snake monitors to conduct daily sweeps to remove any snakes from Project workspaces, and would restore known gestation habitat during right-of-way restoration.

Surveys for state-listed mussels were conducted in Wyalusing Creek, the Susquehanna River, and the Delaware River. Two state-listed species, the yellow lampmussel and green floater, were identified in the Susquehanna River. TGP proposes to cross the Susquehanna River using an HDD and, therefore, impacts on mussels are not anticipated. In the event of a frac-out, TGP would implement measures detailed in its frac-out contingency plan to minimize impact on aquatic resources, including mussels. TGP would also require strict adherence to erosion and sediment control practices to prevent sedimentation to waterbodies. In case of HDD failure resulting in the use of an open-cut installation method, TGP would relocate individuals upstream of the construction area.

New Jersey

The NJNHP has identified 46 threatened, endangered, and special concern species under its jurisdiction that may occur in the Project area (Lord, 2010a, 2010b). These included 22 birds, 1 mammal, 2 amphibians, 6 reptiles, 1 mussel, 10 plants, and 4 insects. Of these, one is also a federally listed species (bog turtle), which is discussed in section 2.3.3.2.

TGP completed targeted state-listed rare plant survey for the Project facilities in New Jersey in June and October 2010, and further surveys are scheduled for 2011. No state-listed plant species were identified in New Jersey during the 2010 surveys. Three species of hawthorn: dotted hawthorn (*C. punctata*), Pennsylvania hawthorn (*C. pennsylvanica*), and Dodge's hawthorn (*C. dodgei*), are taxa protected by the Highlands Water Protection and Planning Act (New Jersey Statutes 13:20-1, *et seq.*) and within the jurisdiction of the Highlands Preservation Area (NJDEP, 2010a). These species were identified along the north side of the Project Loop 323 alignment within the Sawmill Pond Swamp NJNHP site in Montague Township. TGP would continue to coordinate with the NJDEP pertaining to these hawthorn species. TGP would attempt to avoid direct impacts on state-protected plant species through reduction of workspace to avoid individuals or by route deviations to avoid populations. In areas where direct impacts are unavoidable, TGP would mitigate impacts by preserving seed banks and rootstocks through segregation and restoration of topsoil within the workspace. Where necessary, TGP would transplant individuals to locations outside the construction workspace or permanent right-of-way. TGP would also implement its ISMPs to prevent colonization of proposed workspaces and permanent right-of-way with invasive species.

TGP conducted gestation presence/absence surveys for timber rattlesnakes and the northern copperhead at five potential habitat locations in New Jersey in August 2010. The surveys identified individual snakes and/or dens in the Project area. One rattlesnake shed skin was observed in proximity to the metering station at the eastern terminus of Loop 325; however, no gestating rattlesnakes were documented within the survey area. TGP conducted den presence/absence surveys in accordance with the *Pre-permitting Timber Rattlesnake (Excluding the Pinelands) and Northern Copperhead Survey Protocols* (v. 01/13/11) in suitable habitats. No northern copperheads were identified during the survey. Four timber rattlesnakes were observed near the Mahwah Meter Station on two separate survey dates; however, the den could not be identified. TGP is currently conducting efforts to identify the location of the den. TGP would attempt to avoid direct impacts on known timber rattlesnake and northern copperhead den and gestation habitat through workspace reductions or route deviations. Currently, the only area of concern for direct habitat impact is the Mahwah Meter Station. Within specified distances from known timber rattlesnake and northern copperhead locations, TGP would exclude individuals from the workspace through the use of snake exclusion fencing along the workspace limit of disturbance. TGP would also employ snake monitors to conduct daily sweeps to remove any snakes from Project workspaces, and would restore gestation habitat during right-of-way restoration.

TGP conducted presence/absence mussel surveys of the Delaware River and Big Flat Brook in Sussex County and the Ringwood Creek in Passaic County. No brook floaters were observed during the surveys. Qualitative surveys of the Delaware River revealed live individuals of the creeper. TGP proposes to cross the Delaware River using the HDD crossing method and, therefore, impacts on mussels are not anticipated. In the event of a frac-out, TGP would implement measures detailed in its frac-out contingency plan to minimize impacts on aquatic resources, including mussels. One weathered, dead triangle floater shell was observed in the Ringwood Creek. TGP would also require strict adherence to erosion and sediment control practices to prevent sedimentation to waterbodies. TGP stated it would conduct field assessments of all identified streams crossed by Loops 323 and Loop 325 in New Jersey, and evaluate the potential for native unionids. Results of the habitat assessment are pending.

In February 2011, the NJDEP provided correspondence regarding specific survey needs and considerations for other state listed wildlife species. TGP completed presence/absence in early-March and late-May 2011 for barred owl and red-shouldered hawk, including walkthrough surveys to identify potential nesting trees within the Project workspaces, as well as presence/absence playback surveys based on the New Jersey Woodland Raptor Survey Protocol. No suitable nest cavities were found for the barred owl. Red-shouldered hawks were identified at 3 of the 28 survey sites. Barred owls were identified at 15 of 28 survey sites. None of the identified raptors appeared to be nesting near the Project. TGP would conduct vegetative clearing between September 1 and March 31 in Pennsylvania and between August 1 and March 14 in New Jersey to minimize impacts on migratory birds and raptors. TGP would also restrict seasonal tree clearing from March 15 to July 31.

TGP conducted over-wintering habitat assessments at each stream crossing to determine the potential for overwintering of wood turtles in streams to be crossed by the Project. Additionally, TGP conducted vernal pool surveys in April 2011 to identify vernal habitat and survey for blue-spotted salamanders. Results of the surveys are pending; however, to protect vernal pool habitat areas, TGP would implement the wetland restoration procedures detailed in its ECPs, including replacement of topsoil, installation of trench plugs, and strict restoration of all pre-construction grades and contours to maintain surface and groundwater hydrology to support seasonal pooling of surface water.

New York

The New York Natural Heritage Program identified the bald eagle and two forest communities as being within the vicinity of the Port Jervis Pipe Yard. Additionally, two plants (lowland yellow

loosestrife and scarlet Indian-paintbrush) and one dragonfly (extra-striped snaketail) with historical occurrences in the vicinity of the pipe yard were identified (Salerno, 2010).

According to the NYSDEC, the two forest communities are not regulated by the NYSDEC, and the historical records of the dragonfly and plants in the vicinity of the pipe yard do not require habitat surveys (Masi, 2011). TGP stated it would conduct surveys within the proposed pipe yard boundaries for the two rare plant species. Results of the surveys are pending; however, TGP would attempt to avoid direct impacts on state-protected plant species through reduction of workspace to avoid individuals. In areas where direct impacts are unavoidable, TGP would mitigate impacts by preserving seed banks and rootstocks through segregation and restoration of topsoil within the workspace. Where necessary, TGP would transplant individuals to locations outside the construction workspace or permanent right-of-way. TGP would also implement its ISMPs to prevent colonization of proposed workspaces and permanent right-of-way with invasive species.

Wetland Mitigation Sites

TGP has reviewed the Pennsylvania Natural Diversity Inventory (PNDI) system administered by the Pennsylvania Natural Heritage Program for the wetland mitigation sites discussed in section 2.2.4.2. The PNDI receipt indicated that no known impacts on threatened or endangered species and/or special concern species or habitats are anticipated within or adjacent to the Tomjack Creek and Van Auken sites.

The Delaware River Mitigation Site and the Wallkill River Mitigation Site would both be located in Sussex County, New Jersey. Threatened or endangered species and/or special concern species or habitat review and consultations have not yet been provided by TGP for these sites.

General Impacts and Mitigation

In general, impacts on state-listed species would typically be similar to those described for other plant and animal species in sections 2.3.1.2 and 2.3.2.1. TGP continues to consult appropriate state agencies to develop and implement appropriate avoidance and mitigation measures including timing restrictions, as necessary, to avoid adverse impacts on any rare plants and wildlife identified within the Project area. Given that there are surveys for state-listed species that are not yet completed, **we recommend that:**

- **Prior to construction, TGP should file the results of any outstanding surveys for Pennsylvania and New Jersey state-listed species and identify any additional mitigation measures developed in consultation with the applicable state agencies.**

2.4 LAND USE, RECREATION, SPECIAL INTEREST AREAS, AND VISUAL RESOURCES

2.4.1 Land Use

2.4.1.1 Pipeline Facilities

Land use impacts associated with the proposed loops would include the disturbance of existing land uses during construction and retention of an expanded permanent right-of-way during operation of the facilities. TGP proposes to generally use a 100-foot-wide construction right-of-way in upland areas and a 75-foot-wide construction right-of-way in wetlands. The proposed loops would be offset from the existing TGP 300 pipeline by 25 feet for 33.8 of 40.3 miles, or 84 percent of their lengths. TGP would utilize this previously disturbed 25-foot-wide offset area within the construction rights-of-way for the

proposed loops, thus reducing construction-related impacts. TGP would also utilize ATWS during construction at locations such as road and wetland crossings.

The permanent right-of-way would typically be 50 feet wide, consisting of 25 feet of existing right-of-way already retained for operation of the 300 Line and 25 feet of new right-of-way for the loop. The land retained as permanent right-of-way would generally be allowed to revert to former use; however, certain activities such as the construction of aboveground structures would be prohibited. To facilitate pipeline inspection, operation, and maintenance, the entire permanent right-of-way in upland areas would be cleared of woody vegetation and maintained in an herbaceous/scrub-shrub vegetated state. This maintained right-of-way would be mowed no more than once every 3 years. Additionally, to facilitate route patrols and emergency access, a 10-foot-wide strip centered over the pipeline would be mowed annually. In wetland areas, no trees greater than 15 feet high would be allowed within the permanent right-of-way. Drawings depicting the construction and permanent right-of-way configurations for the proposed loops are included in TGP's ECP.

Table 2.4.1-1 summarizes the acres of each land use type that would be affected by construction and operation of the proposed loops. Construction of the pipeline facilities including ATWS would temporarily affect about 496.9 acres of land, of which about 119.4 acres would be retained as new permanent right-of-way. The remaining 377.5 acres used for temporary construction right-of-way and ATWS would be allowed to revert to prior uses following construction.

Roadways and Railroads

The proposed loops would cross nearly 40 roadways, ranging from maintained gravel roads to state or interstate highways. These roadways would be crossed using conventional road bore, open-cut, or HDD crossing methods as described in sections 1.7.1.2 and 2.2.2.3. HDD and bore crossing methods allow the roadway to remain in service while the installation process takes place, resulting in little or no disruption to traffic. In the event of an open-cut crossing, impacts on roadways would include short-term traffic congestion and disruption. To minimize these impacts, TGP would ensure that the passage of fire and emergency vehicles is not prevented by creating temporary travel lanes or placing steel plate bridges to allow continued traffic flow during open trenching. When necessary, TGP would employ a police detail to ensure traffic flow and safety of pedestrians and vehicles. Additionally, residential access would be maintained except for the temporary periods essential for pipeline installation. Following construction, roadways would be restored to preconstruction conditions.

Proposed Loop 317 would also cross one railroad, the Lehigh Railway, at MP 0.4. The railroad crossing is between the entry/exit points of the Susquehanna River HDD and, therefore, there would be no disruption to railroad traffic, and operation of the pipeline facilities would not affect the existing railroad right-of-way.

TABLE 2.4.1-1

Land Affected by Construction and Operation of the Pipeline Facilities

State/Facility	Roadways/ Railroads[a]		Forest Land[b]		Open Land[c]		Agricultural[d]		Commercial/ Industrial[e]		Residential[f]		Wetlands[g]		Waterbodies[h]		Other[i]		Total	
	Con[j]	Op[k]	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op	Con	Op
Pennsylvania																				
Loop 317	0.6	0.2	25.2	7.1	13.1	1.9	23.1	4.3	0.2	0.1	0.0	0.0	5.3	0.4	1.4	0.4	0.0	0.0	69.0	14.2
Loop 319	0.7	0.1	2.2	0.5	5.2	1.3	19.6	3.1	2.0	0.2	0.0	0.0	2.8	0.1	0.0	0.0	0.1	0.0	32.4	5.2
Loop 321	0.5	0.1	53.6	14.3	21.8	3.9	4.8	1.1	0.5	0.2	0.6	0.2	15.7	1.9	0.4	0.0	0.1	0.0	97.9	21.8
Loop 323	0.4	0.3	60.5	24.2	10.4	2.8	0.1	0.0	0.4	0.2	0.8	0.5	2.0	0.2	0.8	0.4	0.0	0.0	75.4	28.5
Pennsylvania Subtotal	2.1	0.7	141.5	46.0	50.5	9.8	47.5	8.5	3.1	0.6	1.4	0.7	25.8	2.6	2.6	0.8	0.2	0.0	274.7	69.8
New Jersey																				
Loop 323	1.2	0.4	70.0	21.9	20.9	2.5	16.5	4.9	0.9	0.2	2.5	0.7	11.5	1.5	3.1	1.2	4.0	1.6	131.5	34.9
Loop 325	0.7	0.1	53.9	9.8	20.0	3.0	0.0	0.0	0.5	0.1	0.5	0.2	11.8	1.4	0.4	0.1	3.0	0.1	90.8	14.8
New Jersey Subtotal	1.9	0.5	123.2	31.7	41.9	5.6	16.5	4.9	1.4	0.3	3.0	1.0	23.3	2.9	3.5	1.3	7.0	1.7	222.3	49.7
Project Total	**4.1**	**1.2**	**265.4**	**77.7**	**92.4**	**15.4**	**64.0**	**13.4**	**4.5**	**0.8**	**4.3**	**1.7**	**49.1**	**5.4**	**6.1**	**2.1**	**7.2**	**1.7**	**496.9**	**119.4**

[a] Roadways/railroads include federal, state, and local roadway crossings and one active railroad line.

[b] Forest land includes upland forest areas. Acres of forest land affected based on the actual amount of forest clearing required; cleared portions of existing right-of-way are included in the open land category.

[c] Open land includes scrub-shrub and herbaceous upland areas maintained for utility rights-of-way (e.g., pipeline, electric transmission) and pasture.

[d] Agricultural land includes cultivated lands and active hayfields.

[e] Commercial/industrial land includes electric power or gas utility stations, manufacturing or industrial plants, landfills, mines, quarries, and commercial or retail facilities.

[f] Residential land includes areas where residential areas are crossed or where homes exist within close proximity, and consists of lawns, driveways, and landscaped areas.

[g] Wetlands include forested and non-forested wetland crossings, as identified in section 2.2.4.

[h] Waterbodies includes waterbody crossings for which both banks were delineated during field investigations (i.e., those greater than about 6 feet wide), as identified in section 2.2.2.

[i] Other land includes special use area (e.g., school land, municipal and state-owned land) crossings.

[j] Assumes a 100-foot-wide construction right-of-way, which includes 25 feet of existing permanent right-of-way, 25 feet of new permanent right-of-way, and 50 feet of temporary construction workspace. Includes additional temporary workspace area requirements.

[k] Assumes a 25-foot-wide area at most locations where structures would be precluded from being installed within the new permanent, operational right-of-way.

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

Forest Land

The proposed loops would cross about 17.6 miles of forest land. Pipeline construction would impact approximately 265.4 acres of forest land, of which about 77.7 acres would be affected during pipeline operation.

Construction of the pipeline loops in forested areas would require the removal of trees to prepare the construction work areas. However, TGP would minimize forest land impacts by locating the proposed facilities within existing rights-of-way and open land wherever possible. Although trees cleared within temporary construction work areas would be allowed to regenerate to preconstruction conditions following construction, impacts on forest resources within these areas would be long term (3 to 10 years) (see section 2.3.1.2).

Following construction, permanent impacts would occur over the maintained portion of the right-of-way. A 10-foot-wide area centered over the pipeline would be maintained treeless on an annual basis. In addition, the clearing of TGP's permanent easement every 3 years would prevent forest overstory vegetation from attaining a mature size and, thus, would permanently alter the nature of the affected forest land.

Conservation Reserve Enhancement Program

The Conservation Reserve Enhancement Program (CREP) is a voluntary program available to landowners in 59 Pennsylvania counties within the Chesapeake Bay and Ohio River watersheds. Loop 319 would cross land enrolled in the CREP between approximate MPs 0.2 and 0.4, temporarily affecting about 4.7 acres of land during construction. In June 2011, TGP had a registered forester confirm that the area consists of red oak and hardwood trees approximately 3 years old. To mitigate for tree loss at this location, TGP would monitor tree and grass removal during construction to ensure that trees are replanted. Because the Project would result in a temporary impact, no reimbursement would be necessary in accordance with CREP. However, if some unanticipated event occurs that prevents TGP from replanting, it would reimburse the landowner and USDA as appropriate. In addition, TGP would include the long-term loss of production as part of its right-of-way negotiations with the landowner.

Open Land

The proposed loops would cross about 10.7 miles of open land. Pipeline construction would impact approximately 92.4 acres of open land, of which about 15.4 acres would be affected during pipeline operation.

The majority of the open land that would be impacted by the loops is associated with either TGP's existing right-of-way or other utility rights-of-way currently maintained as open land. Construction-related impacts on open land would include the removal of vegetation and disturbance of the soils. These impacts would be temporary and short term and would be minimized by implementation of TGP's ECP. Following construction, most open land uses would be able to continue.

Agricultural Land

The proposed loops would cross about 4.0 miles of agricultural land. Pipeline construction would impact approximately 64.0 acres of agricultural land, of which about 13.4 acres would be affected during pipeline operation.

Agricultural lands impacted by the Project are primarily used for raising crops or grazing livestock. Corn and hay are the most common commodities grown in farmed areas. No organic farms would be crossed by the pipeline loops.

Construction on annually cultivated agricultural land would be conducted as described in section 1.7.1.1. The effects of construction on agricultural land are expected to be minor and short term. Short-term impacts on agricultural areas would include the loss of standing or row crops within the construction work area and the disruption of farming operations for the growing season during the year of construction. To reduce these impacts, TGP would adhere to the measures outlined in its ECP. These measures include testing the topsoil and subsoil for compaction at regular intervals in areas disturbed by construction activities and strictly controlling equipment traffic on agricultural land to minimize compaction and rutting. To preserve soil fertility in agricultural land, the entire topsoil layer (to a maximum depth of 12 inches) would be stripped from either the pipeline trench and subsoil storage area or the full construction right-of-way, as stipulated in landowner agreements, and stored separately from the subsoil for replacement after backfilling the trench.

No known drain tiles or irrigation systems would be crossed by the pipeline loops. However, if any drain tiles or irrigation systems are damaged by construction activities, TGP would be responsible for ensuring these areas are repaired or replaced as discussed in its ECP. In the event a drain tile is cut during construction activities, TGP would immediately mark and maintain a written record of the location. A work crew immediately following the pipeline trench crew would complete a temporary repair. All drain tiles would be permanently repaired before the pipeline trench is backfilled and within 14 days of construction completion, weather and soil conditions permitting. TGP would employ specialists to verify that the repairs made have been successful.

Active horse pasture land crossed by the pipeline loops would be protected by installing temporary fencing, diverting livestock to cross the construction corridor at alternative locations, and/or alternating feeding arrangements, as negotiated with the landowner by TGP.

Following construction, TGP would implement the restoration practices outlined in its ECP and uses would continue as before construction. TGP would monitor crops during the first and second growing seasons after seeding to determine if additional restoration is needed and would consult an experienced agronomist to determine the need for additional restoration measures.

New Jersey Farmland Preservation Properties

Loop 323 in New Jersey would cross three Farmland Preservation properties between approximate MPs 6.9 and 7.3, MPs 15.1 and 15.5, and MPs 15.6 and 15.9. The Farmland Preservation Program is administered by the State Agriculture Development Committee, and consists of land that meets the Committee's minimum eligibility criteria, qualifies for farmland tax assessment, and is part of an agricultural development area (i.e., farming is viable over the long term). Landowners who sell their development easements to the Farmland Preservation Program still own their land, but must develop the land for agriculture use. Such deed restrictions remain in force for any future landowners and ensure that the land is forever protected for agricultural use.

There is no mechanism for diverting lands from New Jersey’s Farmland Preservation Program. Therefore, TGP would negotiate with each landowner for a right-of-way across his/her lands. If an agreement cannot be reached, TGP would need to initiate condemnation proceedings at the appropriate time in order to secure the right-of-way and remove the program restrictions.

Commercial/Industrial Land

The proposed loops would cross about 0.3 mile of commercial/industrial land. Pipeline construction would impact approximately 4.5 acres of commercial/industrial land, of which about 0.8 acre would be affected by pipeline operation.

Commercial/industrial lands affected by the Project primarily consist of areas devoid of undisturbed vegetation. Commercial/industrial land uses could be temporarily impacted during pipeline construction by increased dust from exposed soils, construction noise, and traffic congestion. TGP would minimize impacts on commercial/industrial land uses by avoiding scheduling construction during peak use periods, coordinating driveway crossings with business owners to provide access across the construction right-of-way, and expediting construction through these areas. Road surfaces would be restored as soon as practicable so that normal access can resume, and commercial/industrial land uses would be restored to preconstruction conditions, or as specified in landowner agreements.

Residential Land

The proposed loops would cross about 0.5 mile of residential land. Pipeline construction would impact approximately 4.3 acres of residential land, of which about 1.7 acres would be affected during pipeline operation.

The location of existing residences and structures within 50 feet of the construction work area and the impacts on and mitigation proposed for these residences and structures are discussed in section 2.4.2.1.

Wetlands

The proposed loops would cross about 5.5 miles of forested and non-forested wetlands. Pipeline construction would impact approximately 49.1 acres of wetlands, of which approximately 5.4 acres would be affected during pipeline operation.

The temporary impacts related to construction would be minimized by reducing the construction corridor to 75 feet in wetland areas. Standard pipeline construction techniques would be used in wetlands that exhibit non-saturated soils, conventional wetland construction techniques would be used in wetland areas with saturated soils, and the push-pull construction technique would be used in wetlands areas with inundated or saturated soils (i.e., areas of open water present within the wetland). These construction techniques are discussed in further detail in section 2.2.4.2.

Most wetlands would continue to function as before construction, although trees would not be allowed to grow within 15 feet of the pipeline centerline.

Other

The Project would cross about 0.4 mile of "other" lands, which are associated with special use areas (e.g., schools, parks, places of worship, recreation areas). Pipeline construction would impact approximately 7.2 acres of special use areas, of which about 1.7 acre would be affected by pipeline operation.

Construction-related impacts on special use land would include the removal of vegetation and disturbance of the soils. Indirect impacts on special use land areas could include construction equipment noise and dust resulting from soil disturbance. These impacts would be temporary and short term and

would be minimized by implementation of TGP's ECP. Following construction, the activities on most special use lands would be able to continue. However, some activities, such as the building of new structures, would be prohibited on the permanent right-of-way. Section 2.4.3 addresses specific interest areas affected by the Project.

Waterbodies

The proposed loops would cross 128 surface waters, affecting about 6.1 acres of open water during construction. All of the waterbody construction techniques are described in detail in section 2.2.2.3 of this EA and in section 5.13 of TGP's ECP. Sensitive waterbodies are discussed in section 2.2.2.1.

Operation of the pipeline facilities would not impact waterbodies and use would continue as before construction.

2.4.1.2 Aboveground Facilities

Compressor Stations

Approximately 42.0 acres of land would be required for modifications to existing Compressor Stations 319 (5.6 acres), 321 (20.4 acres), 323 (8.9 acres), and 325 (7.1 acres). Construction at the existing compressor stations would occur within the previously disturbed, graded, or graveled areas within the existing fenceline of the facilities. Land use that would be affected by the modifications is primarily existing commercial/industrial land, although some agricultural, open, and roadway land uses within the existing facilities' fencelines would be temporarily affected.

No additional land would be required or disturbed during the modification or operation of the compressor stations, thus, they are not discussed further in this section.

Meter Stations

Approximately 0.2 acre of commercial/industrial land would be affected by equipment removal activities at the existing Mahwah Meter Station. An additional 2.0 acres of land would be required to install the new Mahwah Meter Station in Bergen County, New Jersey. The new Mahwah Meter Station would be located immediately adjacent to the existing meter station and would affect forest (0.2 acre), open (1.6 acre), and commercial/industrial (0.2 acre) land. Operation of the new Mahwah Meter Station would result in permanently affecting 1.1 acre of land, consisting of 0.2 acre of forest land, 0.7 acre of open land, and 0.2 acre of commercial/industrial land. Construction and operation impacts at the Mahwah Meter Station include a new facility perimeter road.

Pig Launchers and Receivers and Mainline Valves

Pig launchers and receivers and MLVs would be installed at various locations along the pipeline loops (see table 1.5.2-2). The pig launchers and receivers would be installed at tie-in points with TGP's existing 24-inch-diameter 300 Line pipeline and within TGP's existing compressor or meter station sites. MLVs would be installed within the existing compressor station sites; along the pipeline loops and within TGP's new permanent right-of-way adjacent to existing MLVs associated with the operational 300 Line; or along the pipeline loops and at new locations within TGP's new permanent right-of-way. For these reasons, land use impacts for installation and operation of the proposed pig launchers and receivers and MLVs have not been separated from the land use impacts associated with modifications of these facilities or construction and operation of the proposed pipeline loops. However, operation of facilities at new

locations would result in a permanent land use conversion to commercial/industrial. Visual impacts associated with the operation of these facilities are discussed separately in section 2.4.6.2.

2.4.1.3 Contractor/Pipe Yards

TGP proposes to use 12 contractor/pipe yards on a temporary basis to support construction activities (see table 2.4.1-2). These yards would temporarily affect about 216.1 acres of land, consisting of approximately 51.8 acres of commercial/industrial land and 164.3 acres of mixed agricultural, open, and forest lands. Upon completion of construction, the yards would be restored in accordance with TGP's ECP and prior use of the sites would continue.

TABLE 2.4.1-2

Land Use Impacts Associated with Contractor/Pipe Yards

State/Facility	County	Facility Name	Existing Land Use	Temporary Impacts (acres)
Pennsylvania				
Loop 317	Bradford	Towanda Pipeyard and Railsiding	Agriculture	18.3
		Wysox Pipeyard	Commercial/Industrial	11.0
		Hwy 6 Pipeyard	Agriculture	6.4
		Sayre	Agriculture	30.0
Loop 321	Wayne	Herrick Pipeyard	Agriculture	70.5
			Forest	1.5
		Bethel Contractor and Pipeyard	Open	3.4
			Agriculture	4.4
		Honesdale Pipeyard	Agriculture	14.8
Pennsylvania Subtotal				**160.3**
New York				
Loop 323	Orange	Port Jervis Pipe and Contractor Yard	Open	6.5
New York Subtotal				**6.5**
New Jersey				
Loop 323	Sussex	Montague Pipeyard	Open	8.5
Loop 325	Passaic	Tilcon Contractor Yard	Commercial/Industrial	7.5
		Tilcon Pipeyard	Commercial/Industrial	6.0
		Jungle Habitat Pipeyard	Commercial/Industrial	27.3
New Jersey Subtotal				**49.3**
Project Total				**216.1**

2.4.1.4 Access Roads

While public roads and the construction right-of-way would be used for primary access to the pipeline loops during construction, TGP proposes to also modify 52 non-public, existing roads for access during construction (see appendix C). The majority of these roads have a dirt or gravel surface and would require modifications such as grading, surface modification, widening, and tree clearing based on the equipment that would use the road. The surface type of existing temporary access roads would not be permanently changed. Modifications to existing temporary access roads would affect about 28.0 acres of land in Pennsylvania and 25.1 acres of land in New Jersey during construction.

2.4.1.5 Additional Temporary Workspace

TGP identified certain areas where it believes site-specific conditions require the use of ATWS outside of the proposed nominal 100-foot-wide pipeline construction right-of-way. ATWS generally

would be required in areas where the proposed pipeline route crosses wetlands and waterbodies, steep side slopes, bedrock outcrops, agricultural land, and roads, railroads and existing utilities. Impacts associated with ATWS are included with the pipeline construction impacts in table 2.4.1-1. A list of ATWS associated with the Project is included in appendix B.

2.4.1.6 Land Ownership and Easement Requirements

Pipeline operators must obtain easements from existing landowners to construct and operate proposed facilities, or acquire the land on which the facilities would be located. An easement agreement between a company and a landowner typically specifies compensation for losses resulting from construction, including losses of non-renewable and other resources, damages to property during construction, and restrictions on existing uses that would not be permitted on the permanent right-of-way after construction. Compensation would be based on a market study conducted by a licensed real estate appraiser.

Easements can be temporary, granting the operator the use of the land during Project construction (e.g., ATWS, temporary access roads, contractor/pipe yards), or permanent, granting the operator the right to operate and maintain the facilities once constructed.

For this Project, TGP's existing permanent easements associated with the 300 Line gives TGP the right to maintain the right-of-way as necessary for pipeline operation, including the periodic removal of larger vegetation and trees, as needed. In some areas, TGP has sited the Project facilities entirely within its existing fee property or an existing permanent easement, in which case TGP would not need to acquire additional land or permanent easements. In other areas, TGP would need to acquire new easements or acquire the necessary land to construct and operate the Project. The easements would convey both temporary (for construction) and permanent rights-of-way to TGP and would give TGP the right to construct, operate, and maintain the pipeline and related facilities.

If an easement cannot be negotiated with a landowner and the Project is certificated by the FERC, TGP may use the right of eminent domain granted to it under section 7(h) of the NGA and the procedures set forth under the Federal Rules of Civic Procedure (Rule 71A) to obtain the right-of-way and ATWS areas necessary to construct and operate the Project. TGP would still be required to compensate the landowner for the right-of-way and damages incurred during construction. However, the level of compensation would be determined by a court according to state or federal law. Whether a negotiated easement or right-of-way obtained via eminent domain, TGP would compensate landowners for use of the land. Eminent domain does not apply to lands under federal or tribal ownership but does apply to lands under state and local ownership.

2.4.2 Existing Residences, Commercial Facilities, and Planned Developments

2.4.2.1 Existing Residences and Commercial Facilities

TGP's proposed construction work area would be located within 50 feet of 16 residences and 4 commercial buildings (see table 2.4.2-1).

TABLE 2.4.2-1

Residences and Other Structures Within 50 Feet of the Construction Work Area [a, b]

State/Facility/ Parcel	County	Milepost	Description of Structure	Direction and Approximate Distance from Construction Work Area (feet)	Direction and Approximate Distance from Pipeline Centerline (feet)
Pennsylvania					
Loop 321					
889	Pike	7.5	Residence	SW / 42	SW / 67
889.02	Pike	7.9	Residence	SW / 31	SW / 41
Loop 323					
963.03	Pike	1.9	Residence	SW / 39	SW / 64
967.04	Pike	2.4	Residence	S / 49	S / 71
989	Pike	6.1	Commercial Building	SW / 24	SW / 74
990	Pike	6.1	Residence	W / 27	W / 77
991	Pike	6.1	Commercial Building	E / 17	E / 57
991	Pike	6.1	Residence	E / 49	E / 89
New Jersey					
Loop 323					
2.2	Sussex	7.4	Residence	SW / 48	SW / 122
3.2	Sussex	7.7	Residence	NW / 30	NW / 105
3.999803	Sussex	8.3	Residence	NW / 0	NW / 73
3.999804	Sussex	8.4	Residence	NW / 25	NW / 105
18.42-3	Sussex	9.6	Commercial Building	SW / 7	SW / 17
18.42-4	Sussex	9.6	Residence	SW / 22	SW / 72
163.01	Sussex	9.7	Residence	SW / 30	SW / 55
9	Sussex	9.8	Residence	SW / 23	SW / 73
29.01	Sussex	14.3	Residence	SW / 27	SW / 27
36.02	Sussex	15.2	Residence	SW / 34	SW / 59
Loop 325					
142.02	Passaic	1.1	Residence	SW / 39	SW / 64
146.05	Passaic	2.4	Commercial Building	S / 10	S / 50

[a] No residences or other structures are located within 50 feet of pipeline Loops 317 and 319, the four existing compressor stations and Mahwah Meter Station that would be modified, the pig launchers/receivers, and the mainline valves.

[b] Residences or other structures are located within 50 feet of the Honesdale, Bethel, Port Jervis, and Tilcon pipe or contractor yards. However, TGP has negotiated with the property owners and confirmed that he/she has no concerns with use of the yard in proximity to the residence or structure.

The 20 structures within 50 feet of the construction work area would be most likely to experience the effects of construction and operation of the Project. In general, as the distance to the construction work area increases, the impacts on residences decrease. In residential areas, typically the greatest impacts associated with construction and operation of a pipeline are temporary disturbances during construction and the encumbrance of the permanent right-of-way, which would prevent the construction of permanent structures within the right-of-way.

Temporary construction impacts on residential areas could include inconvenience caused by noise and dust generated by construction equipment, personnel, and trenching of roads or driveways; traffic congestion; ground disturbance of lawns; removal of trees, landscaped shrubs, or other vegetative screening between residences and/or adjacent rights-of-way; potential damage to existing septic systems or wells and other utilities; and removal of aboveground structures such as fences, sheds, or trailers from within the right-of-way.

Before mobilizing any equipment, TGP would stake the limits of disturbance and the centerline of the pipeline. Affected landowners would be notified at least 3 to 5 days before construction commences, unless more advance notice is requested by the landowner during easement negotiations.

If the construction right-of-way crosses a road, TGP would maintain access so residents have ingress/egress to their homes, and workers and customers have access to businesses. If the road is open cut, one lane would remain open during construction or traffic would be detoured around the work area through the use of adjacent roadways. Traffic safety personnel would be present during construction periods, and signage and safety measures would be developed in compliance with applicable state and local roadway crossing permits. To the maximum extent practicable, TGP would schedule work within roadways to avoid commuter traffic and impacts on school bus schedules.

TGP would utilize special construction methods designed for working in confined space, such as residential and commercially developed areas. These special construction methods are described in section 1.7.1.2 and in TGP's ECP and include stove pipe and drag-section construction methods. TGP would implement the following general measures to minimize construction-related impacts on all residences and other structures located within 50 feet of the construction right-of-way:

- attempt to maintain a minimum distance of 25 feet between any residence or business establishment and the edge of the construction work area;
- fence the boundary of the construction work area to ensure that construction equipment and materials, including the spoil pile, remain within the construction work area;
- install safety fence at the edge of the construction right-of-way for a distance of 100 feet on either side of a residence or business establishment;
- attempt to leave mature trees and landscaping intact within the construction work area unless the trees and landscaping interfere with the installation techniques or present unsafe working conditions;
- ensure piping is welded and installed as quickly as reasonably possible to minimize the amount of time a neighborhood is affected by construction;
- backfill the trench within 10 days of when the pipe is laid or temporarily place steel plates over the trench; and
- complete final cleanup, grading, and installation of permanent erosion control devices within 10 days after backfilling the trench, weather permitting.

In addition to adopting the mitigation measures listed above, TGP adopted modifications to its workspace at 13 locations based on landowner requests in order to avoid or minimize impacts on residential properties. TGP has also developed site-specific residential construction plans to inform affected landowners of proposed measures to minimize disruption and to maintain access to the residences located within 25 feet of the construction work area for proposed facilities (see appendix F). These site-specific construction plans include a dimensioned drawing depicting the residence in relation to the pipeline; workspace boundaries; the proposed permanent right-of-way; and nearby residences, structures, roads, and miscellaneous features (e.g., other utilities, catch basin, sewer). We have reviewed the site-specific residential construction plans and find them acceptable. However, we encourage the owners of each of these residences to provide us comments on the plan for their property.

Following construction, all residential areas would be restored to preconstruction conditions or as specified in written landowner agreements. Ornamental shrubs and other landscape plantings would be restored as specified in landowner agreements. Landowners would continue to have use of the right-of-way provided it does not interfere with the easement rights granted to TGP for construction and operation of the pipeline system.

As listed in table 2.4.2-1, one residence would be located within 10 feet of the proposed construction work area. Because of the increased potential for construction of the Project to disrupt this residence and to ensure that these specific property owners have adequate input to a construction activity occurring so close to their residence, **we recommend that:**

- **Prior to construction, TGP should file with the Secretary for the review and written approval of the Director of OEP evidence of landowner concurrence with the site-specific residential construction plan at MP 8.3 of Loop 323.**

TGP has also provided as part of its application a Public Participation Plan. The Public Participation Plan discusses four stages of public and agency communications and includes a Landowner Complaint Resolution Procedure, which details how it intends to address landowner issues and concerns during and following construction. We believe that implementation of TGP's construction methods for working in proximity to residences and commercial facilities and site-specific residential construction plans would minimize disruption to residential and commercial areas to the extent practicable and facilitate restoration of these areas as soon as reasonably possible upon completion of construction. Further, TGP's Landowner Complaint Resolution Procedure would promote resolution of landowner issues.

2.4.2.2 Planned Developments

TGP contacted landowners and local officials in the affected municipalities to identify planned residential or commercial developments within 0.25 mile of the Project. Correspondence is pending or ongoing from Bradford County, Pennsylvania, specific to Loops 317 and 319 and Compressor Station 319; Susquehanna County, Pennsylvania, specific to Compressor Station 321; Bergen County and several towns in New Jersey specific to Loop 325; and Orange County, New York, specific to the Port Jervis Pipe and Contractor Yard. However, TGP stated that it is not aware of any planned residential or commercial developments that would be crossed by the Project. Additional planned developments were identified more than 0.25 mile away from the Project; however, due to the distance between projects and the speculative nature of the planned developments' construction schedules, these projects were not considered further in this section. Section 2.10 discusses the cumulative impacts of the Project and other projects (e.g., transportation and energy projects) in the general Project area.

Loop 321

Two proposed residential development projects would be within 0.25 mile of Loop 321 in Wayne and Pike Counties: the Lake Teedyuskung Residential Development and the Fawn Lake Residential Development (Mrozinski, 2010a). Both projects are residential subdivision developments whose construction was identified as ongoing. The details of development (e.g., new structures planned for each parcel) are currently unknown. Comments concerning potential construction and operational impacts were received from residents of the Fawn Lake area. The Project would not directly impact development of these areas, and TGP would construct the Project adjacent to its existing 300 Line pipeline, which already precludes the placement of structures over the permanently maintained right-of-way at this location. However, indirect impacts such as noise from construction equipment and dust resulting from soil work would occur on a temporary basis. While it is anticipated that the developments would

conclude prior to the commencement of construction of the Project, TGP has committed to coordinating with the landowners of the subdivisions to identify any potential conflicts associated with the construction and operation of the Project.

Loop 323

Sixteen planned development projects would be within 0.25 mile of Loop 323 in Pike County, Pennsylvania (11 projects) and Sussex County, New Jersey (5 projects).

Loop 323 would be within 0.25 mile of the following proposed or recently approved residential developments in Pike County (Mrozinski, 2010a, 2010b): Keystone Park, Moon Valley Falls, Milford Highlands, Wheatfield Village, Milford Towngreen, and King Arthur Estates Subdivision in Pine Hill. Additional proposed or recently approved activities were also identified within 0.25 mile of the Project (Mrozinski, 2010b): Have A Hoot Party Store, Milford Convalescent Home, Deep Brook (Pike County Natural Areas Inventory), and Mashipacong Cliffs (Pike County Natural Areas Inventory). In addition, a proposed county recreation park, referred to as the Santos Project, was identified within 0.25 mile of the Project.

Loop 323 would also be within 0.25 mile of the following possible developments in Sussex County: three locations along Clove Road where lot line relocations are proposed, a minor subdivision on New Mashipacong Road, and a development project of unknown type (Zitone Construction and Supply on Cole Haven Terrace West).

Each project was identified as having an ongoing or unknown construction schedule. The details of development (e.g., new structures planned for each parcel) are currently unknown. The Project would not directly impact development of these areas and, in most cases, TGP would construct the Project adjacent to its existing 300 Line pipeline, which already precludes the placement of structures over the permanently maintained right-of-way at this location. However, indirect impacts such as noise from construction equipment and dust resulting from soil work would occur on a temporary basis. While it is anticipated that construction at the developments would conclude prior to the commencement of construction of the Project, TGP has committed to coordinating with the landowners of the subdivisions and permitting authorities to identify any potential conflicts associated with the construction and operation of the Project.

2.4.3 Recreation and Special Interest Areas

Table 2.4.3-1 lists the special interest and recreational areas crossed by the Project.

In addition to the areas crossed, the Project would be located within 0.25 mile of:

- Wayne County Park (Loop 321);
- Cricket Hill Golf Club (Loop 321);
- the Delaware River, a National Wild and Scenic River, and the Delaware Water Gap National Recreation Area (Loop 323); and
- a baseball field (Loop 325).

Direct impacts on these areas would not occur. While indirect impacts such as noise and visual impacts would occur, they would be temporary and limited to the time of construction.

TABLE 2.4.3-1

Recreation and Special Interest Areas Crossed by the Project

State/Milepost	Name of Area	Land Ownership/ Management	Crossing Length (feet)	Area Affected (acres)	
				Const. [a]	Oper. [b]
Pennsylvania					
Loop 317					
0.2 – 0.4	Susquehanna River Water Trail, North Branch Section and Susquehanna River	State of Pennsylvania, Department of Conservation and Natural Resources, Bureau of Forestry/National Park Service (trail and waterbody) and Susquehanna Greenway Partnership (trail)	1,196	0.0 [d]	0.0 [d]
3.1	U.S. Route 6 Grand Army of the Republic Highway Recreational Trail	Pennsylvania Department of Transportation/Grand Army of the Republic Highway Association	291	0.0	0.0
Loop 323					
0.0 – 0.9	Delaware State Forest	State of Pennsylvania/ Department of Conservation and Natural Resources, Bureau of Forestry	4,655	10.9	2.6
New Jersey					
Loop 323					
14.4	Appalachian National Scenic Trail	State of New Jersey/New Jersey Department of Environmental Protection (NJDEP), Division of Parks and Forestry	2	<0.1	<0.1
10.0 – 10.3	High Point State Park	State of New Jersey/NJDEP, Division of Parks and Forestry	20,256	44.1	7.0
10.5 – 10.9					
11.1 – 11.9					
11.9 – 13.2					
13.2 – 14.4					
Loop 325					
0.0 – 7.6	Highlands Region	Various/NJDEP	40,311	83.4	14.8
0.0 – 0.2	Long Pond Ironworks State Park	State of New Jersey/NJDEP, Division of Parks and Forestry	4,174	8.1	1.0
0.5 – 1.1					
0.2 – 0.5	Monksville Reservoir	State of New Jersey/NJDEP	1,419	0.0 [d]	0.0 [d]
1.2 – 1.6	Waterview (Green Acres Program Property)	Passaic River Coalition	2,100	4.9	1.2
1.6 – 2.0	(Green Acres Program Property)	Passaic River Coalition	1,766	4.0	1.0
2.6 – 3.2	Wanaque Reservoir Watershed Property	North Jersey District Water Supply Commission	3,080	6.8	1.5
3.3 – 3.4 [c]	Baseball field	Borough of Ringwood	525	1.2	0.3
3.4 – 3.5	Ringwood State Park (partial Green Acres Program Property)	State of New Jersey/NJDEP, Division of Parks and Forestry	19,352	41.4	6.2
3.5 – 7.0					
7.0 – 7.5	Ramapo Valley County Reservation (Green Acres Program Property)	Bergen County, Department of Parks	2,600	6.0	1.5

[a] Assumes a 100-foot-wide construction right-of-way, which includes 25 feet of existing permanent right-of-way, 25 feet of new permanent right-of-way, and 50 feet of temporary construction workspace.

[b] Assumes 25 feet of new permanent right-of-way.

[c] Includes mainline valve 328-2, which would be installed adjacent to the baseball field.

[d] Direct impacts on the area would be avoided by use of the horizontal directional drill method.

One of the primary concerns when crossing recreation and special interest areas is the impact of construction on the purpose for which the area was established (e.g., the recreational activities, public access, and resources the area aims to protect). Construction would alter visual aesthetics by removing existing vegetation and disturbing soils. Construction would also generate dust and noise, which could be

a nuisance to recreational users. Construction could also interfere with or diminish the quality of the recreational experience by affecting wildlife movements or disturbing trails.

In general, Project impacts on recreational and special interest areas occurring outside of forest land would be temporary and limited to the period of active construction, which typically would last only several days to several weeks in any one area. These impacts would be minimized by implementing TGP's ECP. Following construction, most open land uses would be able to revert to their former uses. Forest land affected by the temporary construction right-of-way and ATWS areas, however, would experience long-term impacts because of the time required to restore the woody vegetation to its preconstruction condition. Further, forest land within the permanent right-of-way would experience permanent impacts because it would be precluded from being reestablished within the maintained portion of the right-of-way.

TGP has proposed general mitigation measures and provided site-specific crossing plans for the recreation and special interest areas that would be affected by the Project. These site-specific plans include measures that would be adopted at each location such as a commitment to contact the land management agency(ies) prior to construction and posting signs at trailheads. TGP has committed to continuing consultations with the landowners of recreation and special interest areas regarding the need for specific construction mitigation measures. In addition, in September 2011 we contacted the applicable land managing agency and/or permitting authority of the areas with potential Project impacts and directed them to TGP's filing of these plans. We have reviewed the site-specific recreation and special interest construction plans and find them acceptable.

2.4.3.1 Pennsylvania

Clean and Green Program

The Pennsylvania Department of Agriculture oversees and administers the Clean and Green Program, which was developed to preserve and protect farmland and forested areas throughout the state. The Clean and Green Program provides a tax benefit to owners of agricultural or forest land by basing property taxes on the use value of the land as compared to its market value. Individual owners who agree to solely devote their lands to agricultural use, agricultural reserve, or forest reserve are given preferential assessment.

Although not listed in table 2.4.3-1, a number of Clean and Green properties would be crossed by Loops 317, 319, 321, and 323. Loop 317 would cross Clean and Green properties at 22 locations, Loop 319 at 11 locations, Loop 321 at 29 locations, and Loop 323 at 15 locations. TGP has limited the proposed construction right-of-way to 100 feet in uplands and 75 feet in wetlands, and would implement the construction methods described in its ECP for these properties. Following construction, TGP would typically retain 25 feet of new permanent right-of-way. Agricultural uses would continue to their normal uses after construction and forest land would be permanently removed from the new operational right-of-way. Based upon a review of the Clean and Green Program qualifications, TGP has determined that the landowners' continued participation in the program would be not affected by construction or operation of the Project. However, in the event that Project impacts would result in a disqualification of a property from the Clean and Green Program, TGP would compensate the affected landowner(s).

Community Conservation Partnership Program

The Community Conservation Partnerships Program (C2P2) joins the PADCNR with communities, nonprofit groups, and the private sector in conserving Pennsylvania's natural and cultural heritage (PADCNR, 2011). The C2P2 combines several funding sources into one grant program that

provides funding to various entities in support of conservation planning and the acquisition of land for local parks, greenways, open space preservation, and natural areas protection.

Based upon a review of PADCNR data and federal Land and Water Conservation Fund[12] acquisition and development projects, C2P2 lands would be crossed along Loops 321 and 323 in Pike County as listed in table 2.4.3-2.

TABLE 2.4.3-2

Community Conservation Partnership Program Properties Crossed by the Project

Facility/ County	Milepost	Line List Number	Property Name	Ownership
Loop 321				
Pike	5.4 – 6.6	878, 879, 880, 880.02	Pike County Greenway	Private
Loop 323				
Pike	0.0 – 0.9	955, 957, 957.02, 958	Milford Reservation	Private
	0.9 – 1.7	959, 961, 961.02	Milford Experimental Forest / Pinchot Conservation Easement	Private

The functions of C2P2 properties crossed by the Project include open space preservation and natural areas protection on private property. Project impacts would be short term as the open and agricultural land use would be allowed to return to preconstruction conditions following construction. TGP would monitor revegetation progress in accordance with its ECP to ensure re-establishment.

Loop 317

Susquehanna River Water Trail (North Branch) and Susquehanna River

Loop 317 would cross the Susquehanna River Water Trail, a recreational trail, and the Susquehanna River, a Nationwide Rivers Inventory waterbody, between MPs 0.2 and 0.4 in Bradford County, Pennsylvania. The North Branch segment of the Susquehanna River Water Trail is a 181-mile-long, NPS-designated National Recreation Trail that is managed by the Susquehanna Greenway Partnership. The water trail is also part of the Pennsylvania Water Trail system coordinated by the PAFBC. The water trail runs from Sunbury, Pennsylvania to the Pennsylvania-New York border.

The Susquehanna River is also listed in the Nationwide Rivers Inventory, which is a NPS-managed listing of more than 3,400 waterbodies that possess one or more "outstandingly remarkable" natural or cultural values judged to be of more than local or regional significance. Uses of the water trail/waterbody include canoeing, kayaking, camping, fishing, swimming, and wildlife observation (National Recreation Trail, 2011). Although the water trail/waterbody is open to recreational users year-round, the peak use period for boating and fishing activities is between April and October (Buck, 2011).

TGP would use the HDD method to cross the Susquehanna River and Susquehanna River Water Trail, and therefore, construction and operation of the Project would not directly affect the water trail/waterbody. Further, TGP would not conduct tree or vegetation clearing between the HDD entry and exit workspace areas, resulting in no visual impacts on users of the water trail/waterbody. The nearest facility associated with the water trail/waterbody is Homet's Ferry, which is located approximately 0.7

[12] The Land and Water Conservation Fund (LWCF) is a federal program that provides matching grants to state and local governments for the acquisition and development of public recreation areas and facilities. No LWCF properties or projects would be affected by the Project.

mile south of the crossing. Indirect impacts such as noise from construction equipment and visual impacts on any passersby from construction personnel and activities would occur on a temporary basis.

U.S. Route 6 Grand Army of the Republic Highway Recreational Trail

Loop 317 would cross the U.S. Route 6 Grand Army of the Republic Highway Recreational Trail at MP 3.1 in Bradford County, Pennsylvania. The highway is managed by the Grand Army of the Republic Highway Association (National Recreational Trails Program, 2010) and is the longest highway ever established in the United States, running from Provincetown, Massachusetts west to the Long Beach, California area. The trail experiences heavy traffic year round, with peak use from May through August (Pennsylvania Department of Transportation, 2011).

TGP would use the bore method to cross U.S. Route 6 Grand Army of the Republic Highway Recreational Trail and, therefore, construction and operation of the Project would not directly affect the highway. ATWS required on both sides of the road crossing would be located in primarily forest land, which would require clearing and result in a temporary visual impact on passersby. Additional indirect impacts such as noise from construction equipment and dust resulting from soil work would occur on a temporary basis. Following construction, the forest land associated with the ATWS on either side of the trail would be allowed to revert to pre-construction conditions. However, the existing permanent right-of-way associated with the 300 Line pipeline would be expanded by 25 feet to accommodate operation of the Project pipeline, resulting in an incremental long-term visual impacts on users of the highway.

Loop 319

Based on a review of NPS and Pennsylvania Spatial Data Access (PASDA) Managed Lands electronic data, consultations with the PADCNR, and TGP's review of property records, no federal or state public lands or municipal lands would be crossed by or are within 0.25 mile of Loop 319 in Bradford County, Pennsylvania.

Loop 321

Based on a review of NPS and PASDA Managed Lands electronic data, consultations with the PADCNR, and TGP's review of property records, no federal or state public lands would be crossed by or are within 0.25 mile of Loop 321 in Wayne and Pike Counties, Pennsylvania. Two municipal areas would be within 0.25 mile of the Project, a county park and golf club, as mentioned above.

Loop 323

Delaware State Forest

Loop 323 would cross the Delaware State Forest between MPs 0.0 and 0.9 in Pike County, Pennsylvania. The Delaware State Forest is managed by the PADCNR, Bureau of Forestry. Public activities within the Delaware State Forest consist of hiking, camping, hunting, fishing, all-terrain vehicle use, and sight-seeing as well as use of picnic and educational centers. Peak use of the forest is between June and August; during bear and deer hunting season (fall, and fall and winter, respectively); during opening weekend trout fishing (spring); and Memorial Day, Fourth of July, and Labor Day weekends (Balch, 2011). Within the forest, Loop 323 would cross Range Trail and Pinchot Brook (MP 0.2).

Construction of the Project would temporarily affect 10.6 acres of primarily forest, open, and wetland land within the Delaware State Forest. TGP would use standard upland construction methods to install its pipeline across this area, including Range Trail. Pinchot Brook is a perennial waterbody and

has been classified by the PAFBC as an Exceptional Value Water. TGP would use a dry-crossing method (e.g., flume, dam-and-pump) to cross Pinchot Brook. The proposed loop would be located adjacent to the existing 24-inch-diameter pipeline and, therefore, the construction right-of-way would overlap onto previously disturbed and existing right-of-way, thus reducing the area of new impact. Depending on the timing of construction, the Project could adversely impact hikers, campers, fishers, hunters, site-seers, or other recreational users by restricting access and frightening wildlife and game animals in close proximity. These impacts would be short-term and limited to the duration of construction and active restoration. Indirect impacts such as noise from construction equipment, dust resulting from soil work, and visual impacts on any passersby from construction personnel and activities would occur on a temporary basis.

Following construction, TGP would maintain approximately 2.6 acres of mixed land use types permanently converted to open land for operation of the new pipeline loop.

Based on consultations with the PADCNR, Bureau of Forestry, the agency has requested that it be consulted on expected construction dates prior to the start of construction.

2.4.3.2 New Jersey

Loop 323

No Net Loss

As described below, several state-owned lands would be affected by the Project. Construction and tree removal on state-owned land would trigger New Jersey's NNRA. The NNRA states that trees must be replaced when they are removed during development projects involving 0.5 acre or more (NJDEP, 2011a). While the requirements of the act typically only apply to state entities, TGP has committed to complying with state requirements for these areas, which would involve the development of a reforestation plan for the tree impacts associated with the Project (NJDEP, 2011a).

High Point State Park

Loop 323 would cross High Point State Park at various locations between MPs 10.0 and 14.4 (see table 2.4.3-1). The park, which is managed by the NJDEP, Division of Parks and Forestry, is named for the highest peak in the State of New Jersey and part of the Kittatinny Mountain Range. Although not near the Project area, the park hosts the High Point Monument, a 220-foot-tall structure that offers views of the Pocono Mountains, the Catskill Mountains, and the Wallkill River Valley. Common recreational activities and facilities available to the public within High Point State Park includes camping, picnicking, hiking, mountain biking, horseback riding, cross-country skiing, snowshoeing, dog sledding, snowmobiling fishing, a homeowner firewood plan, interpretive educational programs, boating, and hunting. Peak use of the park is between June and August, with periodic high-use periods during the winter associated with ice fishing, snow shoeing, and cross-country skiing (NJDEP, 2011b). Within the park, Loop 323 would cross the Sawmill Loop Trail, the Appalachian Trail (MP 14.4; discussed below), and an unnamed trail, as well as several waterbodies, including Shimer's Brook (MP 10.6), Parker Brook (MP 12.5), and Big Flat Brook (MP 13.1). The nearest campground is located over 1.0 mile from the Project.

Construction of the Project would temporarily affect 44.1 acres of primarily forest, open, and wetland land within High Point State Park. TGP would use standard upland construction methods to install its pipeline across this area, including Sawmill Loop Trail, the Appalachian Trail, and the unnamed trail. The waterbodies crossed by Loop 323 within High Point State Park consist of perennial waterbodies

that have been classified by the NJDEP as Freshwater 1 Trout Production or Freshwater 2 Trout Production fisheries. TGP would use a dry-crossing method (e.g., flume, dam-and-pump) to cross these waterbodies. The proposed loop would be located adjacent to the existing 24-inch-diameter pipeline and, therefore, the construction right-of-way would overlap onto previously disturbed and existing right-of-way, thus reducing the area of new impact. Depending on the timing of construction, the Project could adversely impact hikers, campers, fishers, hunters, site-seers, or other recreational users by restricting access and frightening wildlife and game animals in close proximity. These impacts would be short-term and limited to the duration of construction and active restoration. Indirect impacts such as noise from construction equipment, dust resulting from soil work, and visual impacts on any passersby from construction personnel and activities would occur on a temporary basis.

Following construction, TGP would maintain approximately 7.0 acres of mixed land use types permanently converted to open land for operation of the new pipeline loop. Visual impacts on the landscape resulting from the Project are discussed in section 2.4.6.

Appalachian National Scenic Trail

Loop 323 would cross the Appalachian National Scenic Trail at MP 14.4 in Sussex County, New Jersey. The Appalachian National Scenic Trail is approximately 2,181 miles long and runs from Springer Mountain, Georgia north to Katahdin, Maine. Although designated by the NPS as a National Scenic Trail, the hiking trail is managed cooperatively by the NPS, the Appalachian Trail Conservancy (ATC), volunteers from 30 local Appalachian Trail Clubs, the U.S. Forest Service, and other public land-managing agencies. The point at which Loop 323 would cross the Appalachian National Scenic Trail is on land owned by the State of New Jersey within the High Point State Park. Although open year-round, peak use of the hiking trail is between mid-June and July (ATC, 2011) and is within a day's drive of two thirds of the U.S. population (NPS, 2010).

Construction of the Project would affect less than 0.1 acre of forest and open land at the Appalachian National Scenic Trail crossing. TGP would use standard upland construction methods to install its pipeline in upland areas across this area and would restore the area following construction in accordance with its ECP. The proposed loop would be adjacent to the existing 24-inch-diameter pipeline and, therefore, the construction right-of-way would overlap onto previously disturbed and existing right-of-way, thus reducing the area of new impact. Indirect impacts such as noise from construction equipment, dust resulting from soil work, and visual impacts on any passersby from construction personnel and activities would occur on a temporary basis.

Based on a meeting between TGP and NPS and ATC representatives (November 9, 2010), the primary concerns associated with the Project at the trail crossing are workspace requirements and potential interruption to trail users. TGP has agreed to keep required workspace to a minimum (currently reduced to 75 feet) and would minimize disruption to trail users by keeping the trail crossing open at all times. TGP has also committed to providing an access route around the active construction area during discrete construction periods to ensure hiker safety. TGP would replant areas cleared to accommodate ATWS with native tree species following construction.

Following construction, TGP would maintain less than 0.1 acre of primarily forest land permanently for operation of the new pipeline loop. Strict adherence to the restoration and revegetation protocols outlined in TGP's ECP, reducing the area required for construction to the extent possible, replanting the area with native tree species, and maintaining access around the trail would minimize impacts on the trail and recreational users.

Loop 325

Highlands Region

The entirety of Loop 325 is within the New Jersey Highlands Region in Passaic and Bergen Counties, New Jersey. The Highlands Region is defined under the Highlands Water Protection and Planning Act (Highlands Act) that was signed into law in August of 2004 (N.J.S.A 13-20-1 et seq.).

The Highlands Act defines two separate areas within the Highland Region: the Preservation Area and the Planning Area. Loop 325 would cross the Preservation Area for its entire length (about 7.6 miles). The main goals of the Highlands Act are to preserve open space and natural resources for public enjoyment and to protect drinking water resources. Water resources in the Highlands Region supply drinking water to more than half of New Jersey households. In addition, the Highlands Region contains numerous recreation areas and sites of cultural and historical significance.

In response to passage of the Highlands Act, the NJDEP established the Highlands Council to develop and oversee the implementation of a Regional Master Plan (RMP) that would bring to fruition the goals of the Highlands Act. The RMP provides guidelines for adherence to the rules and regulations of the Highlands Act. In addition, the Highlands Council regulates and approves all proposals for major development, as defined in the Highlands Act, within the Planning Area and provides RMP consistency determinations to the NJDEP for all major development in the Preservation Area, which is applicable to the Project.

As defined in the Highlands Act, all major developments in the Preservation Area are regulated by the NJDEP and require NJDEP approval. The Highlands Act has established a number of exemptions to this rule for activities such as minor development in existing residential areas; municipal development and/or transportation safety projects; and maintenance of existing utilities. TGP is seeking an exemption from such regulations under the Highlands Act.

On March 25, 2011, TGP met with Highlands Council staff regarding the Project. As a result of this meeting, the Highlands Council recommended that TGP amend its application for a consistency determination for the previously FERC-Certificated 300 Line Project (FERC Docket No. CP09-444-000) to include the portion of the Project within the Highlands Region Preservation Area, specifically Loop 325 in Passaic and Bergen Counties, New Jersey. TGP has submitted an applicability determination application and it is expected that, similar to the process encountered for the 300 Line Project, the Highlands Council would recommend to the NJDEP that the Project be exempted from regulation under the Highlands Act and that TGP would subsequently file applications with the NJDEP for the state permits necessary to construct the Project.

Construction of the Project would temporarily affect about 83.4 acres of primarily forest, open, and wetland land uses within the Highlands Region. The proposed loop would be located adjacent to the existing 24-inch-diameter pipeline for the majority of its length and, therefore, the construction right-of-way would overlap onto previously disturbed and existing right-of-way, thus reducing the area of new impact. Indirect impacts such as noise from construction equipment, dust resulting from soil work, and visual impacts on any passersby from construction personnel and activities would occur on a temporary basis. TGP would use standard upland construction and HDD methods to install its pipeline across this area and would maintain approximately 14.8 acres of land permanently for operation of the new pipeline loop. TGP has committed to continuing coordination with the NJDEP and Highlands Council regarding construction procedures and mitigation planning for construction of Loop 325 within the Highlands Region.

Within the Highlands Region, Loop 325 would also cross various state parks, baseball fields, municipal areas, and Green Acres properties. A discussion of these areas is presented below.

Long Pond Ironworks State Park – Loop 325 would cross the Long Pond Ironworks State Park between MPs 0.0 and 0.2 and MPs 0.5 and 1.1 in Passaic County, New Jersey. The state park is managed by the NJDEP, Division of Parks and Forestry. Common recreational activities available to the public within Long Pond Ironworks State Park include hiking, bird watching, biking, fishing, and hunting. No known public or recreational trails or facilities would be affected by the Project. Peak use of the park is between July and August, although the park is also commonly used between April and September (Pain, 2011).

Construction of the Project would temporarily affect approximately 8.1 acres of primarily forest, open, and wetland land within the Long Pond Ironworks State Park. TGP would use an HDD to cross the Monksville Reservoir and standard upland construction methods to install Loop 325 across the remainder of the park. Except on the east side of the Monksville Reservoir where the HDD crossing would necessitate an approximately 150-foot offset, the proposed loop would be located adjacent to the existing 24-inch-diameter pipeline and, therefore, the construction right-of-way would overlap onto previously disturbed and existing right-of-way, thus reducing the area of new impact. Depending on the timing of construction, the Project could adversely impact hikers, fishers, hunters, site-seers, or other recreational users by restricting access and frightening wildlife and game animals in close proximity. These impacts would be short-term and limited to the duration of construction and active restoration. Indirect impacts such as noise from construction equipment, dust resulting from soil work, and visual impacts on any passersby from construction personnel and activities would occur on a temporary basis.

Following construction, TGP would maintain approximately 1.0 acres of mixed land use types permanently converted to open land for operation of the new pipeline loop.

Monksville Reservoir – Loop 325 would cross the Monksville Reservoir between MPs 0.2 and 0.5 in Passaic County, New Jersey. The Monksville Reservoir is surrounded by the Long Pond Ironworks State Park (see discussion above) and is managed as "Open Space" by the NJDEP. The Monksville Reservoir holds 6.6 billion gallons of water and is a source for drinking water and recreation (Passaic County, 2011). Public access to the reservoir is available, which provides access to anglers, sporting clubs, and the U.S. Sailing Association. Similar to the surrounding state park, the peak use period of the reservoir is between July and August.

TGP would use the HDD method to cross the Monksville Reservoir and, therefore, construction and operation of the Project would not directly affect the reservoir. Further, TGP would not conduct tree or vegetation clearing between the HDD entry and exit workspace areas, resulting in no visual impacts on users of the reservoir. Indirect impacts such as noise from construction equipment and visual impacts on any passersby from construction personnel and activities would occur on a temporary basis.

Green Acres Properties – Four publicly and privately held Green Acres properties would be crossed by Loop 325 between MPs 1.2 and 1.6, MPs 1.6 and 2.0, and MPs 3.4 and 3.5 in Passaic County, and MPs 7.0 and 7.5 in Bergen County, New Jersey. Three of these crossings are associated with the Waterview, Ringwood State Park, and Ramapo Valley County Reservation, respectively, which are discussed further below.

New Jersey created the Green Acres Program in 1961 to address the state's growing recreation and conservation requirements. The goal of the Green Acres Program is to create a network of open spaces and recreational resources for public use and enjoyment. The regulations for the program and for

Green Acres properties are provided in Title 7, Chapter 36 of the New Jersey Administrative Code (NJDEP, 2010b).

TGP has committed to mitigate Project impacts in accordance with the requirements of the Green Acres Program, which include identifying land that would provide opportunities for the preservation of permanent outdoor recreation areas for public use and enjoyment, and maintaining public access to the properties without discrimination or exclusion based on residency. Further, TGP would be required to adhere to the requirements imposed by the New Jersey State agencies charged with regulating activities within Green Acres properties (e.g., NJDEP), who's permits and authorizations are pending.

Waterview – Loop 325 would cross Waterview, a New Jersey "Open Space," between MPs 1.2 and 1.6 in Passaic County, New Jersey. Waterview is a 67.8-acre property managed by the Passaic River Coalition to preserve the open space surrounding the Monksville Reservoir. No known public or recreational features (e.g., trails) exist on Waterview but the area is home to various bird, vegetative, and wildlife species. Waterview is also a Green Acres property.

Construction of the Project would temporarily affect approximately 4.9 acres of forest and open land within Waterview. TGP would use standard upland construction methods to install its pipeline across this area. The loop would be located adjacent to the existing 24-inch-diameter pipeline and, therefore, the construction right-of-way would overlap onto previously disturbed and existing right-of-way, thus reducing the area of new impact. Depending on the timing of construction, the Project could affect wildlife in close proximity. These impacts would be short-term and limited to the duration of construction and active restoration. Indirect impacts such as noise from construction equipment, dust resulting from soil work, and visual impacts on any passersby from construction personnel and activities would occur on a temporary basis.

Following construction, TGP would maintain approximately 1.2 acres of mixed land use types permanently converted to open land for operation of the new pipeline loop.

Wanaque Reservoir Watershed Property – Loop 325 would cross the Wanaque Reservoir Watershed Property between MPs 2.6 and 3.2 in Passaic County, New Jersey. The Wanaque Reservoir Watershed Property surrounds a portion of the 2,310-acre Wanaque Reservoir, which is managed by the North Jersey District Water Supply Commission. No known public or recreational features (e.g., trails) exist on the property; however, the reservoir, which is commonly fished, is about 0.1 mile from the Project.

Construction of the Project would temporarily affect approximately 6.8 acres of forest and open land within the Wanaque Reservoir Watershed Property. TGP would use standard upland construction methods to install its pipeline across this area. The loop would be located adjacent to the existing 24-inch-diameter pipeline and, therefore, the construction right-of-way would overlap onto previously disturbed and existing right-of-way, thus reducing the area of new impact. Direct impacts on the property would be short-term and limited to the duration of construction and active restoration. Indirect impacts such as noise from construction equipment, dust resulting from soil work, and visual impacts on any passersby from construction personnel and activities would occur on a temporary basis.

Following construction, TGP would maintain approximately 1.8 acres of mixed land use types permanently converted to open land for operation of the new pipeline loop.

Baseball Field – Loop 325 would cross a municipal baseball field between MPs 3.3 and 3.4 in Passaic County, New Jersey. The field crossed is part of a larger complex of fields owned and managed

by the Borough of Ringwood. The field is commonly used between mid-March and October for baseball and softball games, as well as summer camps (Ringwood Borough, 2011).

Construction of the Project would temporarily affect approximately 1.2 acres of forest and open land within the complex. TGP would use standard upland construction methods to install its pipeline across this area. TGP has reduced its temporary construction workspace to 75 feet for a portion of this crossing to avoid the baseball outfield and a parking area. The proposed loop would be located adjacent to the existing 24-inch-diameter pipeline and, therefore, the construction right-of-way would overlap onto previously disturbed and existing right-of-way, thus reducing the area of new impact. TGP would coordinate with Ringwood Borough to avoid interrupting use of the baseball field, and to address safety concerns, including the development of a safety plan and alternative parking and transportation during scheduled events. Following construction, TGP would maintain approximately 0.3 acre of forest and open land for operation of the new pipeline loop. The permanent right-of-way for the new pipeline would not be located within the baseball field, thus there would be no direct, permanent impact on this area.

MLV 328-2 would also be located on the field property, although not directly on the baseball field. The aboveground facility would be separated from baseball field onlookers by a strip of forest land that exists between the existing 24-inch-diameter pipeline and the baseball outfield. Additionally, TGP would visually screen the MLV.

Ringwood State Park – Loop 325 would cross the Ringwood State Park between MPs 3.4 and 3.5 and MPs 3.5 and 7.0 in Passaic and Bergen Counties, New Jersey. The 4,044-acre park is managed by the NJDEP, Division of Parks and Forestry. Common recreational activities available to the public within Ringwood State Park include hiking, horseback riding, picnicking, swimming, hunting, and fishing. The park also hosts a visitor's center, botanical garden, and two historical manors. Peak use of the park is between July and August, although the park is also commonly used between April and September (Pain, 2011). Within the park, Loop 325 would cross Government Mountain Trail. Ringwood State Park is also a Green Acres property (discussed above).

Construction of the Project would temporarily affect 41.4 acres of primarily forest, open, and wetland land within the Ringwood State Park. TGP would use standard upland construction methods to install its pipeline across this area, including Government Mountain Trail. The loop would be located adjacent to the existing 24-inch-diameter pipeline and, therefore, the construction right-of-way would overlap onto previously disturbed and existing right-of-way, thus reducing the area of new impact. Depending on the timing of construction, the Project could adversely impact hikers, picnickers, campers, fishers, hunters, site-seers, or other recreational users by restricting access and frightening wildlife and game animals in close proximity. These impacts would be short-term and limited to the duration of construction and active restoration. Indirect impacts such as noise from construction equipment, dust resulting from soil work, and visual impacts on any passersby from construction personnel and activities would occur on a temporary basis.

Following construction, TGP would maintain approximately 6.2 acres of mixed land use types permanently converted to open land for operation of the new pipeline loop.

Ramapo Valley County Reservation – Loop 325 would cross the Ramapo Valley County Reservation between MPs 7.0 and 7.5 in Bergen County, New Jersey. The 4,000-acre area is a Bergen County park that offers hiking, dog walking, fishing, canoeing, kayaking, cross-country skiing, and camping. Peak use of the park is between April and September (Bergen County Parks, 2011). Within the park, Loop 325 would cross the White Trail. Ramapo Valley County Reservation is also a Green Acres property (discussed above).

Construction of the Project would temporarily affect approximately 6.0 acres of primarily forest land within the Ramapo Valley County Reservation. TGP would use standard upland construction methods to install its pipeline across this area, including White Trail. The loop would be located adjacent to the existing 24-inch-diameter pipeline and, therefore, the construction right-of-way would overlap onto previously disturbed and existing right-of-way, thus reducing the area of new impact. Depending on the timing of construction, the Project could adversely impact hikers, fishers, site-seers, or other recreational users by restricting access and frightening wildlife in close proximity. These impacts would be short-term and limited to the duration of construction and active restoration. Indirect impacts such as noise from construction equipment, dust resulting from soil work, and visual impacts on any passersby from construction personnel and activities would occur on a temporary basis.

Following construction, TGP would maintain approximately 1.5 acres of forest land permanently converted to open land for operation of the new pipeline loop.

2.4.4 Coastal Zone Management Act

According to correspondence with the Pennsylvania Coastal Zone Management Program (Houck, 2010) and a review of New Jersey Bureau of Coast Regulation coastal zone mapping and the New York GIS Clearinghouse data, the Project falls outside of the geographical boundaries of the Pennsylvania, New Jersey, and New York Coastal Zones, respectively, and, therefore, is not subject to coastal consistency.

2.4.5 Hazardous Waste

2.4.5.1 Hazardous Waste Sites and Landfills

TGP reviewed regulatory databases to identify known and potential hazardous waste sites within 0.25 mile of the proposed pipeline loops (EDR, 2010). No mapped sites were identified for proposed pipeline Loops 317, 319, and 321.

In Pennsylvania, the results of the database search identified one potential hazardous waste site within 0.25 mile of Loop 323. The site, which is 1,300 feet from and downgradient of Loop 323, is listed as clean-up completed, indicating that the hazardous substance release has been mitigated in compliance with state-specific regulations. Because the property has been remediated and is downgradient of the construction workspace, the site would not be directly impacted by construction or operation of the loop.

In New Jersey, the results of the database search identified 11 potential hazardous waste sites within 0.25 mile of Loop 323 and 23 potential hazardous waste sites within 0.25 mile of Loop 325. Of the sites identified, 29 are 500 feet or more from the loops, 2 are between 500 and 100 feet of the loops, and 3 are within 100 feet or less from the loops. Of the 34 contaminated sites identified, 25 are listed as closed, cleaned up, and/or not likely to contain soil and/or groundwater contamination that would be encountered by the Project. The remaining nine sites are listed as active, clean-up pending, and/or may have soil and/or groundwater contamination. Of these sites, three are within 500 feet of the Project; the remaining are more than 500 feet from the Project.

TGP identified one site within 0.25 mile of the proposed contractor/pipe yards. Based on consultations with the PADEP, Northcentral Region Environmental Cleanup Program, the Wysox Pipe Yard would be 0.25 mile south of the Wickwire Property, a long-term underground storage tank release site (Miller, 2011). Site contamination resolution is ongoing between the property owners and the PADEP, Northcentral Region Environmental Cleanup Program (Miller, 2011).

During Project scoping, the Ringwood Mines/Landfill site was identified as a site of concern in the Project area. Based on TGP's regulator database search, the Ringwood Mines/Landfill is about 500 feet north and upgradient of Loop 325. The 500-acre site consists of abandoned mine shafts and pits, inactive landfills, and open dumps. While removed as a Superfund site from the EPA's National Priorities List in 1994, subsequent discoveries have prompted further cleanup. The EPA is currently overseeing reinvestigation efforts of the site (EPA, 2010c). The EPA has reported that human exposure and groundwater migration is under control (EPA, 2011c), and TGP's research indicates that there is no risk of encountering contaminated soils or groundwater. However, TGP has committed to continuing site research with EPA and NJDEP information to assess the potential of contaminant migration in proximity to the Project.

In addition to its commitment to continuing consultations with the EPA and state agencies, TGP would implement the protocols described in its ECP and SPCC Plan in the event contaminated media is encountered during construction of the Project. The plan complies with all federal, state, and local regulations and has been submitted to the appropriate federal, state, and local regulatory agencies for review and approval. In general, if unanticipated hazardous materials/waste are encountered or suspected during construction, all construction work in the immediate vicinity would be halted until an appropriate course of action is determined.

2.4.6 Visual Resources

2.4.6.1 Pipeline Facilities

Visual resources along the proposed pipeline routes are a function of geology, climate, and historical processes, and include topographic relief, vegetation, water, wildlife, land use, and human uses and development. Although stretches of upland forest are present along the proposed routes, the majority of the pipeline loops (about 84 percent) would be installed within or parallel to existing rights-of-way. These existing rights-of-way are maintained periodically on different schedules, using different methods of maintenance. As a result, along the majority of the Project, visual resources have been previously affected by other activities.

Visual impacts associated with the construction right-of-way and ATWS would include the removal of existing vegetation and the exposure of bare soils, as well as earthwork and grading scars associated with heavy equipment tracks, trenching, blasting (if required), rock formation alteration or removal, and machinery and tool storage. Other visual effects could result from the removal of large individual trees that have intrinsic aesthetic value; the removal or alteration of vegetation that may currently provide a visual barrier; or landform changes that introduce contrasts in visual scale, spatial characteristics, form, line, color, or texture.

Visual impacts are typically greatest where the pipeline routes parallel or cross roads and may be seen by passing motorists, and on residences where vegetation used for visual screening of existing utility rights-of-way or for ornamental value would be removed. The duration of visual impacts would depend on the type of vegetation that is cleared or altered. The impact of vegetation clearing would be shortest in areas consisting of short grasses and scrub-shrub vegetation and in agricultural crop and pasture lands, where the re-establishment of vegetation following construction would be relatively fast (generally less than 5 years). The impact would be greater in forest land, which would take many years to regenerate mature trees. The greatest potential visual impact in forest land would result from the removal of large specimen trees, which would take longer than other vegetation types to regenerate and would be prevented from re-establishing on the permanent right-of-way.

Because the Project is one that would expand existing rights-of-way, the visual impact on motorists who observe road crossings would be minor. In locations where trees that serve as a visual buffer would be removed, TGP would discuss these screening issues with individual landowners during easement negotiations. In areas where all visual screening is removed, TGP has stated that it would consider strategic planting of fast-growing evergreens.

As discussed above, about 84 percent of the proposed pipeline routes would be within or adjacent to existing rights-of-way. Construction within or adjacent to existing rights-of-way reduces the severity of impacts on visual resources because it minimizes vegetation clearing for the construction work areas and permanent right-of-way and also minimizes new fragmentation of vegetation.

After construction, all disturbed areas would be restored and returned to preconstruction conditions in compliance with federal, state, and local permits; landowner agreements; and TGP's easement requirements, with the exception of aboveground facility sites, discussed further below.

2.4.6.2 Aboveground Facilities

The aboveground facilities associated with the Project would be the most visible features and would result in long-term impact on visual resources. The magnitude of these impacts depends on factors such as the existing landscape, the remoteness of the location, and the number of viewpoints from which the facility could be seen.

All of the proposed compressor station modifications would occur within larger parcels owned by TGP. The Mahwah Meter Station would be located adjacent to an existing facility. MLVs 319-2 and 325-2 would be installed within existing compressor station sites. MLVs 324-2A and 328-2 would be installed along the pipeline loops and within TGP's new permanent right-of-way adjacent to existing MLVs associated with the operational 300 Line. MLVs 322-2A and 324-2B would be installed along the pipeline loops and at new locations within TGP's new permanent right-of-way. The pig launcher/receiver sites would be located at Compressor Stations 319 and 325 and the Mahwah Meter Station. In general, these other aboveground facilities would not result in a significant impact on the surrounding visual character of the Project area. Further, TGP has committed to visually screening MLVs 324-2B and 328-2, which are located near roadways and/or in an open field.

2.4.6.3 Contractor/Pipe Yards

The primary visual impact associated with the 12 proposed contractor/pipe yards would be the storage of equipment, materials, and heavy machinery during Project construction. All of these uses would be temporary and generally concurrent with pipeline construction activities. The contractor/pipe yards would be located in existing fields, quarries, or previously disturbed areas and would not require any modifications to the existing land use. Upon completion of construction, the contractor/pipe yards would be restored in accordance with TGP's ECP. As a result, there would be no permanent impacts on visual resources associated with the use of these yards.

2.4.6.4 Access Roads

In addition to using existing public roads, TGP proposes to modify 52 existing, non-public roads for temporary right-of-way access during construction. The existing non-public access roads are paved, gravel, or dirt roads that may be improved as needed for construction and operations/maintenance. Because the majority of these are existing roads, use as access roads would not result in significant increased impacts on visual resources.

2.5 SOCIOECONOMICS

Construction and operation of the Project could impact socioeconomic resources in the area. Some of these potential effects are related to the number of construction workers that would work on the Project and their impact on population, public services, and temporary housing during construction. Other potential effects are related to construction, such as increased traffic or disruption of normal traffic patterns. Other effects associated with the Project include increased property tax revenue, increased job opportunities, and increased income associated with local construction employment.

2.5.1 Population, Economy, and Employment

Table 2.5.1-1 provides a summary of selected demographic and socioeconomic conditions for affected communities in the Project area.

TABLE 2.5.1-1

Existing Economic Conditions in the Vicinity of the Project

State/County	Population (2000) [a]	Population Density (Persons/sq. mile) (2000) [a]	Per Capita Income (2009) [b]	Civilian Workforce (2000) [a]	Unemployment Rate (percent) (2010-2011) [c, d]	Top Three Industries [e]
Pennsylvania						
Bradford	62,761	54.5	$20,557	29,647	5.2	H, M, R
Wayne	47,722	65.5	$22,315	21,490	7.0	H, R, A
Pike	46,302	84.6	$27,408	20,779	7.0	H, R, A
Susquehanna	42,238	51.3	$21,713	19,945	10.0	H, M, R
New Jersey						
Sussex	144,166	276.6	$35,047	76,632	10.5	H, R, A
Passaic	489,049	2,639.3	$25,808	232,408	12.2	H, M, R
Bergen	884,118	3,775.5	$42,174	453,774	8.4	H, R, W
New York						
Orange	341,367	418.2	$28,272	164,858	8.6	H, R, S

[a] Source: U.S. Census Bureau, Census, 2000.
[b] Source: U.S. Census Bureau. Fact Sheet by State and County. 2005-2009, 2009 inflation-adjusted dollars.
[c] Source: U.S. Department of Labor, Bureau of Labor Statistics. Mid-Atlantic Information Office, 2011 (April).
[d] Source: U.S. Department of Labor, Bureau of Labor Statistics. Labor force data by county, not seasonally adjusted, March 2010-April 2011.
[e] A = Accommodation and Food Services; H = Health and Social Services; M = Manufacturing; R = Retail Trade; S = Scientific and Technical Services; W = Administrative and Support and Waste Management and Remediation Services

Construction of the Project would temporarily increase the population in the general Project area. Certain aspects of construction, including winter tree clearing, installation of HDD segments, and activities in sensitive commercial and/or residential areas, could begin in 2012. The remaining construction activities for the Project would be conducted in 2013. TGP proposes to place the Project facilities in-service no later than November 2013.

TGP estimates that the five pipeline loop segments would require two construction spreads consisting of approximately 400 construction personnel depending upon the loop, and each spread would take approximately 21 to 25 weeks to complete, depending upon site-specific conditions for each loop.

Modifications to the existing compressor station facilities would require from approximately 20 to 40 construction workers and take approximately 6 to 10 months to complete, depending upon the nature of the modifications. TGP does not anticipate the need for additional permanent staff for operation of the new Project facilities.

The construction workforce would include both local and non-local workers, of which approximately 50 percent would be local. TGP, through its construction contractors and subcontractors, may hire local construction workers that posses the required skills and experience into the Project workforce. Project-area population impacts are expected to be temporary and proportionally small. The total population change would equal the total number of non-local construction workers plus any family members accompanying them. Given the brief construction period, most non-local workers would not be expected to be accompanied by their families. Based on the county populations within the Project area, the additional people that might temporarily relocate to the area would not result in a significant change. Additionally, this temporary increase in population would be distributed throughout the pipeline loops and would not have a permanent impact on the population. A brief decrease in the unemployment rate could occur as a result of hiring local workers for construction and increased demands on the local economy.

2.5.2 Housing

Housing statistics for the counties affected by the Project are presented in table 2.5.2-1.

Temporary housing availability varies seasonally and geographically within the counties and communities near the proposed facilities and is available in the form of daily, weekly, and monthly rentals in motels, hotels, campgrounds, and recreational vehicle parks. The demand for temporary housing in the Project area is generally greatest during the summer months when tourism is at its highest. Table 2.5.2-1 also provides the vacant housing units and median monthly housing costs along with number of hotels/motels in the counties crossed by the proposed facilities. Other available temporary housing such as bed and breakfast facilities, apartments, and vacation properties, as well as those in other towns/cities within commuting distance of the Project area (e.g., Scranton, Pennsylvania and Newark, New Jersey) are not included. Therefore, the availability of temporary housing is substantially greater than presented in table 2.5.2-1.

Construction of the Project could affect the availability of housing in the Project area. The Project would likely have a short-term positive impact on the area rental industry through increased demand and higher rates of occupancy; however, no significant impacts on the local housing markets would be expected. Construction activities may occur during the peak tourism season. Also, current activities in the Project area such as Marcellus Shale drilling have resulted in temporary housing being more difficult to find and/or more expensive to secure. However, given the vacancy rates of the Project area (2.9 percent to 8.1 percent), the number of rental housing units in the area, hotel/rooms and campgrounds available in nearby cities and towns, and recent history with the 300 Line Project (FERC Docket No. CP09-444-000), construction crews should not encounter difficulty in finding temporary housing.

TABLE 2.5.2-1

Housing Statistics by County in the Vicinity of the Project

State/County	Owner occupied (percent)	Renter occupied (percent)	Median Monthly Housing Costs [a]		For Seasonal or Occasional Use [a, b]	Vacant Housing Units [a]	Rental Vacancy Rate (percent)	Number of Hotels/ Motels [c]
			Owner Occupied	Renter Occupied				
Pennsylvania								
Bradford	75.5	24.5	1,048	406	2,620	4,211	7.7	1
Wayne	80.4	19.6	1,224	427	10,855	12,243	6.8	0
Pike	84.8	15.2	1,302	986	15,350	17,248	5.7	1
Susquehanna	79.5	20.5	1,146	430	3,924	5,300	7.0	0
New Jersey								
Sussex	82.7	17.3	2,229	812	3,575	5,697	8.1	4
Passaic	55.6	44.4	2,556	971	849	6,192	2.9	5
Bergen	67.2	32.8	2,890	1,000	1,266	9,003	2.6	34
New York								
Orange	69.5	30.5	1,405	631	2,215	7,966	6.5	14

[a] Source: U.S. Census Bureau, 2000.

[b] Seasonal housing units are those intended for occupancy during only certain seasons of the year and are found primarily in resort areas. Housing units held for occupancy by migratory labor employed in farm work during the crop season are tabulated as seasonal. Seasonal mobile homes are counted as a part of the seasonal housing inventory. Source: U.S. Census Bureau, 2000.

[c] Source: ePodunk, 2010. http://www.epodunk.com/

2.5.3 Public Services

A wide range of public services and facilities are offered in the counties crossed by the Project. Services and facilities include hospitals, full-service law enforcement, paid and volunteer fire departments, and schools. Each county in the socioeconomic impact area has its own sheriff's department and numerous fire departments. In addition, each county has multiple school districts operating their own public school systems and a few regional schools.

The influx of non-local workers and associated family members would likely be small relative to the current populations in the Project area (see table 2.5.1-1). This would result in minor, temporary, or no impact on local community facilities and services, such as police, fire, and medical services. The counties, cities, and towns in the Project vicinity presently have adequate infrastructure and services to meet the needs of the non-local workers and family members.

Short-term impacts on public services could include the need for localized police assistance to control traffic flow during construction activities. Also, construction-related injuries could occur as a result of unanticipated accidents or emergencies. In the event of an accident, TGP could require police, fire, and medical services, depending on the type of emergency. The anticipated demand for police, fire, and medical services is not expected to exceed the existing capability of the infrastructure in the Project area to provide them, as these services are expected to be used only in emergencies. These emergency services are located at reasonable distances from the Project area.

Primary impacts on public services would also include temporary increases in demand for retail, recreation, and related services, but we believe the Project area could support these temporary increases in demand. Additionally, we believe that the education infrastructure in the vicinity of the Project could accommodate any temporary educational needs associated with the construction of the Project.

2.5.4 Transportation and Traffic

The local road and highway system in the vicinity of the Project facilities consists of interstate highways, U.S. highways, state highways, secondary state highways, county roads, and private roads. Most local public roads in the vicinity of the Project are paved. Construction of the Project could result in minor, short-term impacts along some roads and highways due to the movement and delivery of equipment, materials, and workers. TGP proposes to primarily use existing public roads during construction but would modify 52 non-public roads for access during construction, which are discussed in section 2.4.1.4 and listed in appendix C.

The Project would cross 30 public roads. The roadways would be crossed by the open-cut, conventional bore, or HDD method, depending on the site-specific conditions. These crossing methods are described in section 1.7.1.2. The number of roads that would be open cut are listed in table 2.5.4-1 by pipeline loop. Road crossing permits would be obtained from applicable state and local agencies. Permit conditions would dictate the day-to-day construction activities at road crossings.

TABLE 2.5.4-1

Summary of Public Roads Crossed and Open-Cut Road Crossings for the Project [a]

State/Pipeline Loop	Number of Public Roads Crossed/Number of Open-Cut Crossings
Pennsylvania	
317	6/1
319	4/1
321	7/3
323 (includes New Jersey segment)	16/3
New Jersey	
325	6/0

[a] Does not include public roadways that have never been developed or have been abandoned and are no longer used but are depicted on the Project alignment sheets based solely on tax map data.

To minimize traffic delays, TGP would establish detours before open cutting roads (see TGP's Traffic Control Plans for Pennsylvania and New Jersey). If no reasonable detours are feasible, at least one traffic lane of the road would be left open, except for brief periods when road closure would be required to lay the pipeline. Appropriate traffic management and signage would be set up and necessary safety measures would be developed in compliance with applicable permits for work in the public roadway. TGP would make arrangements with local officials to have traffic safety personnel present during periods of construction.

The daily commuting of the construction workforce to the Project area could also temporarily affect traffic and create roadside parking hazards. TGP estimates that a maximum of 400 people would be working on any one pipeline spread at any one time. To minimize potential effects on traffic associated with these workers, contractors may provide buses to move workers from common parking areas to the construction work area.

Because pipeline construction work is generally scheduled to take advantage of daylight hours, workers would commute to and from the contractor/pipe yards and/or compressor station sites during off-peak hours (e.g., before 7:00 a.m. and after 6:00 p.m.). Additionally, construction would move sequentially along the pipeline loops and, therefore, traffic flow impacts would be temporary on any given section of roadway.

In addition to the construction workforce, the delivery of construction equipment and materials to the construction work area could temporarily congest existing transportation networks at specific locations. TGP has identified nine contractor/pipe yards where construction equipment would be staged and then transported to the construction right-of-way. Several construction-related trips would be made each day between the construction areas and the yards. These areas would be between about 0.1 to 5.8 miles from each of the pipeline loops. Once a vehicle leaves the contractor/pipe yard, its exact route would vary depending on the current location of construction activity. Equipment would be dropped off in one location and would then move in a linear direction along the right-of-way. As a result, most equipment would be on the pipeline right-of-way and would not significantly affect traffic on local roads after initial delivery.

TGP and its contractors would comply with local weight restrictions and limits, and would attempt to keep roads free of soil that may be deposited by construction equipment. When necessary for equipment to cross roads, mats or other appropriate measures (e.g., sweeping) would be used to reduce deposition of mud. The surfaces of roadways in the general area are not expected to be affected by heavy equipment because such equipment would be restricted to off-roadway operation once it reaches the Project area. The need for road detours and traffic control measures associated with the movement of large construction vehicles may temporarily increase the work load of county law enforcement.

2.5.5 Agriculture

Project construction and operation would result in the temporary disturbance of 64.0 acres of agricultural land (i.e., cultivated fields and hayfields) and permanent disturbance of 13.4 acres of agricultural land (see section 2.4.1.1). The Project would also temporarily disturb about 4.6 acres of an orchard consisting of red oak and various hardwood trees and permanently disturb about 3.2 acres of the orchard.

For agricultural lands, TGP would negotiate just compensation for loss of crop production with each affected landowner, and would conduct post-construction monitoring of crossed agricultural lands to identify areas that may require additional restoration in accordance with its ECP (with the modifications listed in table 1.7-1). Further, the orchard parcel (MPs 0.2 to 0.4 along Loop 319), TGP would prepare a reimbursement plan for the landowner and has committed to negotiating the long-term loss of trees with the affected landowner. Therefore, Project construction and operation is not expected to have a significant socioeconomic impact on affected agricultural landowners.

2.5.6 Property Values

The effect that a pipeline easement may have on a property value is a damage-related issue that would be negotiated between the landowner and TGP during the easement acquisition process, which is designed to provide fair compensation to the landowner for the company's right to use the property for pipeline construction and operation. In addition, affected landowners who believe that their property values have been negatively impacted could appeal to the local tax agency for reappraisal and potential reduction of taxes. It is not anticipated that the Project would negatively impact property values outside the proposed pipeline right-of-way or compressor and meter station boundaries.

The Interstate Natural Gas Association of America (2001) conducted a national case study to determine if the presence of pipeline on a piece of property affected the property value or sale price of the property. The study revealed that there was no significant impact on property sales located along natural gas pipelines and that the pipeline size or the product carried did not impact the sale price. The study also revealed that there were no significant impacts on demand for properties within the geographically diverse areas and that the presence of a pipeline did not impede development of the surrounding

properties. TGP's 300 Line system itself includes numerous locations where residential and commercial developments were purchased and/or constructed on properties that abut the pipeline right-of-way and occurred after the pipeline was built.

We are not aware of any situations where property owners' insurance rates have increased as a result of the location or proximity of aboveground or belowground high pressure natural gas pipeline facilities, nor are we aware of any situation where a landowner's ability to obtain insurance was affected.

2.5.7 Tax Revenues

Construction and operation of the Project would have beneficial impacts on local sales tax revenue. Payroll taxes would also be collected from the workers employed on the Project. TGP anticipates that the total payroll for the Project would be approximately $49 million during the construction phase.

Project construction would result in short-term, beneficial impacts in terms of increased payroll and local material purchases. Because about half of the workers are expected to be local and non-local workers would temporarily relocate to the Project vicinity, a substantial portion of the payroll would be spent with local vendors and businesses. TGP estimates that during a 24-week construction season, non-local workers temporarily relocating to the Project vicinity would spend in excess of $7.5 million on local good and services. TGP also estimates that some additional money would be spent locally on the purchase of equipment and materials. While most of the materials for construction of the Project would be purchased from national vendors, common supplies (e.g., stone and concrete, automotive supplies) would be purchased, as available, from vendors within the Project area. Construction of the Project would also result in increased state and local sales tax revenues associated with the purchase of some construction materials as well as goods and services by the construction workforce. TGP estimates the approximate cost of materials to be $36 million.

TGP has purchased or would purchase additional land and would construct or modify existing buildings on properties already owned by TGP resulting in an increase in property tax revenue in both Pennsylvania and New Jersey. Although Pennsylvania would not receive a significant property tax increase, according to TGP, Sussex, Passaic, and Bergen Counties, New Jersey would each receive estimated property tax increases of between $25,000 and $137,500 beginning in the year 2014. The total amount of property tax increases that would be realized as a result of the Project is approximately $250,000.

2.5.8 Environmental Justice

We received comments during the scoping period regarding the Project's proximity to the Ramapough Lenape American Indians, a non-federally recognized Native American group who primarily reside in the vicinity of Ringwood State Park in northern New Jersey. Commentors assert that the community has been affected by toxic dumping and cleanup of a Ford Motor Company Superfund site in Mahwah, New Jersey and industrial development on lands used by the community for its livelihood.

The Project would involve looping an existing pipeline that was built in the mid-1950s. Therefore, the location of the proposed pipeline loop segments, including Loop 325 in proximity to the Ramapough Lenape American Indian community, is based on the existing pipeline, and the need to expand it. Therefore, the Project siting and design of mitigation occurred without regard for the income or minority status of the property owner. Information about the Project has been readily available to the public, and no disproportionately high and adverse human health or environmental effects on minority and/or low-income communities or Native American tribes have been identified. By locating the pipeline

adjacent to an existing utility corridor, TGP would reduce overall environmental impacts and right-of-way acquisition necessary to construct and operate the Project in comparison to that required for a greenfield project. Further, Project construction would provide some short-term job opportunities. The only long-term socioeconomic effect of the Project is likely to be beneficial, based on the increase in tax revenues that would accrue to the counties affected by the Project.

2.6 CULTURAL RESOURCES

Section 106 of the NHPA, as amended, requires the FERC, as the lead federal agency to take into account the effects of its undertakings on properties listed on or eligible for listing on the National Register of Historic Places (NRHP) and to afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment. TGP, as a non-federal party, is assisting us in meeting our obligations under section 106 of the NRHP and the implementing regulations found at 36 CFR 800.

2.6.1 Agency Consultation

In May 2010, TGP initiated Section 106 consultations with the Pennsylvania Bureau for Historic Preservation (PA SHPO) and the New Jersey Historic Preservation Office (NJ SHPO) and in March 2011, TGP consulted with the New York State Historic Preservation Office (NY SHPO), represented by the Historic Preservation Field Service Bureau of the Office of Parks, Recreation & Historic Preservation.

The PA SHPO advised TGP that known archaeological sites are present within the Project area, provided guidelines for conducting a Phase I archaeological survey, and requested more information regarding their review of recorded historic structures. Subsequently, TGP met with the agency to discuss the results of Phase I investigations and plans for Phase II work and informed the state agency of cultural resources studies for three additional alternative routes in Pennsylvania. TGP has submitted a Draft Phase I cultural resources survey report for Pennsylvania.

The NJ SHPO requested submission of a Phase IA background research report and subsequently provided comments on the report regarding historic preservation issues, clarifications regarding the scope of work, corrections to the Phase IA report, submission of the Phase IB survey report, and completion of an architectural reconnaissance survey. In August 2011, TGP met with the NJ SHPO and submitted the Phase I survey report to the agency. Revisions to the Draft Phase IA literature review report are ongoing, and TGP would submit the revised report when available. TGP has submitted a Draft Phase IB cultural resources survey report for New Jersey.

In March of 2011, TGP wrote a letter to the NY SHPO explaining that the Project proposed to use a single yard in the City of Port Jervis, New York during construction. The NY SHPO concurred with TGP's recommendation that the proposed action would not affect historic properties.

In a November 2010 letter, the Northeast Region of the NPS provided us with comments on the Project. They noted that canal ruins along the Lackawaxen River in Pennsylvania are part of the NRHP-eligible Delaware and Hudson Canal. As it is currently designed, the Project would not cross the Lackawaxen River and would not impact this historic property. The Project would cross the NPS-managed Appalachian National Scenic Trail, which has been determined eligible for NRHP listing since 1978, although is not formally listed. TGP met with the NPS and the ATC on November 9, 2010. TGP explained that the Project would be collocated with TGP's existing, cleared pipeline right-of-way at the Appalachian National Scenic Trail crossing and concluded that the Project would not affect the NRHP-eligibility of the Trail. The Appalachian National Scenic Trail park office of the NPS concurred with this recommendation in a letter dated August 2, 2011. The park office also reported that they are assisting

TGP with special crossing plans at the Trail location. The Appalachian National Scenic Trial is further discussed in section 2.4.3.2.

2.6.2 Tribal Consultation

In June 2010, TGP initiated consultation with American Indian tribes or groups identified as having a potential interest in the Project by providing an information packet and invitation to participate in the Project. TGP sent packets to the Tonawanda Seneca Nation, the Stockbridge-Munsee Community of Wisconsin, St. Regis Mohawk Tribe, Shawnee Tribe of Oklahoma, Seneca-Cayuga Nation of Oklahoma, Tuscarora Nation, Nanticoke Lenni-Lanape Indians of New Jersey, New Jersey Sand Hill Band of Indians, Oneida Indian Nation, Onondaga Nation, Powhatan Renape Nation, Ramapough Lenape Indian Nation, Seneca Nation of New York, Absentee-Shawnee Tribe, Cayuga Nation, Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, Oneida Indian Nation, Cherokee Nation of New Jersey, Echota Chickamunga Cherokee Tribe of New Jersey, and the New Jersey Commission of American Indian Affairs. Follow-up correspondence in the form of additional letters and phone calls occurred in May 2011 and subsequent months.

Five tribes responded that they would like further information or would like to be kept informed about the Project: the Delaware Nation, Delaware Tribe of Indians, Oneida Indian Nation, Eastern Shawnee Tribe of Oklahoma, and the Stockbridge Munsee Community of Wisconsin. Three tribal groups responded that they did not wish to participate in consultation regarding the Project: the Oneida Nation of Wisconsin, Seneca Nation of New York, and the Shawnee Tribe of Oklahoma. Chief Mann of the Ramapough Lenape Nation contacted TGP at an open house on July 28, 2011 and TGP sent a copy of the Draft Phase IB survey report for New Jersey to Chief Mann on September 20, 2011. TGP has indicated that the tribes who responded directly to its initial consultation letters and requested continued interested party status would receive the results of archaeological Phase I and Phase II fieldwork after the NJ SHPO and PA SHPO have commented on the reports. TGP would file records of additional consultation with American Indian tribes with the FERC.

In February 2011, we sent initial consultation letters to 19 American Indian tribes, all of which were previously contacted by TGP. The letters described the Project, invited comments, and requested assistance in identifying properties of traditional, religious, or cultural importance to the tribes that may be impacted by the Project. Follow-up correspondence with the tribes occurred in April and June 2011. To date, three tribes have requested continued consultation with us: the Seneca Nation of New York, Eastern Shawnee Tribe of Oklahoma, and the Ramapough Lenape Nation. The Seneca Nation requested copies of FERC's environmental document. The Ramapough Lenape Nation requested a consultation meeting that would include TGP, the NJ SHPO, and the FERC.

On October 6, 2011, there was a meeting to hear the Ramapough Lenape Nation's concerns about the Project. Meeting attendees included members of the Ramapough Lenape Nation, the FERC, TGP and their cultural resources consultants, and the NJ SHPO. Additionally, a Bergen County representative and an independent archaeologist attended the meeting. The Ramapough Lenape Nation indicated that the background information presented in the draft Phase IA report was missing some local sources of information, including some known sites. They also expressed the concern that the use of low probability survey on slopes within the Ramapo Mountains might miss certain types of cultural sites that might be present. They were concerned about the effects of blasting on cultural resources, including rock shelters and historic mines. They also pointed out the possible historic significance of the Bear Swamp Road and Bear Swamp Bridge. The Ramapough Lenape Nation requested further coordination with TGP to identify and avoid impacts on cultural resources. TGP has agreed to continue to coordinate with the Ramapough Lenape Nation.

2.6.3 Public Comments

During the November 1, 2010 scoping meeting in Ringwood, New Jersey, a Sierra Club representative commented that the Project could impact the view from Ringwood Manor, a property recognized as a National Historic Landmark. In a subsequent filing with us, TGP responded that the Project activities would not traverse the historic property and any potential effects to it would be minor, indirect, and temporary.

At the November 3, 2010 public scoping meeting in Milford, Pennsylvania, a landowner requested that the 1790s barn on his property be protected from pipeline construction impacts. TGP subsequently realigned the pipeline corridor at this property to avoid impacts on the historic barn.

In a November 12, 2010 letter to FERC, Skylands CLEAN commented that a full historical assessment must be completed for Long Pond Ironworks and Ringwood State Parks in New Jersey. The Project is collocated with the existing right-of-way for the 300 Line as it passes through the Long Pond Ironworks State Park, which is not listed on the NRHP. Further, the Long Pond Ironworks Historic District is located approximately 0.5 mile from the Project and would not be affected.

In a letter dated October 2010, and subsequent related letters, several individuals commented that a family cemetery existed in or near the Project in Montague Township, New Jersey. TGP subsequently adopted a route alternative (see section 3.3.2) which would avoid the family cemetery by at least 0.25 mile.

2.6.4 Cultural Resources Surveys

TGP conducted cultural resources survey for the area of potential effects (APE) for the Project including pipeline rights-of-way, access roads, ATWS, aboveground facilities, pipe yards, and other ancillary facilities. TGP surveyed approximately 94 percent of the Project area in Pennsylvania and 96 percent of the Project area in New Jersey. Excluded areas were limited to properties where TGP was unable to obtain landowner access. Archaeological survey was conducted in a 300-foot-wide corridor for pipeline rights-of-way, a 50-foot-wide corridor for access roads. As previously discussed, the NY SHPO concurred with the recommendation that the proposed temporary use of a yard in Port Jervis, Orange County, New York would not affect historic properties.

Phase I archaeological survey included a combination of walkover reconnaissance and shovel testing according to the predictive model of low, medium, and high probability for archaeological discovery. Both the PA SHPO and NJ SHPO recommended geomorphologic investigations to evaluate the potential for deeply buried archaeological resources within the Project APE.

Indirect effects of the Project on historic properties were determined to be primarily visual in nature. Because the Project's pipeline corridor is for the most part collocated with an existing line and would be below ground, the pipeline corridor was not surveyed for indirect impacts. For new or modified aboveground facilities, an APE of 0.25 mile in diameter was surveyed to identify any historic properties within the viewshed of the facility.

TGP filed Draft Phase I survey reports for New Jersey and Pennsylvania, and would file additional survey reports with the FERC and the respective SHPOs for the Phase I survey of any remaining Project locations, including the no-access parcels that have not been surveyed.

2.6.4.1 Phase I Survey Results

Pennsylvania

In Pennsylvania, Phase I archaeological survey has been completed for approximately 906.5 acres, including 737 acres for pipeline corridor, 54 acres for access roads, and 115.5 acres for 5 pipe and contractor yards. Approximately 56 acres (6 percent) of no-access properties remain to be surveyed.

Archaeological survey in Pennsylvania identified 12 archaeological sites consisting of 3 pre-contact sites and 9 historic period sites. Of the three pre-contact sites, one is an artifact scatter and the other two are habitation sites. Of the nine historic period sites, two are artifact scatters, five are artifact scatters with stone features, one is a 20th century shale bank, and one is the North Branch Canal.

Four sites were recommended not eligible for listing on the NRHP and no further work was recommended (36BR0283, 36WY0232, 36WY0295, 36WY0253). Four sites are recommended as potentially eligible or are unevaluated for NRHP-listing and avoidance is recommended (36BR0284, 36PI0254, 36WY0296, 36PI0002). If avoidance is not possible for these sites, Phase II evaluation studies may be recommended (see table 2.6.4-1). Phase II evaluation studies have been completed on three sites (36BR0285, 36BR0286, 36PI0252), and is pending on site 36BR0269. Phase II evaluation reports have not yet been submitted.

TABLE 2.6.4-1

Cultural Resources Sites Identified in Pennsylvania

State/Site Number	Loop/Facility	Recommendations
Archaeological Sites		
36BR0283	Loop 317	Not eligible/No further work
36BR0284	Loop 317	Not evaluated/Avoid
36BR0285	Loop 317	Not eligible/Phase II completed
36BR0286	Loop 317	Not eligible/Phase II completed
36BR0269	Loop 317	Potentially eligible/Phase II Study underway
36WY0295	Loop 321	Not eligible/No further work
36WY0296	Loop 321	Potentially eligible/Avoid, use protective fencing
36WY0232	Loop 321	Not eligible/No further work
36PI0252	Loop 321	Not eligible/Phase II completed
36PI0254	Loop 323	Not evaluated/Avoid by reroute
36PI0002	Loop 323	Potentially eligible/ Avoid or Phase II Study
36PI0253	Loop 323 – Variance 1	Not eligible/ No further work
Historic Architectural Sites		
227 Chute Road	Loop 317	Potentially eligible/Light traffic only
Bethel School House	Loop 321	Potentially eligible/ No further work

The historic architecture survey identified two properties within the Project APE in Pennsylvania that could be affected by the Project: structures at 227 Chute Road in Asylum along an access road proposed for use near Loop 317, and the Bethel School House along an access road proposed for use near Loop 321. To avoid impacts on the property at 227 Chute Road, TGP has proposed to restrict use of Access Road L1-AR-10 to light traffic consisting of pickup trucks, flatbed trucks and small trailers, and would exclude trailers for hauling pipe and heavy equipment. Improvement to the road would include adding gravel and tree trimming. TGP would grade, widen, and add gravel to Access Road L3-AR-0 that passes by the Bethel School House. Access Road L3-AR-0 is more than 50 feet from the Bethel School House and is routinely used for commercial traffic.

TGP continues to assess a number of stone walls that were mapped in the Pennsylvania Phase I report but not discussed in the text. These historic stone features would be addressed in future survey reports. No other historic properties, such as historic districts, historic landscapes, or Traditional Cultural Properties (TCPs) have been recorded within the Project APE in Pennsylvania.

New Jersey

In New Jersey, Phase I survey has been completed for 748 acres, including approximately 606 acres of pipeline corridor, 98 acres for access roads, and 44 acres for pipe and contractor yards. Approximately 28.5 acres (4 percent) of the Project area remains to be surveyed in New Jersey.

The archaeological survey in New Jersey identified 21 archaeological sites consisting of 13 pre-contact sites, 7 historic period sites, and 1 site (28SX467) with both pre-contact and historical period components. Of the 13 pre-contact sites, 5 are isolated finds of lithic artifacts, 4 are lithic artifact scatters, and 4 are artifact scatters with features. Of the seven historic period archaeological sites, four are artifact scatters with foundation remains, one is a dirt road, and two are segments of railroad. The two railroad segments and the dirt road were evaluated during the 300 Line Project and no further work is recommended (28PA187, 28PA188, 28PA192). The five isolated finds are not eligible for NRHP-listing and require no additional work (28SX468, 28SX469, 28SX473, 28PA190, 28PA198). Three sites are recommended as not eligible for NRHP-listing and require no further work (28SX471 Locus 3, 28SX475, 28SX474); and 11 sites are unevaluated or recommended as potentially eligible for NRHP listing, and require avoidance, deep testing, Phase II evaluative testing, or a combination of these treatments (28SX467, 28SX471 Locus 1, 28SX471 Locus 2, 28PA189, 28PA191, 28PA194, 28PA195, 28PA199, 28BE214, 28BE215, 28SX470) (see table 2.6.4-2).

The historic architecture survey identified three properties within the Project APE in New Jersey, which are all recommended as potentially eligible for listing on the NRHP (see table 2.6.4-2). TGP has recommended pre- and post-construction evaluation of St. Luke's Chapel, which may be impacted by vibrations from use of the access road less than 50 feet from the structure, and would post a 10 mile per hour speed limit for a distance of 150 feet on either side of the church building. TGP recommended that only light traffic consisting of pickup trucks, flatbed trucks and small trailers be permitted to cross the historic bridges along Joe's Pond Road. TGP proposes to use Access Road L5 AR 70 as it passes through the Whites Road Gatehouse, the former entrance to the historic Skylands Estate. TGP would post a speed limit of 5 miles per hour for a distance of 150 feet on either side of the former gatehouse during pipe stringing operations in order to guide larger equipment and loads through the stone gate.

The Project would cross the Wanaque Reservoir Historic District, the High Point Park Historic District, and the Appalachian Trail in New Jersey. TGP does not anticipate any effects to these historic properties because the pipeline loops would be collocated with an existing, cleared right-of-way. While the pipeline would cross underneath the Monksville Reservoir, which contains submerged historical architectural resources, use of the HDD method would avoid any impacts on the submerged resources. To date, no other historic districts, historic landscapes, or TCPs have been identified within the Project APE for New Jersey.

TABLE 2.6.4-2

Cultural Resources Sites Identified in New Jersey

State/Site Number	Loop/Facility	Recommendations
Archaeological Sites		
28SX473	Loop 323	Not eligible/Complete deep testing
28SX471 Locus 3	Loop 323	Not eligible/Complete deep testing
28SX471 Locus 2	Loop 323	Potentially eligible/Phase II Study
28SX471 Locus 1	Loop 323	Potentially eligible/Phase II Study
28SX475	L4 AR 35	Not evaluated/Complete deep testing
28SX474	Loop 323	No further work/site is outside APE
28SX467	Loop 323	Potentially eligible/Avoidance or Phase II Study
28SX468	Loop 323	Not eligible/No further work
28SX469	Loop 323	Not eligible/No further work
28PA187	Loop 325	Reported for 300 Line Project/No further work
28PA188	Loop 325	Reported for 300 Line Project/No further work
28PA192	Loop 325	Reported for 300 Line Project/No further work
28PA189	Loop 325	Potentially eligible/Phase II Study
28PA190	Loop 325	Not eligible/No further work
28PA191	Loop 325	Potentially eligible/Phase II Study
28PA194	Loop 325	Potentially eligible/Phase II Study
28PA195	Loop 325	Potentially eligible/Phase II Study
28PA198	Loop 325	Not eligible/No further work
28PA199	Loop 325	Potentially eligible/Avoid, use protective fencing or Phase II Study
28BE214	Loop 325	Potentially eligible/Phase II Study
28BE215	Loop 325	Potentially eligible/Phase II Study
Historic Architectural Sites		
St. Luke's Chapel	Loop 325	Potentially eligible/Avoid, Pre- and Post-construction evaluation
Joes' Pond Road Bridges	Loop 325	Potentially eligible/ Avoid, Restrict heavy traffic
Whites Road Gatehouse	Loop 325	Potentially eligible/ Avoid, Restrict heavy traffic

TGP continues to assess stone walls that were mapped in the New Jersey Phase I report but not discussed in the text. These historic stone features would be addressed in future survey reports. Additional Phase I survey work is still underway in New Jersey. When fieldwork is completed, a Phase I survey report that addresses all reroute surveys including Revised TGP Alternative B along Loop 323 would be submitted to the FERC and the NJ SHPO.

2.6.4.2 Geomorphologic Investigations

TGP filed geomorphology studies as appendices to the respective Phase I survey reports for Pennsylvania and New Jersey. Initial studies to identify deeply buried archeological resources within the Project APE identified locations with the correct soil deposition conditions for potential buried sites. Field testing at these locations revealed one location in the floodplain of the Susquehanna River (Loop 317) with the potential for deeply buried soil horizons and the correct conditions to preserve archaeological resources. Two locations on either side of the Delaware River (Loop 323) were also investigated. While the western side did not have the potential for deeply buried sites, the eastern side on Mashipacong Island in New Jersey revealed deeply buried soil horizons and the correct conditions to preserve archeological resources. TGP's geomorphological consultant recommended further testing for potentially buried archaeological resources at these locations. TGP would report on the results of these investigations with the Phase II evaluation report.

2.6.4.3 Phase II Site Evaluations

In order to provide NRHP-eligibility recommendations, TGP recommended Phase II evaluation studies for four sites in Pennsylvania (36BR0285, 36BR0286, 36BR0269, 36PI0252) and nine sites in New Jersey (28SX471 Locus 1, 28SX471 Locus 2, 28SX467, 28PA189, 28PA191, 28PA195, 28PA194, 28BE214, 28BE215).

Phase II studies have been completed at 36BR0285, 36BR0286, 36BR0252; the Phase II study of 36BR0269 is currently underway. TGP would submit the results of the Phase II evaluations to the FERC and the PA SHPO when they become available.

TGP has started Phase II studies in New Jersey and would submit Phase II evaluation reports to FERC and the NJ SHPO when they become available.

2.6.5 Unanticipated Discoveries Plan

TGP has prepared plans for Pennsylvania, New Jersey, and New York to be used in the event any unanticipated cultural resources or human remains would be encountered during construction. The plan provides for the notification of interested parties, including American Indian tribes, in the event of any discovery. TGP would file with the FERC any comments regarding the Unanticipated Discoveries Plan from the various SHPOs. We find these plans acceptable.

2.6.6 Wetland Mitigation Sites

As discussed in section 2.2.4, TGP is proposing wetland mitigation at three parcels of land in Pennsylvania and New Jersey. In June 2011, TGP initiated consultation with the Philadelphia COE regarding the results of cultural resources investigations for the Van Auken Creek and Tomjack Creek Wetland Mitigation Sites in Wayne and Bradford Counties, Pennsylvania, respectively.

The Phase IA Cultural Resource Survey for the Van Auken Creek Mitigation Site indicated that no known cultural resources are located within or immediately adjacent to the Project site. No cultural resources were identified during a walkover survey, and it was concluded that there is a low potential for cultural resources within the Project site. It was recommended that no additional cultural resource investigations are required for the Project site.

The Phase IA Cultural Resource Survey for the Tomjack Creek Mitigation Site indicated that no known cultural resources are located within or immediately adjacent to the Project site. No cultural resources were identified during a walkover survey, and it was concluded that there is a low potential for cultural resources within the Project site. It was recommended that no additional cultural resource investigations are required for the Project site.

The third proposed wetland mitigation parcel, the Wallkill River Mitigation Site, would be located in Sussex County, New Jersey. TGP has not yet provided cultural resources survey reports for this site. SHPO comments have not been filed for any of the wetland mitigation sites.

2.6.7 General Impacts and Mitigation

Construction and operation of the pipeline loops and associated facilities could affect historic properties. Direct effects could include destruction or damage to all, or a portion of archaeological sites and historic architecture properties. Indirect effects could include the introduction of visual elements that affect the setting or character of a historic property.

Compliance with section 106 of the NHPA has not been completed for the proposed Northeast Upgrade Project. To ensure that the FERC's responsibilities under the NHPA and its implementing regulations are met, **we recommend that:**

- **TGP should not begin construction of facilities, including the pipeline loops and compressor stations, meter stations, and/or use of all staging, storage, or temporary work areas and new or to-be-improved access roads until**:

  a. TGP files with the Secretary the following:

  (1) the updated Phase IA survey report for New Jersey;
  (2) Phase I cultural resources survey report(s) for any previously unreported areas for Pennsylvania and New Jersey, including the Revised TGP Alternative B route and the Wallkill River Mitigation Site;
  (3) Phase II site evaluation reports, as required, to provide NRHP-eligibility recommendations for sites in Pennsylvania and New Jersey, including additional geomorphological testing;
  (4) any other reports, plans, or special studies not yet submitted, including archaeological site avoidance and treatment plans, historic architectural avoidance plans, and unanticipated discovery plans;
  (5) comments on the cultural resource reports and plans from the PA SHPO, NJ SHPO, and any other consulting parties; and
  (6) the records of continued consultation with the Ramapough Lenape Nation, Delaware Nation, the Delaware Tribe of Indians, the Oneida Indian Nation, the Eastern Shawnee Tribe of Oklahoma, and the Stockbridge Munsee Community of Wisconsin, and any other American Indian tribe that have not yet been filed;

  b. the ACHP is afforded an opportunity to comment if historic properties would be adversely affected; and

  c. the FERC staff reviews and the Director of OEP approves the cultural resources reports and plans, and notifies TGP in writing that treatment plans/mitigation measures may be implemented and/or construction may proceed.

  All material filed with the Commission containing location, character, and ownership information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: "CONTAINS PRIVILEGED INFORMATION--DO NOT RELEASE."

2.7 AIR QUALITY

The Project would result in air emissions through both short-term construction activities and long-term operation of the modifications at four existing compressor stations and at one new meter station.

The EPA has established National Ambient Air Quality Standards (NAAQS) for criteria pollutants to protect human health (primary standards) and public welfare (secondary standards). The EPA set NAAQS for the following air contaminants designated “criteria pollutants”: nitrogen dioxide

(NO_2), CO, ozone (O_3), sulfur dioxide (SO_2), lead (Pb), particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM_{10}), and particulate matter with an aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$). The NAAQS reflect the relationship between pollutant concentrations and health and welfare effects, and are supported by sound scientific evidence. The states are required to implement and enforce the NAAQS under a process called State Implementation Plans (SIP), which are approved by the EPA. The State of Pennsylvania implements its SIP through the PADEP, Bureau of Air Quality. The State of New Jersey implements its SIP through the NJDEP.

On December 7, 2009, the EPA defined air pollution to include six greenhouse gases (GHG): carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. This issuance also announced the EPA's finding that at atmospheric concentrations, these GHGs endangered public health and public welfare of current and future generations.[13] The principle GHGs that would be produced by the Project are CO_2, CH_4, and N_2O. No fluorinated gases would be emitted by the Project. Emissions of GHGs are typically estimated as carbon dioxide equivalents (CO_{2e}). GHGs are ranked by their global warming potential (GWP). The GWP is a ratio relative to CO_2 that is based on the properties of the GHG's ability to absorb solar radiation as well as the residence time within the atmosphere. Thus, CO_2 has a GWP of 1, CH_4 has a GWP of 21, and N_2O has a GWP of 310.

Air quality control regions (AQCRs) are areas established for air quality planning purposes in which implementation plans describe how ambient air quality standards would be achieved and maintained. AQCRs were established by the EPA and local agencies, in accordance with section 107 of the CAA, as a means to implement the CAA and comply with the NAAQS through SIPs. The AQCRs are intra- and interstate regions such as large metropolitan areas where improvement of the air quality in one portion of the AQCR requires emission reductions throughout the AQCR. Each AQCR, or portion thereof, is designated based on compliance with the NAAQS. AQCR designations fall under three categories as follows: "attainment" (areas in compliance with the NAAQS); "non-attainment" (areas not in compliance with the NAAQS); or "unclassifiable." The Project area spans several counties in Pennsylvania and New Jersey that have varying attainment designations. Table 2.7-1 shows the counties traversed by the Project and the non-attainment designation for criteria pollutants.

[13] See 74 FR 66,496

TABLE 2.7-1

Attainment Status for the Counties Where Project Facilities Would be Located

Project Component	Location (County, State)	Air Quality Control Region (AQCR) [a]	Pollutant Status	
			Attainment or Unclassifiable	Non-attainment [b]
Compressor Station 319, Loop 317, Loop 319	Bradford, Pennsylvania	Northeast Pennsylvania – Upper Delaware Valley Air Quality Control Region	CO, NO_2, Pb, PM_{10}, $PM_{2.5}$, SO_2, O_3	O_3 (moderate due to OTR)
Compressor Station 321	Susquehanna, Pennsylvania	Northeast Pennsylvania – Upper Delaware Valley Air Quality Control Region	CO, NO_2, Pb, PM_{10}, $PM_{2.5}$, SO_2	O_3 (moderate due to OTR)
Loop 321	Wayne, Pennsylvania	Northeast Pennsylvania – Upper Delaware Valley Air Quality Control Region	CO, NO_2, Pb, PM_{10}, $PM_{2.5}$, SO_2	O_3 (moderate due to OTR)
Compressor Station 323, Loop 321, Loop 323	Pike, Pennsylvania	Northeast Pennsylvania – Upper Delaware Valley Air Quality Control Region	CO, NO_2, Pb, PM_{10}, $PM_{2.5}$, SO_2	O_3 (moderate due to OTR)
Loop 325	Passaic, New Jersey	New Jersey-New York-Connecticut Interstate Air Quality Control Region	CO, NO_2, Pb, PM_{10}, SO_2	O_3 (moderate) $PM_{2.5}$
Compressor Station 325, Loop 323	Sussex, New Jersey	Northeast Pennsylvania – Upper Delaware Valley Air Quality Control Region	CO, NO_2, Pb, PM_{10}, $PM_{2.5}$, SO_2	O_3 (moderate)
Mahwah Meter Station, Loop 325	Bergen, New Jersey	New Jersey-New York-Connecticut Interstate Air Quality Control Region	CO, NO_2, Pb, PM_{10}, SO_2	O_3 (moderate) $PM_{2.5}$
Port Jervis Pipe and Contractor Yard	Orange, New York	New Jersey-New York-Connecticut Interstate Air Quality Control Region	CO, NO_2, Pb, PM_{10}, SO_2	O_3 (moderate) $PM_{2.5}$

[a] Though not a designated AQCR, all counties listed above affected by the Project are located in the Northeast OTR (Ozone Transport Region).

[b] O_3 is moderate because all counties are included in the Northeast OTR.

CO = carbon monoxide
NO_2 = nitrogen dioxide
Pb = lead
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
SO_2 = sulfur dioxide
O_3 = ozone

2.7.1 Construction Impacts and Mitigation

Emissions associated with construction and installation of five pipeline loops, modifications at four existing compressor stations, and modifications at one existing meter station, would include fossil-fuel combustion emissions and fugitive dust. Emissions associated with construction activities generally include: 1) exhaust emissions from construction equipment, 2) fugitive dust emissions associated with construction vehicle movement on unpaved surfaces, and 3) fugitive dust associated with trenching, backfilling, and other earth-moving activities. The exhaust emissions would depend on the equipment used and the hp-hours of operation. Table 2.7.1-1 shows the estimated construction emissions (in tons per year [tpy]) resulting from Project construction.

TABLE 2.7.1-1

Estimated Project Construction Emissions by County

Location (County, State)	Project Component	Emissions (tons per year)					
		NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Bradford, Pennsylvania	Compressor Station 319	4.06	0.31	1.77	0.00	2.11	0.59
	Loop 317	5.57	0.99	14.42	0.01	11.72	1.57
	Loop 319	2.79	0.49	7.21	0.01	5.83	0.78
	Towanda Pipe Yard and Railsiding [a]	--	--	--	--	2.00	0.30
	Wysox Pipe Yard [a]	--	--	--	--	1.20	0.18
	Highway 6 Pipe Yard [a]	--	--	--	--	0.70	0.11
	Sayre Pipe Yard [a]	--	--	--	--	3.28	0.50
Susquehanna, Pennsylvania	Compressor Station 321	4.06	0.31	1.77	0.00	2.11	0.59
Wayne, Pennsylvania	Loop 321	3.86	0.68	9.98	0.01	7.82	1.06
	Herrick Pipe Yard [a]	--	--	--	--	7.86	1.19
	Bethel Contractor and Pipe Yard [a]	--	--	--	--	0.85	0.13
	Honesdale [a]	--	--	--	--	1.62	0.24
Pike, Pennsylvania	Compressor Station 323	4.06	0.31	1.77	0.00	2.11	0.59
	Loop 321	7.43	1.32	19.23	0.019	14.97	2.03
	Loop 323	3.57	0.63	9.25	0.009	7.24	0.98
Passaic, New Jersey	Loop 325	7.48	1.33	19.35	0.02	14.67	2.00
	Tilcon Contractor Yard [a]	--	--	--	--	0.82	0.12
	Tilcon Pipe Yard [a]	--	--	--	--	0.66	0.10
	Jungle Habitat [a]	--	--	--	--	2.98	0.45
Sussex, New Jersey	Compressor Station 325	4.06	0.31	1.77	0.00	2.11	0.59
	Loop 323	12.08	2.14	31.25	0.032	23.14	3.17
	Montague Pipe Yard [a]	--	--	--	--	0.93	0.14
Bergen, New Jersey	Mahwah Meter Station	5.50	0.37	2.06	0.004	1.93	0.64
	Loop 325	1.81	0.32	4.69	0.005	3.55	0.48
Orange, New York	Port Jervis Pipe and Contractor Yard [a]	--	--	--	--	0.71	0.11

[a] Contractor and pipe yards include fugitive dust emissions only.

NO_x = nitrous oxide
VOC = volatile organic compound
CO = carbon monoxide
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
SO_2 = sulfur dioxide

The PADEP and NJDEP regulate construction-related particulate emissions through title 25 of the Pennsylvania Code, section 123.1 (25 PA Code 123.1) and title 7 of the New Jersey Administrative Code (NJAC), chapter 27, subchapter 22 (NJAC 7:27-22), respectively. TGP would use the following and other applicable methods to ensure compliance with 25 PA Code 123.1 and NJAC 7:27-22:

- use, where possible, of water or chemicals for control of dust in the demolition of buildings or structures, construction operations, the grading of roads or the clearing of land;
- apply asphalt, oil, water, or suitable chemicals on dirt roads, material stockpiles, and other surfaces which may give rise to airborne dust;
- paving and maintenance of roadways;

- prompt removal of soil or other material from paved streets onto which it has been transported by trucking or earth moving equipment, erosion by water, or other means; and

- limiting on-road and off-road construction equipment to 3 minutes of idling, where appropriate.

Construction equipment would be operated generally during the day time and on an as-needed basis. TGP would require its contractors to comply with best management practices discussed in TGP's ECP related to air quality during construction, including the use of dust suppression (e.g., watering); using newer, cleaner operating equipment; and encouraging the use low-emission fuels.

Once construction activities in an area are completed, fugitive dust and construction equipment emissions would subside and Project-related impact on air quality would terminate. Given the limited scope of the Project, emissions associated with the construction phase would be short-term in nature and would not result in a significant impact.

2.7.2 Operational Impacts and Mitigation

Operation of the Project's modified compressor stations would result in air emission increases over pre-Project emissions levels. The operational sources, mitigation measures, emissions, impacts, and regulatory applicability for each proposed facility is outlined below.

2.7.2.1 Compressor Stations 319 and 325

The proposed modifications at Compressor Stations 319 and 325 would not increase facility emissions or compression capacity and would not have any impact on air quality.

2.7.2.2 Compressor Station 321

Compressor Station 321 in Susquehanna County, Pennsylvania operates in accordance with Title V Operating Permit 58-00001 (issued on March 6, 2009) and PADEP Plan Approval 58-329-008 (issued on April 28, 2010). The compressor station currently consists of four Solar Centaur 20 Simple turbines and one emergency generator. The proposed modifications include installation of one 10,310-hp natural gas-fired Solar Taurus 70 turbine with Solar's SoLoNO$_x$ Technology. One of the existing Solar Centaur 40 Turbines would be removed. Potential-To-Emit (PTE) emissions resulting from the proposed new source at the compressor station are summarized in table 2.7.2-1.

TABLE 2.7.2-1

Proposed Potential Emissions - Compressor Station 321

Source	Emissions (tpy)						
	NO_x	CO	VOC	SO_2	PM[a]	HCHO	Total HAPs
Existing Natural Gas Turbine Potential	18.00	23.58	6.33	0.67	1.30	0.26	0.30
Existing Natural Gas Turbine Potential	18.00	23.58	6.33	0.67	1.30	0.26	0.30
Existing Natural Gas Turbine Potential	18.00	23.58	6.33	0.67	1.30	0.26	0.30
Existing Emergency Generator Potential	0.44	0.87	0.22	0.0006	0.01	0.08	0.11
Existing Natural Gas Turbine Potential[b]	-18.00	-23.58	-6.33	-0.67	-1.30	-0.26	-0.30
New Natural Gas Turbine Potential	20.26	23.81	11.53	1.19	2.31	0.50	0.56
Total New	**56.70**	**71.84**	**24.41**	**2.53**	**4.92**	**1.10**	**1.27**

[a] Assumes PM = PM_{10} = $PM_{2.5}$

[b] This compressor unit was installed for temporary use under Docket No. CP09-234-000 and TGP's blanket authority (CP82-413-000). TGP plans to remove this unit in 2011.

NO_x = nitrous oxide
CO = carbon monoxide
VOC = volatile organic compound
SO_2 = sulfur dioxide
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
HCHO = Formaldehyde
HAPs = hazardous air pollutants

Nonattainment New Source Review and Prevention of Significant Deterioration

New Source Review (NSR) refers to the pre-construction permitting programs under Parts C and D of the CAA that must be satisfied before construction can begin on new major sources or major modifications are made to existing major sources located in attainment or unclassified areas. This review may include a Prevention of Significant Deterioration (PSD) review. This review process is intended to prevent new air emission sources from causing existing air quality to deteriorate beyond acceptable levels as codified in the federal regulations. For sources located in non-attainment areas, the Non-attainment New Source Review (NNSR) program is implemented for the pollutants for which the area is classified as non-attainment.

The PSD review regulations are intended to preserve the air quality in areas where criteria pollutant levels are below the NAAQS to which major new or modified stationary sources may contribute. The PSD regulations apply to new major sources or major modifications of existing major sources located in an attainment area. The PSD regulations (40 CFR 52.21) define a "major source" as any source type belonging to a list of named source categories that emit, or have the PTE, 100 tpy or more of any regulated criteria pollutant. A major source under PSD can also be defined as any source not on the list of named source categories with a PTE equal to or greater than 250 tpy for criteria pollutants.

As previously noted, Compressor Station 321 is located in the Northeast Ozone Transport Region (OTR) and, therefore, a review must be performed to address NNSR applicability for the pollutants in nonattainment (nitrous oxide [NO_x] and volatile organic compound [VOC]) and a PSD applicability review for the pollutants in attainment (carbon monoxide [CO], particulate matter, and SO_2). The compressor station currently designated as a minor source under the NNSR program because VOC and NO_x emissions are below their respective major source thresholds. The facility is also a minor source with respect to the PSD program. The modified Compressor Station 321 would remain a minor source with respect to NNSR and PSD and would not be subject to NNSR or PSD.

Title V Operating Permit

Title V of the CAA requires states to establish an air operating permit program. The requirements of Title V are outlined in 40 CFR 70 and the permits required by these regulations are often referred to as Part 70 permits. If a facility's PTE exceeds the criteria pollutant or hazardous air pollutant (HAP) thresholds, the facility is considered a major source. The major source threshold level for an air emission source is 100 tpy for criteria pollutants. The major source HAP thresholds for a source are 10 tpy of any single HAP or 25 tpy of all HAPs in aggregate.

The EPA also promulgated the Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule.[14] The first phase-in step of the tailoring rule began on January 2, 2011, and required application of PSD or Title V requirements to sources' GHG emissions only if the sources were already subject to PSD or Title V due to their non-GHG pollutants. A source was subject to PSD requirements under this first step if GHG emissions increased by at least 75,000 tpy CO_{2e} and also had a significant increase in at least one non-GHG pollutant. For Title V, only sources with a Title V permit, or new sources obtaining a Title V permit for non-GHG pollutants were required to address GHGs in phase I of the Tailoring Rule. The second phase-in began on July 1, 2011. New sources and existing sources not previously subject to Title V that emitted at least 100,000 tpy CO_{2e} would become subject to PSD and Title V requirements. Also, sources that had the PTE to emit at least 100,000 tpy CO_{2e} and that undertook a modification that increased net emissions of GHGs by 75,000 tpy CO_{2e} would be subject to PSD requirements.

Title V permitting requirements would not have applied to Compressor Station 321 because the future PTE emission levels would be below the major source thresholds for criteria pollutants and HAPs. However, upon completion of the Project, the station would have PTE emission levels above 100,000 tpy CO_{2e}, the Title V major source permitting thresholds with regards to the Tailoring Rule. In accordance with Pennsylvania rule Title 25 Part I Subpart C 127.12b, TGP plans to submit a Title V Administrative Amendment application to update its current Title V Operating Permit within 180 days after the proposed turbine begins operation, prior to the expiration of the PADEP plan approval. The PADEP plan approval authorizes construction, startup, and temporary operation of the turbine.

New Source Performance Standards Requirements

New Source Performance Standards (NSPS) for various engine sizes and types have been established by the EPA and implemented under the CAA. NSPS regulations are issued for categories of sources that cause or contribute significantly to air pollution which may reasonably be anticipated to endanger public health or welfare. The standards apply to new stationary sources of emissions, i.e., sources whose construction, reconstruction, or modification began after a standard for those sources was proposed.

NSPS Subpart KKKK applies to manufacturers and owner/operators of gas turbines manufactured after the applicability date stated in the rule for the particular type and size gas turbine. Subpart KKKK regulates emissions of NO_x and SO_2. The proposed Solar Taurus 70 turbine would be subject to NSPS Subpart KKKK as a new medium-sized natural gas-fired turbine. TGP would meet the required NO_x and SO_2 emission limits through the Solar SoLoNO$_x$ Technology and the combustion of only pipeline-quality natural gas. In addition to Subpart KKKK, TGP would also comply with applicable requirements in NSPS Subpart A.

[14] See 75 FR 31,514 (June 3, 2010).

National Emission Standard for Hazardous Air Pollutants for Source Categories and Maximum Achievable Control Technologies

National Emission Standard for Hazardous Air Pollutants for Source Categories and Maximum Achievable Control Technologies (NESHAP) Parts 61 and 63 regulate the emissions of HAPs from existing and new sources. Natural gas transmission and storage or compressor stations are not among the industries listed in Part 61 and do not emit any pollutants listed in Part 61. Therefore, the compressor stations are not subject to the NESHAP requirements in 40 CFR 61.

The 1990 CAA Amendments established a list of 189 HAPs (currently 187 HAPs), resulting in the promulgation of Part 63. Part 63, also known as Maximum Achievable Control Technology standards, defines major source categories that emit HAPs above Title V major source thresholds. The major source thresholds for the purpose of NESHAP applicability are 10 tpy of any single HAP or 25 tpy of all HAPs in aggregate. As identified in table 2.7.2-2, Compressor Station 321 would be a minor source (or area source) of HAPs. NESHAP Subpart YYYY (NESHAP for Stationary Combustion Turbines) would not apply to the turbines at Compressor Station 321 as the facility would not be a major source of HAP emissions. However, TGP would be subject to the general permitting and notification requirements under 40 CFR 63, Subpart A.

Air Dispersion Modeling Analysis

TGP conducted a modeling analysis using the EPA's SCREEN3 dispersion model to provide a conservative evaluation of the potential impacts on the ambient air quality from operation of the new turbine at Compressor Station 321. SCREEN3 is a simple screening-level dispersion model that is capable of considering one emission source. A conservative estimate of the impact of multiple emission sources can be performed by adding individual SCREEN3 results for multiple sources. The result is conservative because all the emission sources are not collocated and actual dispersion due to the spacing between emission sources results in lower pollutant concentrations. In addition to the onsite emission sources, a background concentration obtained from representative ambient air monitoring stations was added to the results produced by SCREEN3. The total provides a conservative estimate of pollutant concentrations due to emissions from the new compressor unit plus background pollutant levels. As demonstrated in table 2.7.2-2, the potential impact of the modified Compressor Station 321 plus the representative background concentrations would be below all applicable NAAQS.

TABLE 2.7.2-2

Summary of Predicted Air Quality Impacts - Compressor Station 321

Pollutant	Averaging Period	Potential Impact ($\mu g/m^3$)	Ambient Background Concentration [a] ($\mu g/m^3$)	Project Impact Plus Background ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Percent of NAAQS Impact (%)
NO_x	1-Hour	65.95	112.87	178.82	188	95.12
	Annual	5.28	20.70	25.98	100	25.98
SO_2	3-Hour	2.68	123.00	125.68	1,300	9.67
	24-Hour	1.19	52.30	53.49	365	14.66
	Annual	0.24	13.10	13.34	100	13.34
CO	1-Hour	77.20	3,321.0	3,398.2	40,000	8.50
	8-Hour	54.04	2,061.0	2,115.04	10,000	21.15
PM_{10}	24-Hour	2.25	57.00	59.25	150	39.50
$PM_{2.5}$	24-Hour	2.25	29.47	31.72	35	90.63
	Annual	0.45	11.28	11.73	15	78.21

[a] Ambient background concentration determined from U.S. Environmental Protection Agency (EPA) AirData website for Scranton, Pennsylvania, from 2007-2009 (EPA, 2011b).

$\mu g/m^3$ = micrograms per cubic meter NAAQS = National Ambient Air Quality Standards

2.7.2.3 Compressor Station 323

Proposed modifications at Compressor Station 323 would not have an effect on facility emissions because the new compression would be accomplished with one 12,000-hp electric-driven compressor unit that would not generate air emissions. The modifications do not meet the definition of modification under the NSR program and, therefore, air permitting activities are not required.

2.7.3 Conformity of General Federal Actions

In addition to New Jersey and Pennsylvania being located in the Northeast OTR, Bergen and Passaic Counties, New Jersey, are part of the New York-North New Jersey-Long Island NY-NJ-CT AQCR that is currently designated as a moderate ozone nonattainment area and nonattainment for $PM_{2.5}$. Sussex County, New Jersey, is part of the Northeast Pennsylvania – Upper Delaware Valley AQCR that is currently designated as a moderate ozone nonattainment area. Additional regulations have been adopted to reduce emissions of $PM_{2.5}$ and ozone precursors; VOC and NO_x. The General Conformity Rule is codified in 40 CFR 51, Subpart W and Part 93, Subpart B, "Determining Conformity of General Federal Actions to State or Federal Implementation Plans." General Conformity, if applicable, refers to the process to evaluate plans, programs, and projects to determine and demonstrate that they satisfy the requirements of the CAA and applicable SIP.

The permanent and temporary emissions associated with the Project would need to be evaluated for applicability of the General Conformity program requirements. The permanent emissions associated with the Project are those of the new unit at Compressor Station 321. The modified Compressor Station 321 would be subject to Title V permitting requirements with regard to GHG emissions, and would be excluded from general conformity requirements. Therefore, we reviewed the criteria pollutant emissions expected to be generated during construction of the Project in each county for comparison to the General Conformity thresholds in 40 CFR 93.153(b)(1). The results are summarized in table 2.7.3-1.

As shown in table 2.7.3-1 the estimated applicable Project emissions generated in each county as well as the total Project emissions would be below the applicable General Conformity thresholds and, therefore, a General Conformity Determination is not required.

TABLE 2.7.3-1

General Conformity Applicability Review

Location (County, State)	Project Component	Project Emissions (tons per year) NO_x	VOC	$PM_{2.5}$
Bradford, Pennsylvania	Compressor Station 319, Loop 317, Loop 319, Towanda Pipe Yard and Railsiding, and Wysox, Highway 6, and Sayre Pipe Yards	12.42	1.80	4.03
Susquehanna, Pennsylvania	Compressor Station 321	4.06	0.31	0.59
Wayne, Pennsylvania	Loop 321, Bethel Contractor and Pipe Yard, Herrick Pipe Yard, and Honesdale	3.86	0.68	2.62
Pike, Pennsylvania	Compressor Station 323, Loop 321, and Loop 323	15.06	2.27	3.60
Passaic, New Jersey	Loop 325, Tilcon Contractor Yard, Tilcon Pipe Yard, and Jungle Habitat	7.48	1.33	2.67
Sussex, New Jersey	Compressor Station 325, Loop 323, and Montague Pipe Yard	16.13	2.46	3.90
Bergen, New Jersey	Mahwah Meter Station and Loop 325	7.31	0.69	1.13
Orange, New York	Port Jervis Pipe and Contractor Yard [a]	--	--	0.11
Project Totals [b]		**66.32**	**9.54**	**18.65**
General Conformity Threshold [c]		**100**	**50**	**100**
General Conformity Applicability		**No**	**No**	**No**

[a] Contractor and pipe yards include fugitive dust emissions only.

[b] Per 40 Code of Federal Regulations 93.150(e), conformity must be evaluated for each non-attainment or maintenance area separately. However, the total Project construction emissions are reported here because the combined emissions are below the general conformity thresholds. Therefore, no further analysis is required.

[c] Applicable thresholds for a designated moderate nonattainment area located within an ozone transport region.

NO_x = nitrous oxide
VOC = volatile organic compound
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter

2.7.4 Greenhouse Gas Emissions

On September 22, 2009, the EPA issued the final Mandatory Reporting of GHG Rule. The Mandatory Reporting Rule established the following reporting categories that may apply to the Project: general stationary fuel combustion sources (Subpart C), petroleum and natural gas systems (Subpart W), and suppliers of natural gas (Subpart NN). In order to be subject to any of these reporting subparts the source must emit or supply greater than or equal to 25,000 metric tons[15] of GHG, as CO_{2e}, per year.

Emissions of GHG pollutants associated with the construction and operation of the Project, including all direct and indirect emission sources, were calculated. In addition, GHG emissions were converted to total CO_{2e} emissions based on the GWP of each pollutant. Summaries of GHG emissions from construction and operation of the Project are provided in tables 2.7.4-1 and 2.7.4-2, respectively. The EPA's reporting rule does not apply to construction emissions; however, we have included the construction emissions for accounting and disclosure purposes.

[15] A metric ton is 2,205 pounds, or approximately 1.1 tons.

TABLE 2.7.4-1

Summary of Project-Related Construction Greenhouse Gas Emissions

Location	Carbon dioxide equivalent (CO_{2e}) Emissions (metric tons/year) [a]
Compressor Station 319	532.4
Compressor Station 321	532.4
Compressor Station 323	532.4
Compressor Station 325	532.4
Mahwah Meter Station	595.1
Pipeline Loop 317	635.1
Pipeline Loop 319	317.5
Pipeline Loop 321	846.4
Pipeline Loop 323	1,374.6
Pipeline Loop 325	1,057.6
Total Emissions	**6,955.9**

[a] CO_{2e} calculated from global warming potentials presented in the Intergovernmental Panel on Climate Control's Fourth Assessment Report.

TABLE 2.7.4-2

Summary of Project-Related Operational Greenhouse Gas Emissions

Source	Carbon dioxide equivalent (CO_{2e}) Emissions (metric tons/year) [a]
Compressor Station 319	0
Compressor Station 321	42,468
Compressor Station 323	3,621
Compressor Station 325	0
Total Emissions	**46,089**

[a] CO_{2e} calculated from global warming potentials presented in the Intergovernmental Panel on Climate Control's Fourth Assessment Report.

Based on the emission estimates summarized in table 2.7.4-2, the combustion-related GHG emissions from operation of the Project may potentially exceed 25,000 metric tons per year. For all actual GHG emissions from the proposed sources equal to or greater than 25,000 metric tons per year, TGP would be required to comply with all applicable requirements of the Mandatory Reporting Rule.

Potential impacts on air quality associated with construction and operation of the Project would be minimized by strict adherence to all applicable federal and state regulations. Based on the analysis presented above, we believe that operation of the proposed facilities would have no significant impact on regional air quality.

2.8 NOISE

Construction and operation of Project components may affect overall noise levels in the Project area. The ambient sound level of a location is defined by the total noise generated within the specific environment and is usually comprised of natural and man-made sounds. At any location, both the magnitude and frequency of environmental noise may vary considerably over the course of a day and throughout the week. This variation is caused in part by changing weather conditions and the effect of seasonal vegetative cover.

Two measurements used by some federal agencies to relate the time-varying quality of environmental noise to its known effects on people are the equivalent sound level (L_{eq}) and the 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 and early morning (10:00 p.m. to 7:00 a.m.) noise exposures are penalized +10 decibels to account for people's greater sensitivity to sound during the nighttime hours.

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 (dB) on the A-weighted scale (dBA) protects the public from indoor and outdoor activity interference. We have adopted this criterion and use it to evaluate the potential noise impacts from the Project at noise-sensitive areas (NSAs).

For Pennsylvania sites, Susquehanna County, Clifford Township, and Lackawaxen Township all have noise regulations, which must be considered for the Project components in those areas. In New Jersey, Sussex, Bergen, and Passaic Counties have noise control statutes that must be considered. Additionally, West Milford Township, Ringwood Borough, and Mahwah Township all have noise control ordinances that must be considered (see table 2.8-1).

2.8.1 Construction Impacts and Mitigation

Noise could affect the local environment during the construction period along the pipeline routes and at aboveground facilities and contractor/pipe yards. The construction activities would be performed with standard heavy equipment, such as track-excavators, backhoes, bulldozers, dump trucks, cement trucks, and boring equipment; however, not all of the equipment would be used in each phase of construction.

Construction is currently planned to occur during normal daytime working hours, except for limited 24-hour work associated with the blowdown, construction dewatering, and hydrostatic testing activities. HDD activities could also potentially occur on a 24-hour-per-day basis as discussed below. TGP indicates that there are residences within 50 feet of the construction work area for the proposed pipeline loops. Individuals at these locations would likely hear construction noise during the daytime, but the overall impact would be temporary. During Project construction, area nighttime noise levels would normally be unaffected, as most construction would be limited to daylight hours with the exceptions noted above.

Construction activities at Compressor Stations 321 and 323 where additional compression equipment is proposed would consist of earthwork and installation of the new compressor units, piping, and associated buildings. The duration of construction at these aboveground facilities would be between 6 and 8 months. Construction noise impact at the nearest NSA would not substantially change the noise levels generated by the existing stations. Likewise, modifications to Compressor Stations 319 and 325 and at the Mahwah Meter Station would not cause any significant impact on the noise quality in the areas. With activities limited to daytime hours and given the temporary nature of the proposed modifications, we do not believe that adjacent landowners would be adversely affected.

TABLE 2.8-1

Noise Ordinances in the Project Area

Jurisdiction	Facility	HDD	Noise Regulations
County, State			
Susquehanna, PA	Compressor Station 321	None	Section 710: Compressor Stations and Water Treatment Facilities – 710.3.B Noise – "Audible sound from a Natural Gas Compressor Station shall not exceed fifty (50) dBA as measured at the exterior of any Occupied Building on a Non-participating Landowner's property."
Sussex, NJ	Compressor Station 323	Delaware River	All three counties adhere to the New Jersey Administrative Code (N.J.A.C.) 7:29 for Noise Control. This code states that continuous noise between 7 a.m. and 10 p.m. must remain below 65 dBA at any residential property line, and continuous noise between 10 p.m. and 7 a.m. must remain below 50 dBA at any residential property line. At community service facilities, continuous noise must remain below 65 dBA regardless of time of day. The code also places limits on sound pressure level at each octave band. Special instructions are given for impulsive noise.
Bergen, NJ	Mahwah Meter Station	None	
Passaic, NJ	None	Monksville Reservoir	
Township			
Clifford, PA	Compressor Station 321	None	Industrial Noise Ordinance 02-2010 exists but is not available through the township's website. TGP has contacted the township for more information.
Lackawaxen, PA	Compressor Station 323	None	From Lackawaxen Township Ordinance 82, Section 6: Noise measured with A-weighting and fast response time at the property line shall be within the following ECNL limits: 63 dB for daytime (6 a.m. to 7 p.m.), 50 dB for evening (7 p.m. to 10 p.m.), and 40dB for nighttime (10 p.m. to 6 a.m.). If a noise source causes less than a 5 dB increase in environmental noise level, the noise source would not be found in violation of this standard.
West Milford, NJ	None	Monksville Reservoir	West Milford Town Code Chapter 226, Noise: Section 6 C.(3): "Construction and demolition activity, excluding emergency work, shall not be performed between the hours of 6pm and 7am on weekdays, or between the hours of 6pm and 9am on weekends and federal holidays, unless such activities can meet the limits set forth in Tables I and II. All motorized equipment used in construction and demolition activity shall be operated with a muffler. At all other times, the limits set forth in Tables I and II do not apply to construction and demolition activities." Table I indicates that the general operation of commercial facilities shall remain below 65 dB(A). Table II provides octave-band limits on emitted noise. All measurements apply at the property line.
Ringwood Borough	None	Monksville Reservoir	From Ringwood General Ordinances 3-4: Noise: Construction or repairing of buildings is permitted only between 7 a.m. and 6 p.m. on weekdays. Power equipment shall not be operated between 8 p.m. and 7 a.m. on weekdays or any time on Sundays. Noisy machinery such as pile drivers and steam shovels shall not be operated between the hours of 10 p.m. and 7 a.m. on any day. Ordinance 37-4.12 indicates that environmental impact statements shall include anticipated effects on noise and vibration levels. Applicants must establish that the regular operation of the facility would not exceed State of New Jersey noise regulations.
Mahwah, NJ	Mahwah Meter Station	None	From Mahwah General Ordinances 24-8.4g: octave-band sound pressure level must be below 60 dB at 20-300 Hz, below 40 dB at 300-2,400 Hz, and below 30 dB at higher frequencies. A correction is applied to the limits according to the nature of the noise. The limits increase by 5 dB for daytime operation or for noise that occurs less than 20 percent of any 1-hour period. The limits decrease by 5 dB for noise of impulsive or tonal character. Only one correction is applied. Measurements are to be taken at the property lines of the noise source.

The Project as proposed includes three HDDs for construction across major waterbodies. These include crossing of the Susquehanna River, Delaware River, and Monksville Reservoir. TGP would conduct the proposed HDDs during daylight hours (with the exception of the pipe pullback through the drilled hole), barring any difficulties during drilling. The duration of the HDDs at the Susquehanna River, Delaware River, and Monksville Reservoir are expected to last about 12, 4, and 23 weeks, (assuming a 10-hour-day and 6-day-per-week schedule), respectively. HDD activities occurring between 10:00 p.m. and 7:00 a.m. local time would be conducted with the goal of maintaining the perceived noise at the nearest NSAs at or below an L_{dn} of 55 dBA. If this L_{dn} cannot be achieved, TGP would provide compensation or temporary relocation options for residents at the affected NSAs.

TGP conducted a noise assessment that included both a site ambient sound survey and an acoustical analysis of the proposed HDD noise at the nearest NSAs to each of the HDD entry and exit sites. The NSAs within 0.5 mile of each HDD entry or exit are identified below. Calculated sound contributions of the HDD activities at each NSA are presented in table 2.8.1-1.

TABLE 2.8.1-1

Calculated 12-Hour Horizontal Directional Drill Sound Level Contributions at Nearest Noise-Sensitive Areas

Horizontal Directional Drill No. and Site	Entry/ Exit	Noise-Sensitive Area	Distance (feet) and Direction	Calculated Existing Sound Level, L_{dn} (dBA)	Calculated HDD Contribution, L_{dn} (dBA)	Estimated HDD L_{dn} + Existing L_{dn} (dBA)	Potential Noise Change (dB)
1 – Susquehanna River	Entry (West)	1	480 SSW	43.1	48.1 [a]	49.3	6.2
		2	760 SW	43.1	44.7 [a]	47.0	3.9
		3	660 WSW	43.1	47.2 [a]	48.6	5.5
		4	780 NW	43.1	52.7 [a]	53.2	10.1
	Exit (East)	1	560 NE	36.5	45.3	45.8	9.3
		2	1,800 SE	36.5	37.3	39.9	3.4
2 – Delaware River	Exit (North)	1	125 SW	64.1[b]	48.7 [a]	64.2	0.1
		2	150 SE	64.1[b]	47.5 [a]	64.2	0.1
		3	130 E	64.1[b]	47.9 [a]	64.2	0.1
	Entry (South)	1	1,800 SSE	52.1	42.3	52.5	0.4
		2	2,050 ENE	52.1	40.9	52.4	0.3
3 – Monksville Reservoir	Entry (East)	1	2,700 ESE	50.7	39.5	51.0	0.3
		2	2,860 ESE	50.7	38.8	51.0	0.3
		3	2,900 ESE	50.7	38.7	51.0	0.3
	Exit (West)	1	1,525 NW	62.9[c]	37.1	62.9	0
		2	1,420 WNW	62.9[c]	37.5	62.9	0
		3	1,580 W	62.9[c]	36.8	62.9	0
		4	1,960 SW	62.9[c]	36.3	62.9	0

[a] Sound level contributions listed are with noise control treatments.

[b] Dominant source of sound was constant traffic noise from Interstate 84 and U.S. Highway 6.

[c] Includes sound from operation of light industrial facilities and vehicles.

L_{dn} = day-night sound level
dBA = decibels on the A-weighted scale
dB = decibels

As shown in table 2.8.1-1, the HDD contribution at the nearest NSAs would be below our criteria of an L_{dn} of 55 dBA. In order to meet our criteria of an L_{dn} of 55 dBA, TGP committed to installing residential-grade exhaust mufflers on all HDD drill rig engines and placing temporary barriers around the southern side of the Susquehanna River entry site and around the western, southern, and eastern side of Delaware River exit site. Secondary noise control treatments may be required, depending on the actual equipment layout and the site characteristics. As an alternative to the primary and/or secondary noise control treatments, TGP would offer compensation or temporary relocation to the residents as a means of reducing the temporary HDD noise impact.

In spite of the noise mitigation measures implemented, the potential noise increase at some of the NSAs near the Susquehanna River exit and entry points would range from 3.4 to 10.1 dB. In general, an increase of 3 dB is the threshold of noticeable difference for humans, 5 dB is clearly noticeable, and a 10-dB difference would be perceived as twice the noise. Even with these increases in ambient noise, we find that the noise impact would not be significant considering that TGP would conduct the HDD activities during the daytime.

For the 12-hour HDD scenario at the Susquehanna River entry and exit sites, the barriers and residential-grade exhaust mufflers would reduce the sound level to less than 55 dBA L_{dn} and the noise increase would be under the threshold of noticeable difference at all NSAs. However, it may be necessary for TGP to conduct HDD operations on a 24-hour-per-day basis. Calculated sound contributions of the 24-hour HDD activities at each NSA are presented in table 2.8.1-2.

TABLE 2.8.1-2

Calculated 24-Hour Horizontal Directional Drill Sound Level Contributions at Nearest Noise-Sensitive Areas

Horizontal Directional Drill No. and Site	Entry/ Exit	Noise-Sensitive Area	Distance (feet) and Direction	Calculated Existing Sound Level, L_{dn} (dBA)	Calculated HDD Contribution, L_{dn} (dBA)	Estimated HDD L_{dn} + Existing L_{dn} (dBA)	Potential Noise Change (dB)
1 – Susquehanna River	Entry (West)	1	480 SSW	43.1	57.5[a]	57.7	14.6
		2	760 SW	43.1	54.1[a]	54.4	11.3
		3	660 WSW	43.1	56.6[a]	56.8	13.7
		4	780 NW	43.1	62.1[a]	62.2	19.1
	Exit (East)	1	560 NE	36.5	54.7	54.8	18.3
		2	1,800 SE	36.5	46.7	47.1	10.6
2 – Delaware River	Exit (North)	1	125 SW	64.1[b]	58.1[a]	65.1	1.0
		2	150 SE	64.1[b]	56.9[a]	64.9	0.8
		3	130 E	64.1[b]	57.3[a]	64.9	0.8
	Entry (South)	1	1,800 SSE	52.1	51.7	54.9	2.8
		2	2,050 ENE	52.1	50.3	54.3	2.2
3 – Monksville Reservoir	Entry (East)	1	2,700 ESE	50.7	48.9	52.9	2.2
		2	2,860 ESE	50.7	48.2	52.6	1.9
		3	2,900 ESE	50.7	48.1	52.6	1.9
	Exit (West)	1	1,525 NW	62.9[c]	46.5	63.0	0.1
		2	1,420 WNW	62.9[c]	46.9	63.0	0.1
		3	1,580 W	62.9[c]	46.2	63.0	0.1
		4	1,960 SW	62.9[c]	45.7	63.0	0.1

[a] Sound level contributions listed are with noise control treatments.

[b] Dominant source of sound was constant traffic noise from Interstate 84 and U.S. Highway 6.

[c] Includes sound from operation of light industrial facilities and vehicles.

L_{dn} = day-night sound level
dBA = decibels on the A-weighted scale
dB = decibels

As shown, the noise increases at the NSAs for the 24-hour HDD activities are still estimated to exceed an L_{dn} of 55 dBA (despite TGP's currently proposed noise mitigation measures). Furthermore, the noise increase due to the nighttime HDD activities would range from 13.7 to 19.1 dB, more than doubling the perceptible noise difference at these nearby NSAs. Local noise ordinances may limit the time that HDD activities can be performed. However, to ensure that the nearest NSAs to the Susquehanna River entry site are not exposed to excessive noise during nighttime HDD operations in the event that TGP conducts 24-hour HDD activities, **we recommend that:**

- **Prior to construction, TGP should file for the review and written approval of the Director of OEP a plan detailing the additional noise mitigation measures TGP would use to ensure that the noise levels attributable to the 24-hour HDD activities do not exceed an L_{dn} of 55 dBA at the NSAs near the Susquehanna River HDD entry site.**

Construction activities associated with the Project would result in short-term, temporary increases in ambient noise levels. With non-HDD-related construction limited to daytime hours, and based on the anticipated noise levels attributable to the short-term HDD activities, TGP's proposed mitigation measures, and our recommendation, we believe that adjacent landowners would not be significantly affected by construction-related noise.

2.8.2 Operational Impacts and Mitigation

2.8.2.1 Compressor Stations 319 and 325

The proposed modifications to Compressor Stations 319 and 325 would not change existing horsepower capacity or modify any existing noise sources. As a result, there would be no change in sound levels at the NSAs surrounding the stations as a result of the proposed modifications.

2.8.2.2 Compressor Station 321

Compressor Station 321 is located west of Brooklyn Street, approximately 5 miles west of Union Dale, Pennsylvania. The station consists of three turbine-driven compressors in a single building (Units 5, 6, and 7, and one temporary compressor unit [Unit 4]). Units 1, 2, and 3 were abandoned as part of the TGP Line 300 Project.[16] TGP now proposes to install an additional 10,310-hp natural-gas-driven centrifugal compressor unit (Unit 8). The new unit would be housed in a new acoustically-designed compressor building, west of the existing compressor building. The station is located in an area with undeveloped wooded land, residential properties, and commercial facilities. There are six groups of residences within approximately 1 mile of the station, each group designated as a NSA.

The operational noise sources at the compressor station would include the turbine exhaust, turbine intake air system, turbine/compressor casing, lube oil/auxiliary cooler, and aboveground station piping. In an effort to mitigate noise impacts at nearby NSAs and meet 55 dBA L_{dn}, TGP would install noise control measures on the new equipment. The mitigation would be finalized as TGP finalizes design of the compressor building.

A baseline sound level survey was conducted with sound levels measured at each identified NSA location on November 9, 2010. Predicted noise levels due to the modified compressor station operation were estimated at the nearest NSAs based upon the proposed equipment and noise mitigation measures using a three-dimensional computer model. At the time of the baseline noise survey, Unit 5 had not been installed yet. The existing L_{dn} levels included an adjustment to account for the Unit 5 contribution (addition of 1.8 dBA). Unit 4, a temporary unit, was not included in the noise survey because it would be removed once Unit 5 is in service. Audible noise sources during the noise survey included the compressor station equipment, leaves rustling, light wind, birds, and vehicle traffic on nearby roads. The station was audible at NSAs 2 and 3. Table 2.8.2-1 summarizes the estimated noise levels attributable to the modified Compressor Station 321.

[16] FERC Docket No. CP09-444-000. Order Issuing Certificate dated May 14, 2010.

TABLE 2.8.2-1

Sound Level Predictions - Compressor Station 321

Noise-Sensitive Area	Distance from Station (feet)[a]	Direction	Calculated Existing L_{dn} (dBA)	Estimated L_{dn} Contribution of New Equipment (dBA)	Predicted Sound Level, (L_{dn}) of Existing + New Equipment (dBA)	Potential Increase Above Existing L_{dn} (dB)
1	1,100	E	51.4	48.1	53.1	1.7
2	890	SE	49.7	49.0	52.4	2.7
3	1,180	SE	50.1	47.3	51.9	1.8
4	1,120	SW	39.9	42.2	44.2	4.3
5	1,240	W	43.8	41.8	45.9	2.1
6	2,140	NW	42.8	36.7	43.8	1.0

[a] Distance estimated based on aerial photography.

L_{dn} = day-night sound level
dBA = decibels on the A-weighted scale

As seen in table 2.8.2-1, the noise attributable to the modified Compressor Station 321 would remain below our criteria of an L_{dn} of 55 dBA. The estimated noise increase at the nearby NSAs would range from 1.0 to 4.3 dB and would be potentially noticeable at NSA 4 (an increase above 3 dB).

2.8.2.3 Compressor Station 323

Existing Compressor Station 323 is located off Westcolang Road, north of Pennsylvania Highway 590, approximately 5 miles west of Lackawaxen, Pennsylvania. The station consists of one electric-driven centrifugal compressor in an acoustical building. TGP proposes to install an additional electric unit rated at 12,000 hp. The new unit would be installed in an extension to the existing compressor building. The station is located in an area surrounded by agriculture and residences. There are eight groups of residences surrounding the station site, each group designated as a NSA.

The significant operational noise sources at the compressor station would include the turbine exhaust, turbine intake air system, turbine/compressor casing, lube oil cooler, gas aftercooler, and aboveground station piping. TGP anticipates installing noise control measures identical to those in place on the existing compressor unit at the station.

The noise survey conducted after the installation of the existing compressor unit was used as a baseline sound level survey to identify the existing L_{dn} at each NSA location. The station was at full operation at the time of the noise survey, in March and June 2002. The new unit would be almost identical as the existing unit and would be located within the existing building. Because of the similarities, the previously measured noise levels from the 2002 noise survey (and a horsepower adjustment to account for the smaller new unit) was used to predict the noise levels attributable to the new unit. Table 2.8.2-2 summarizes the estimated noise levels attributable to the modified Compressor Station 323.

TABLE 2.8.2-2

Sound Level Predictions - Compressor Station 323

Noise-Sensitive Area (NSA)	Distance from Station (feet)[a]	Direction	Calculated Existing L_{dn} (dBA)	Estimated L_{dn} Contribution of New Equipment (dBA)	Predicted Sound Level (L_{dn}) of Existing + New Equipment (dBA)	Potential Increase Above Existing L_{dn} (dB)
1	1,325	W	43.7	43.2	46.5	2.8
2	900	WNW	48.5	48.0	51.3	2.8
3	900	NW	48.2	47.7	51	2.8
4	1,375	NW	43.6	43.1	46.4	2.8
5	1,875	NNE	39.5	39.0	42.3	2.8
6	1,600	ENE	43.7	43.2	46.5	2.8
7	1,100	SE	48.8	48.3	51.6	2.8
8	2,050	SW	53.2[b]	40.6[b]	53.4	0.2

[a] Distances estimated based on aerial photography.

[b] The previously measured sound level was dominated by vehicle traffic on Highway 590. The estimated L_{dn} of the new unit was calculated using the measured sound level at NSA 2 and propagated to the distance of NSA 8.

L_{dn} = day-night sound level
dBA = decibels on the A-weighted scale

As seen in table 2.8.2-2, the noise attributable to the modified Compressor Station 323 would remain below our criterion of 55 dBA L_{dn}. The estimated noise increase at the nearby NSAs would range from 0.2 to 2.8 dB, barely below the 0.3-dB threshold of noticeable difference for humans.

One landowner, Ms. Wyman, filed a comment expressing concern over any noise increase due to the station expansion and the adverse impacts on her family. We found that Ms. Wyman's residence is about 1,850 feet from Compressor Station 323, and determined that because of the distance to the station any noise increase attributable to the modified station would not be noticeable at Ms. Wyman's residence.

Based on the measurements and estimates presented in the acoustical analyses, noise levels attributable to the compressor stations would remain below our criterion of an L_{dn} of 55 dBA at nearby NSAs. However, to ensure that the noise attributable to operation of Compressor Stations 321 and 323 at nearby NSAs would not exceed an L_{dn} of 55 dBA, **we recommend that:**

- **TGP should file noise surveys with the Secretary no later than 60 days after placing the authorized units at the Compressor Stations 321 and 323 in service. If the noise attributable to the operation of all of the equipment at the identified compressor stations at full load exceeds an L_{dn} of 55 dBA at the nearby NSAs, TGP should install additional noise controls to meet the level within 1 year of each stations in-service date. TGP should confirm compliance with the above requirement by filing a second set of noise surveys with the Secretary no later than 60 days after it installs the additional noise controls.**

Based on the results of the noise analyses and our recommendation, we believe that operation of the Project would have no significant impact on the noise environment in the Project area.

2.9 RELIABILITY AND SAFETY

The transportation of natural gas by pipeline involves some incremental risk to the public due to the potential for an accidental release of natural gas. The greatest hazard is a fire or explosion following a major pipeline rupture.

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.

Methane has an auto-ignition temperature of 1,000 degrees Fahrenheit and is flammable at concentrations between 5.0 percent and 15.0 percent in air. An unconfined mixture of methane and air is not explosive; however, it may ignite if there is an ignition source. A flammable concentration within an enclosed space in the presence of an ignition source can explode. It is buoyant at atmospheric temperatures and disperses rapidly in air.

2.9.1 Safety Standards

The DOT is mandated to provide pipeline safety under 49 USC 601. The DOT's Pipeline and Hazardous Materials Safety Administration's (PHMSA) administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. It develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards which set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety.

PHMSA ensures that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the federal, state, and local level. Section 5(a) of the Natural Gas Pipeline Safety Act provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing the federal standards, while section 5(b) permits a state agency that does not qualify under section 5(a) to perform certain inspection and monitoring functions. A state may also act as DOT's agent to inspect interstate facilities within its boundaries; however, the DOT is responsible for enforcement actions. The majority of the states have either 5(a) certifications or 5(b) agreements, while nine states act as interstate agents. Pennsylvania and New Jersey each have section 5(a) certifications.

The DOT pipeline standards are published in 49 CFR 190-199. Part 192 specifically addresses natural gas pipeline safety issues.

Under a *Memorandum of Understanding on Natural Gas Transportation Facilities* (Memorandum) dated January 15, 1993, between the DOT and the FERC, the DOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of the FERC's regulations require that an applicant certify that it would design, install, inspect, test, construct, operate, replace, and maintain the facility for which a Certificate is requested in accordance with federal safety standards and plans for maintenance and inspection, or certify that it has been granted a waiver of the requirements of the safety standards by the DOT in accordance with section 3(e) of the Natural Gas Pipeline Safety Act. The FERC accepts this certification and does not impose additional safety standards other than the DOT standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum to promptly alert the DOT. The Memorandum also provides for referring complaints and inquiries made by state and local

governments and the general public involving safety matters related to pipelines under the Commission's jurisdiction.

The FERC also participates as a member of the DOT's Technical Pipeline Safety Standards Committee which determines if proposed safety regulations are reasonable, feasible, and practicable.

The pipeline and 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 specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion.

The DOT also defines area classifications, based on population density in the vicinity of the pipeline, and specifies more rigorous safety requirements for populated areas. The class location unit is an area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipeline. The four area classifications are defined below:

Class 1 - location with 10 or fewer buildings intended for human occupancy.

Class 2 - location with more than 10 but less than 46 buildings intended for human occupancy.

Class 3 - location with 46 or more buildings intended for human occupancy or where the pipeline lies within 100 yards of any building, or small well-defined outside area occupied by 20 or more people on at least 5 days a week for 10 weeks in any 12-month period.

Class 4 - location where buildings with four or more stories aboveground are prevalent.

Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. Pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil and 18 inches in consolidated rock. TGP's proposed loop pipelines would exceed this requirement and be installed with 36 inches of cover in Class 1 locations with normal soils. Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 36 inches in normal soil and 24 inches in consolidated rock.

Class locations also specify the maximum distance to a sectionalizing block valve (i.e., 10.0 miles in Class 1, 7.5 miles in Class 2, 4.0 miles in Class 3, and 2.5 miles in Class 4 locations). Pipe wall thickness and pipeline design pressures; hydrostatic test pressures; maximum allowable operating pressure (MAOP); inspection and testing of welds; and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas. Class locations for the Project have been developed based on the relationship of the pipeline centerline to other nearby structures and manmade features. The specific class locations for the Project are listed in table 2.9.1-1.

TABLE 2.9.1-1

Class Locations for the Project Pipeline Facilities

State/Facility	Begin Milepost	End Milepost	Class
Pennsylvania			
Loop 317	0.0	5.4	1
Loop 319	0.0	2.0	1
Loop 321	0.0	0.2	2
	0.2	6.5	1
	6.5	7.0	2
	7.0	7.4	1
	7.4	7.7	2
	7.7	8.1	1
Loop 323	0.0	1.7	1
	1.7	2.8	2
	2.8	6.0	1
	6.0	6.1	2
	6.1	6.1	3
	6.1	6.4	2
New Jersey			
Loop 323	6.4	6.8	2
	6.8	7.2	1
	7.2	7.8	2
	7.8	8.0	1
	8.0	8.4	2
	8.4	9.1	2
	9.1	10.5	3
	10.5	14.27	1
	14.3	16.5	2
Loop 325	0.0	0.9	1
	0.9	1.1	2
	1.1	1.2	3
	1.2	1.5	2
	1.5	1.6	1
	1.6	2.0	2
	2.0	2.1	1
	2.1	2.3	2
	2.3	2.3	3
	2.3	2.3	2
	2.3	2.5	3
	2.5	2.6	2
	2.6	3.0	1
	3.0	3.9	2
	3.9	7.6	1

If a subsequent increase in population density adjacent to the right-of-way indicates a change in class location for the pipeline, the Project would reduce the MAOP or replace the segment with pipe of sufficient grade and wall thickness, if required to comply with the DOT regulations for the new class location.

The Pipeline Safety Improvement Act of 2002 requires operators to develop and follow a written integrity management program that contained all the elements described in 49 CFR 192.911 and addressed the risks on each transmission pipeline segment. Specifically, the law establishes an integrity management program which applies to all high-consequence areas (HCA).

The DOT has published rules that define HCAs where a gas pipeline accident could do considerable harm to people and their property and requires an integrity management program to minimize the potential for an accident. This definition satisfies, in part, the Congressional mandate for the DOT to prescribe standards that establish criteria for identifying each gas pipeline facility in a high-density population area.

The HCAs may be defined in one of two ways. In the first method, an HCA includes:

- current Class 3 and 4 locations,
- any area in Class 1 or 2 where the potential impact radius[17] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle,[18] or
- any area in Class 1 or 2 where the potential impact circle includes an identified site.

An "identified site" is an outside area or open structure that is occupied by 20 or more persons on at least 50 days in any 12-month period; a building that is occupied by 20 or more persons on at least 5 days a week for any 10 weeks in any 12-month period; or a facility that is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate.

In the second method, an HCA includes any area within a potential impact circle which contains:

- 20 or more buildings intended for human occupancy, or
- an identified site.

Once a pipeline operator has determined the HCAs along its pipeline, it must apply the elements of its integrity management program to those sections of the pipeline within HCAs. The DOT regulations specify the requirements for the integrity management plan at section 192.911. The HCAs have been determined based on the relationship of the pipeline centerline to other nearby structures and identified sites. According to first method described above, HCAs would be located in the Class 3 locations shown in table 2.9.1-1. TGP has identified approximately 2.6 miles that would be classified as an HCA, including 0.3 mile along proposed Loop 323 in Pennsylvania and 2.3 miles along Loop 325 in New Jersey. The pipeline integrity management rule for HCAs requires inspection of the entire pipeline in HCAs every 7 years.

The DOT prescribes the minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities. Each pipeline operator is required to establish an emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency. Key elements of the plan include procedures for:

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[17] The potential impact radius is calculated as the product of 0.69 and the square root of the MAOP of the pipeline in pounds per square inch (gauge) multiplied by the square of the pipeline diameter in inches.

[18] The potential impact circle is a circle of radius equal to the potential impact radius.

- receiving, identifying, and classifying emergency events, gas leakage, fires, explosions, and natural disasters;

- establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;

- emergency system shutdown and safe restoration of service;

- making personnel, equipment, tools, and materials available at the scene of an emergency; and

- protecting people first and then property, and making them safe from actual or potential hazards.

The Project would be monitored by TGP's gas control center, which is maintained in Houston, Texas. The center monitors system pressures, flows, and customer deliveries 24 hours per day, 365 days per year. TGP also operates area offices along its pipeline route that allow TGP personnel to provide a quick response to any emergency situation and to direct safety operations as necessary. Additionally, TGP maintains a backup location for gas control operations in the event the primary location is placed out of service. TGP also would conduct aerial and/or ground patrols one to four times per year, depending on the feature(s) inspected. Additional ground surveys would be conducted on an as-needed basis to respond to issues such as landowner concerns and third-party encroachment on the pipeline right-of-way.

The DOT regulations require TGP to establish and maintain liaison with appropriate fire, police, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency, and to coordinate mutual assistance. TGP liaison with fire, police, and public officials, and local utilities along its pipeline system would continue following construction of the Project. Key elements of TGP's liaison program include:

- periodic visits with emergency agencies to coordinate emergency response in the event of an incident;

- special information meetings and training at the invitation of municipalities; and

- circulation of emergency telephone numbers and other pertinent data.

In accordance with DOT regulations, the facilities would be regularly inspected for leakage as part of scheduled operations and maintenance. Additionally, TGP injects an odorant so that the natural gas is odorized in accordance with DOT regulations. TGP's existing compressor stations that would be modified in conjunction with the Project area are also remotely linked to TGP's information and data software networks and infrastructure, which monitors the pipeline system on a 24-hour-per-day, 365-days-a-year basis.

We received comments suggesting that, for increased safety, TGP should replace its existing 24-inch-diameter pipeline, which was installed in the mid-1950s, either in addition to or instead of constructing the proposed pipeline loops. We do not believe replacement of the existing pipeline is necessary because it is subject to the DOT safety regulations and operated under TGP's safety systems discussed above, and DOT has not required replacement of the original pipeline. In addition, the data discussed below show that natural gas pipelines continue to be a safe, reliable means of energy transportation.

2.9.2 Pipeline Accident Data

The DOT requires all operators of natural gas transmission pipelines to notify it of any significant incident and to submit a report within 20 days. Significant incidents are defined as any leaks that:

- caused a death or personal injury requiring hospitalization; or
- involve property damage of more than $50,000, in 1984 dollars.[19]

During the 20-year period from 1990 through 2009, a total of 1,104 significant incidents were reported on the more than 300,000 total miles of natural gas transmission pipelines nationwide.

Additional insight into the nature of service incidents may be found by examining the primary factors that caused the failures. Table 2.9.2-1 provides a distribution of the causal factors as well as the number of each incident by cause.

TABLE 2.9.2-1

Natural Gas Transmission Pipeline Significant Incidents by Cause

Cause	Incidents Percentage (1991-2010)[a]
Outside Force [b]	35
Corrosion [c]	23
Construction Activity or Material Defect [d]	23
Other [e]	19
Total	100

[a] U.S. Department of Transportation, 2011. Significant Pipeline Incidents. Available online at: http://primis.phmsa.dot.gov/comm/reports/safety/SigPSI.html?nocache=9740: Accessed March 2011.

[b] Outside Force includes: fire, explosion, vehicle damage, previous damage, intentional damage, and natural force damage.

[c] Corrosion includes: internal and external corrosion.

[d] Construction Activity or Material Defect includes: excavation, pipeline material, weld or equipment failure, and incorrect operation.

[e] Other: miscellaneous causes.

The dominant incident cause is outside forces, constituting 35 percent of all significant incidents. These result from the encroachment of mechanical equipment such as bulldozers and backhoes; earth movements due to soil settlement, washouts, or geologic hazards; weather effects such as wind, storms, and thermal strains; and willful damage. The pipelines included in the data set in table 2.9.2-1 vary widely in terms of age, diameter, and level of corrosion control. Each variable influences the incident frequency that may be expected for a specific segment of pipeline.

The frequency of significant incidents is strongly dependent on pipeline age. Older pipelines have a higher frequency of corrosion incidents because corrosion is a time-dependent process.

[19] $50,000 in 1984 dollars is approximately $109,000 in 2011 (Bureau of Labor Statistics, 2011).

The use of both an external protective coating and a cathodic protection system,[20] required on all pipelines installed after July 1971, significantly reduces the corrosion rate compared to unprotected or partially protected pipe.

Older pipelines have a higher frequency of outside forces incidents partly because their location may be less well known and less well marked than newer lines. In addition, the older pipelines contain a disproportionate number of smaller diameter pipelines, which have a greater rate of outside forces incidents. Small diameter pipelines are more easily crushed or broken by mechanical equipment or earth movements.

Since 1982, operators have been required to participate in "One Call" public utility programs in populated areas to minimize unauthorized excavation activities in the vicinity of pipelines. The "One Call" program is a service used by public utilities and some private sector companies (e.g., oil pipelines and cable television) to provide preconstruction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts.

2.9.3 Impact on Public Safety

The service incident data summarized in table 2.9.3-1 include pipeline failures of all magnitudes with widely varying consequences.

Table 2.9.3-2 presents the average annual fatalities that occurred on natural gas transmission lines from 1990 to 2009. Fatalities between 2005 and 2009 have been separated into employees and nonemployees, to better identify a fatality rate experienced by the general public. Fatalities among the public averaged 2 per year over the 20 year period. However, the data show that the total annual average for the period 2005 through 2009 decreased to 1 fatality per year.

TABLE 2.9.3-1

Outside Forces Incidents by Cause[a] (1990-2009)

Cause	Number of Incidents	Percent of All Incidents
Third party excavation damage	183	16.6
Operator excavation damage	26	2.4
Unspecified equipment damage	5	0.5
Heavy Rain/Floods	61	5.5
Earth Movement	37	3.4
Lightning/Temperature/High Winds	15	1.4
Unspecified Natural Force	20	1.8
Vehicle (not engaged with excavation)	39	3.5
Fire/Explosion	8	0.7
Previous mechanical damage	5	0.5
Intentional damage	1	<0.1
Unspecified outside force	1	<0.1
TOTAL	401	36.3

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[a] Excavation, Outside Force, and Natural Force from table 2.9.2-1.

[20] Cathodic protection is a technique to reduce corrosion (rust) of the natural gas pipeline that includes the use of an induced current and/or a sacrificial anode that corrodes preferentially.

TABLE 2.9.3-2

Annual Average Fatalities - Natural Gas Transmission Pipelines

Year	Employees	Nonemployees	Total
1990-2009[a]	-	-	2.0
2005-2009[b]	<1	<1	1.0

[a] 20-year average.
[b] Total of five fatalities: three employees, two members of the public.

In addition, the majority of fatalities from natural gas pipelines are associated with local distribution pipelines. These pipelines that are not regulated by the FERC; they distribute natural gas to homes and businesses after transportation through interstate transmission pipelines. In general, these distribution lines are smaller-diameter pipes, plastic pipes, and older pipelines which are more susceptible to damage. In addition, distribution systems do not have large rights-of-way and pipeline markers common to the FERC-regulated interstate natural gas transmission pipelines.

The nationwide totals of accidental fatalities from various manmade and natural hazards are listed in table 2.9.3-3 in order to provide a relative measure of the industry-wide safety of natural gas transmission pipelines. Direct comparisons between accident categories should be made cautiously, however, because individual exposures to hazards are not uniform among all categories. Furthermore, the fatality rate is more than 25 times lower than the fatalities from natural hazards such as lightning, tornados, floods, earthquakes, etc.

TABLE 2.9.3-3

Nationwide Accidental Deaths [a]

Type of Accident	Annual No. of Deaths
All accidents	117,809
Motor vehicle	45,343
Poisoning	23,618
Falls	19,656
Injury at work	5,113
Drowning	3,582
Fire, smoke inhalation, burns	3,197
Floods [b]	93
Lightning[b]	57
Tornado[b]	57
Natural gas distribution lines[c]	15
Natural gas transmission pipelines[c]	2

[a] All data, unless otherwise noted, reflects 2005 statistics from U.S. Census Bureau, Statistical Abstract of the United States: 2010 (129th Edition), Washington, DC, 2009; http://www.census.gov/compendia/statab.
[b] NOAA National Weather Service, Office of Climate, Water and Weather Services, 30-year average (1980-2009); http://www.weather.gov/om/hazstats.shtml.
[c] DOT PHMSA, 2011. Significant Incidents Summary Statistics: 1991-2010, 20-year average (1991-2010); http://primis.phmsa.dot.gov/comm/reports/safety/.

The available data show that natural gas transmission pipelines continue to be a safe, reliable means of energy transportation. From 1990 to 2009, there were an average of 55 significant incidents and 2 fatalities per year. The number of significant incidents distributed over the more than 300,000 miles of

natural gas transmission pipelines indicates the risk is low for an incident at any given location. The operation of the Project would represent only a slight increase in risk to the nearby public.

2.10 CUMULATIVE IMPACTS

In accordance with NEPA, we considered the cumulative impacts of the Project and other projects or actions in the area. Cumulative impacts represent the incremental effects of the proposed action when added to other past, present, or reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place in the same general area over a given period of time. The direct and indirect impacts of the Project are discussed in other sections of this EA.

The purpose of this analysis is to identify and describe cumulative impacts that would potentially result from implementation of the Project. This cumulative impact analysis generally follows the methodology set forth in relevant guidance (Council on Environmental Quality, 1997; EPA, 1999). Under these guidelines, inclusion of other actions within the analysis is based on identifying commonalities of impacts from other actions to potential impacts that would result from the Project. An action must meet the following criteria to be included in the cumulative impacts analysis:

- impact a resource area potentially affected by the Project;
- cause this impact within all, or part of, the Project area; and
- cause this impact within all, or part, of the time span for the potential impact of the Project.

The actions considered in this cumulative impact analysis may vary from the Project in nature, magnitude, and duration. We included these actions based on the likelihood of Project completion, and only projects that have been recently completed, are under construction, or are reasonably foreseeable future actions were evaluated. We further considered existing or reasonably foreseeable actions expected to affect similar resources during similar time periods with the Project. The anticipated cumulative impacts of the Project and these other actions are discussed below, as are pertinent mitigation measures. Anticipated cumulative impacts were based on NEPA documentation, agency and public input, and best professional judgment.

We have identified four types of projects that would potentially cause a cumulative impact when considered with the Project. These are: 1) Marcellus Shale development (wells and gathering systems); 2) natural gas facilities associated with the Project but that are not under the Commission's jurisdiction; 3) other FERC jurisdictional natural gas pipelines; and 4) unrelated actions (see table 2.10-1). We identified these projects through scoping and independent research, as well as information provided by TGP.

2.10.1 Marcellus Shale Development

2.10.1.1 Background

The Marcellus Shale is an approximately 385-million-year-old, organic-rich shale formation that exists beneath 93 million acres of Pennsylvania, southern New York, eastern Ohio, and northern West Virginia. The Marcellus Shale does not extend beneath the New Jersey components of the Project.

TABLE 2.10-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project	Description	Estimated Construction Completion	Location Relative to Northeast Upgrade Project
Marcellus Shale Development			
Wells [a]	Natural gas well drilling	On-going	In proximity to Northeast Upgrade Project facilities in Susquehanna and Bradford Counties, Pennsylvania; no active drilling in Wayne or Pike Counties, Pennsylvania or in New Jersey
Gathering Systems [b]			
Laser Northeast Gathering Company Susquehanna Gathering System I	30 miles of 16-inch-diameter pipeline in Susquehanna County, Pennsylvania and Broome County, New York; 12 miles of smaller diameter pipeline in Susquehanna County	Completed 2011; in-service	Begins 12 miles northeast of Loop 319 and extends northeasterly into New York
PVR Midstream Lycoming Gathering System	12- to 30-inch-diameter pipeline system in Lycoming, Bradford, and Tioga Counties, Pennsylvania	2011 (partly in-service February 2011)	Pipeline routes undetermined at this time but service area includes Bradford County where Loop 317 would begin
Pentex Pipeline Company Northeast Pennsylvania Gathering System	Gathering system in southeastern Bradford County, Pennsylvania	2011 (proposed)	Pipeline routes undetermined at this time but service area includes Asylum Township where Loop 317 would begin
Williams Pipeline Company Springville Gathering System	33.5 miles of 24-inch-diameter pipeline in Susquehanna, Wyoming, and Luzerne Counties, Pennsylvania; compressor station in Wyoming County	2011 (proposed)	Pipeline begins 15 miles west of Compressor Station 321 and 15 miles east of Loop 319 and extends south into Wyoming and Luzerne Counties
DTE Energy Bluestone Gathering System	37 miles of 16- to 20-inch-diameter pipeline in Susquehanna County, Pennsylvania and Bloome County, New York	2012 (proposed)	25 miles east of Loop 319 and would connect with 300 Line approximately 5 miles west of Compressor Station 321 in Susquehanna County
Laser Northeast Gathering Company Susquehanna Gathering System II	9 miles of 24-inch-diameter pipeline from southern termination of Phase I in Susquehanna County, Pennsylvania to Wyoming County, Pennsylvania	Unknown	May include interconnect with TGP 300 Line System in Susquehanna County, Pennsylvania
Nonjurisdictional Project-Related Facilities			
Chesapeake Energy Marketing, LLC and Statoil Natural Gas, LLC Meter Station Upgrades	Upgrade meter stations to deliver Northeast Upgrade Project natural gas volumes	2013	Existing meter stations on 300 Line in Bradford and Susquehanna Counties, Pennsylvania

TABLE 2.10-1 (cont'd)

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project	Description	Estimated Construction Completion	Location Relative to Northeast Upgrade Project
FERC Jurisdictional Natural Gas Pipeline Projects [b]			
Columbia Gas Transmission Line 1278/Line K Replacement Project (CP10-492)	Replace approximately 16 miles of 14-inch-diameter pipeline with 20-inch-diameter pipeline; other short, small diameter pipeline replacements; abandon compressor station; all work in Pike County, Pennsylvania and Orange County, New York	2011 (in-service)	20-inch-diameter pipeline replacement crosses proposed Loop 323 near MP 1.9 in Pike County, Pennsylvania
Central New York Oil and Gas (CNYOG) North-South Project (CP10-194)	Two electric-driven compressor stations in Bradford County, Pennsylvania and Tioga County, New York; two parallel 820-foot-long, 30-inch-diameter pipelines in Bradford County	2011 (under construction)	One compressor station (NS2) and the proposed pipelines adjacent to Compressor Station 319 in Bradford County, Pennsylvania
Tennessee Gas Pipeline Company (TGP) 300 Line Project (CP09-444)	127.4 miles of 30-inch-diameter pipeline loop in seven segments in northern Pennsylvania and northern New Jersey; two new compressor stations in western Pennsylvania; other compressor station modifications	2011 (under construction)	Northeast Upgrade Project would fill gaps in 300 Line Project looping segments in Pennsylvania and New Jersey
CNYOG MARC I Hub Line Project (CP10-480)	39 miles of 30-inch-diameter pipeline in Bradford, Sullivan, and Lycoming Counties, Pennsylvania; new compressor unit at Compressor Station NS2 (under construction CP10-194) in Bradford County	2012 (proposed)	Pipeline would begin at Compressor Station NS2 (CP10-194) adjacent to Northeast Upgrade Project Compressor Station 319 in Bradford County, Pennsylvania and extend south into Sullivan and Lycoming Counties
Spectra Energy New Jersey-New York Expansion Project (CP11-56)	15.5 miles of 30-inch-diameter pipeline; replace 4.8 miles of 12- and 20-inch-diameter pipeline with 42-inch-diameter pipeline; abandon 3.2 miles of 12-inch-diameter pipeline; six new meter stations; miscellaneous modifications; work in New Jersey, New York, and Connecticut	2013 (proposed)	Modifications at existing meter station at Mahwah Meter Station site in Bergen County, New Jersey; nearest pipeline activities approximately 25 miles south in Hudson County, New Jersey
Transcontinental Gas Pipe Line Company, LLC (Transco) Northeast Supply Link Project (PF11-4)	12.3 miles of 42-inch-diameter pipeline in three loop segments in Lycoming and Monroe Counties, Pennsylvania and Hunterdon County, New Jersey; new electric driven compressor station in Essex County, New Jersey; pipeline uprates and 0.4-mile pipeline replacement in New Jersey and New York	2013 (proposed)	Proposed compressor station approximately 15 miles from Northeast Upgrade Project Loop 325; nearest new pipeline construction activities approximately 30 miles south in Hunterdon County
Transco Bayonne Lateral Project (CP09-417)	0.9 mile of new 14- and 20-inch-diameter pipeline; acquire 5.4 miles of existing pipeline; all work in Essex and Hudson Counties, New Jersey	2011 (under construction)	Approximately 25 miles south of Loop 325, near Newark Liberty Airport

TABLE 2.10-1 (cont'd)

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project	Description	Estimated Construction Completion	Location Relative to Northeast Upgrade Project
TGP Northeast Supply Diversification Project (CP11-39)	6.8 miles of 30-inch-diameter pipeline loop in Tioga and Bradford Counties, Pennsylvania; appurtenant facilities and facility modifications in Pennsylvania and New York	2012 (proposed)	New pipeline approximately 25 miles west of Northeast Upgrade Project Loop 317
Liberty Pipeline, LLC Liberty Pipeline Project (CP11-10)	9.2 miles of 36-inch-diameter pipeline in Middlesex and Union Counties, New Jersey; associated with proposed Liberty LNG	2012 (proposed)	New pipeline approximately 30 miles south of Northeast Upgrade Project Loop 325
Transco Rockaway Lateral Project (PF09-11)	3.2 miles of 30-inch-diameter pipeline in Kings County, New York	2013 or later	30 miles south of Northeast Upgrade Project Loop 325 in urban Brooklyn, New York
Unrelated Projects			
Electric Generation and Transmission			
Pennsylvania Power and Light/Public Service Electric and Gas Company Susquehanna to Roseland 500kV Transmission Line Project	130 miles of electric transmission line in Luzerene, Lackawana, Wayne, and Pike Counties, Pennsylvania and Warren, Sussex, Morris and Essex Counties, New Jersey; 90 percent collocated in existing powerline rights-of-way	2015 (proposed)	A segment of the proposed transmission line is approximately 4 miles south of Loop 321; majority of powerline would be 10 to 30 miles from Northeast Upgrade Project
Moxie Energy Moxie Liberty Generation Plant	800 megawatt natural gas fired electric generation plant constructed on 20 acres south of Towanda in Bradford County, Pennsylvania	2015 (proposed)	5 miles northwest of Loop 317
Transportation [c]	See text discussion	On-going	Transportation projects in the counties crossed by the Northeast Upgrade Project
Commercial/Residential Development [c]	See text discussion	On-going	Commercial and residential development projects in the counties crossed by the Northeast Upgrade Project

[a] Well drilling activity within approximately 30 miles of the Northeast Upgrade Project; see text for additional details.

[b] Projects recently completed, under construction, or expected to be under construction in the same timeframe as and located within 50 miles of the Northeast Upgrade Project.

[c] Major projects recently completed, under construction, or expected to be under construction in the same timeframe and located within 5 miles of the Northeast Upgrade Project; see text for additional details.

Over geologic time and with the pressure and temperature associated with deep burial, oil and natural gas can be generated within organic-rich shale formations. However, because shale is generally impermeable (i.e., fluids do not readily flow through the formation), the oil and natural gas contained in these types of rocks cannot be economically produced using conventional well drilling and completion methods. Within the last 20 years, however, the petroleum industry has developed the horizontal drilling technique in conjunction with hydraulic fracturing (fracking), which has been in use for over 50 years, to recover natural gas from shale reservoirs. Fracking involves the injection of fluids and sand under high pressure to fracture the shale around the wellbore, thus enabling the flow of natural gas to the well.

Using these techniques, the first natural gas production from the Marcellus Shale in Pennsylvania began in 2005. Prior to 2005, Pennsylvania was producing approximately 0.5 Bcf/d of natural gas from conventional reservoirs. With development of the Marcellus Shale, Pennsylvania is forecast to produce approximately 7.5 Bcf/d by 2015 and 13.4 Bcf/d by 2020 (Governor's Marcellus Shale Advisory Commission, 2011). The USGS recently estimated that the Marcellus Shale contains a technically recoverable mean of 84 trillion cubic feet (tcf) of natural gas (Coleman, et al., 2011). For comparison, the United States currently utilizes approximately 23 tcf of natural gas per year; thus, the Marcellus Shale represents a significant natural gas deposit in close proximity to the high population centers of the northeastern United States.

Natural gas production from the Marcellus Shale involves the drilling and completion of wells and construction of gathering systems and consequent rights-of-way. We received comments concerning the FERC's jurisdiction over these "upstream" production activities. As discussed in section 1.3, the FERC's authority under the NGA and NEPA review requirements relate only to natural gas facilities that are involved in interstate commerce. Thus, the facilities associated with the production of natural gas are not under the FERC's jurisdiction.

Although we do not examine the impacts of Marcellus Shale upstream facilities to the same extent as the Project facilities in this EA, we considered the general development of the Marcellus Shale in proximity to the Project within the context of cumulative impacts in the Project area. A more specific analysis of Marcellus Shale upstream facilities is outside the scope of this analysis because the exact location, scale, and timing of future facilities are unknown. In addition, the potential cumulative impacts of Marcellus Shale drilling activities are not sufficiently causally related to the Project to warrant the comprehensive consideration of those impacts in this EA.

2.10.1.2 Wells

Marcellus Shale production wells involve improvement or construction of roads, preparation of a well pad, and drilling and completion of the well. PADEP records indicate that 1,454 Marcellus Shale wells were drilled in Pennsylvania in 2010 and approximately 1,740 Marcellus Shale wells would be drilled in 2011 based on January through July data. Drilling has focused on northeastern Pennsylvania, where 640 wells (63 percent) were drilled from January through July 2011 in Bradford, Tioga, Lycoming, Susquehanna, and Wyoming Counties. Therefore, the Project facilities in closest proximity to active Marcellus Shale drilling consist of proposed Loops 317 and 319 in southeastern Bradford County and the proposed modifications at existing Compressor Station 321 in central Susquehanna County. Thus, it is likely that drilling would continue through the construction of the Project, but the exact extent of such drilling is unknown. As previously noted, the Marcellus Shale does not extend beneath New Jersey and no Marcellus Shale wells were drilled in New York in 2010 or to date in 2011 due to a state-wide moratorium on the fracking method (in July 2011, Governor Andrew Cuomo lifted the moratorium on fracking).

2.10.1.3 Pipeline Gathering Systems

Pipeline companies are constructing non-FERC jurisdictional pipeline systems to gather natural gas from Marcellus Shale wells for transport to local customers or the interstate natural gas transmission system. We identified six gathering systems in the Project vicinity that have either been recently completed, are under construction, or are proposed to be under construction in the near future. These gathering systems involve at least 121.5 miles of 12- to 30-inch-diameter pipeline and can include new or modified compressor stations. One project, Susquehanna Gathering System (Phase I), was completed in 2011 and is now in service. A second project, Lycoming Gathering System, is partly in service with construction expected to be completed in late 2011. The Northeast Pennsylvania Gathering System and the Springville Gathering System are proposed for construction in 2011, and the Bluestone Gathering System is proposed for construction and operation by mid-2012. Construction of these projects would not significantly overlap with construction of the Project, the majority of which would occur in 2013. The construction schedule for the Susquehanna Gathering System (Phase II) project is unknown.

Construction of the gathering systems would involve activities similar to construction of interstate natural gas transmission facilities, although land requirements for construction would typically be less for gathering systems due to the installation of smaller diameter pipeline.

2.10.2 Nonjurisdictional Project-related Facilities

The Project shippers may modify existing meter stations at connections with TGP's 300 Line system in Bradford and Susquehanna Counties, Pennsylvania (see section 1.6). TGP stated that it would provide details to the Commission regarding this work when it becomes available. We anticipate that the majority of the nonjurisdictional meter station modifications, if necessary, would occur within existing fence lines, that the shippers would use existing access roads, and that the shippers would obtain all environmental permits and approvals required for the modifications. Therefore, we conclude that construction and operation of the nonjurisdictional Project-related facilities would result in negligible cumulative impacts in the region.

2.10.3 FERC Jurisdictional Natural Gas Pipeline Projects

The Commission recently approved or is in the process of reviewing 10 natural gas transmission projects within at least 50 miles of the Project. A description of each project is included in table 2.10-1 and additional details regarding each project can be obtained through our website at www.ferc.gov by utilizing the docket number given for each project. The projects included in table 2.10-1 are listed in order of increasing minimum distance from the Project.

Five of the 10 projects would either connect or be located adjacent to the Project: Line 1278/Line K Replacement Project (Docket No. CP10-492); North-South Project (Docket No. CP10-194); 300 Line Project (Docket No. CP09-444); MARC I Hub Line Project (Docket No. CP10-480); and the New Jersey-New York Expansion Project (Docket No. CP11-56). Of these projects, one was completed in 2011 and is in service (Line 1278/Line K Replacement Project) and two are under construction with in-service dates expected in late 2011 (North-South Project, 300 Line Project). The two remaining proposed nearby projects, the MARC I Hub Line Project and the New Jersey-New York Expansion Project, are discussed in more detail below.

The MARC 1 Hub Line Project is proposed by Central New York Oil and Gas Company (CNYOG) and would include a new compressor unit to be installed at the CNYOG compressor station under construction (Docket No. CP10-194) near TGP Compressor Station 319 in Bradford County, and about 39 miles of 30- or 36-inch-diameter natural gas pipeline that would extend south and generally

perpendicular from TGP's 300 Line system and proposed Loop 319. Thus, the majority of the MARC 1 Hub Line pipeline would be located at a substantial distance from proposed Loop 319. Furthermore, construction of the MARC 1 Hub Line Project is proposed to be completed by July 2012; whereas the majority of TGP's Project construction would occur in 2013.

The New Jersey-New York Expansion Project is proposed by Spectra Energy's (Spectra) natural gas transmission companies, Texas Eastern Transmission and Algonquin. The project would involve installing 15.5 miles of new 30-inch-diameter pipeline; replacing 4.8 miles of 12- and 20-inch-diameter pipeline with new 42-inch-diameter pipeline; abandoning 3.2 miles of 12-inch-diameter pipeline; constructing six new meter stations; and miscellaneous modifications. Of these components, Algonquin would construct a new meter station at the site of the existing Project's Mahwah Meter Station in Bergen County, New Jersey (see section 1.5.2.2). Spectra has proposed a construction and in-service schedule similar to the TGP Project. Construction of Algonquin's new meter station in Mahwah would likely coincide with the construction of TGP's new meter station at the same location; however, all of the pipeline work associated with the New Jersey-New York Expansion Project would occur at a minimum of 25 miles from the Project.

Of the five remaining jurisdictional projects, Transcontinental Gas Pipe Line Company, LLC's Northeast Supply Link Project would include a new compressor station approximately 15 miles south from Loop 325. Because the compressor station would be constructed on an existing industrial site and be electric-driven (thus no operating air emissions), there would be no significant cumulative impacts associated with the facility relative to the Project. All of the new pipeline construction associated with the Northeast Supply Link Project and remaining jurisdictional projects listed in table 2.10-1 would occur at least 25 miles from TGP's Project. Based on their distance from the Project, scope, and schedule, the remaining jurisdictional projects are not expected to significantly contribute to cumulative impacts in the Project area. In addition, all of the above FERC jurisdictional projects would be constructed and maintained in accordance with our approved procedures and other construction, operation, and mitigation measures that may be required by federal, state, or local permitting authorities, further reducing the potential for cumulative impacts.

2.10.4 Unrelated Projects

2.10.4.1 Electric Generation and Transmission Projects

We are aware of one major electric transmission line being planned in the general Project area. The Susquehanna-Roseland electric transmission line project is a 500 kilovolt power line that would extend for about 147 miles through northern Pennsylvania and New Jersey. One segment of the power line would be located approximately 4 miles south from TGP's proposed Loop 321 in Pike County, Pennsylvania, with the remainder of the projects separated by 10 to 30 miles. PPL Electric Utilities, Inc. (PPL) and Public Service Electric and Gas (PSE&G) have received approval for the project from the Pennsylvania Public Utilities Commission and the New Jersey Board of Public Utilities, which conducted an environmental review of the project. Construction of the Susquehanna-Roseland project has been delayed pending final routing; however, the current schedule indicates that most construction would occur in 2014 and 2015, or after TGP's Project would be placed in service, if approved. In addition, approximately 90 percent of the transmission line project would occur within PPL's and PSE&G's existing power line right-of-way, without significant land disturbance outside of the right-of-way. Because of their geographical separation, anticipated construction schedule, and high degree of collocation for both projects, it is not expected that the Susquehanna-Roseland electric transmission line project and the Project would result in significant cumulative impacts.

Moxie Energy has proposed to construct the Moxie Liberty Generation Plant on a 30-acre site in Bradford County, Pennsylvania, approximately 5 miles northwest of Loop 317. The power plant would utilize natural gas to generate 800 megawatts of electricity. An electric transmission line would not be necessary as the proposed site is already crossed by a high voltage transmission line. Based on current schedules, construction of the Moxie Energy project and the Project would overlap in 2013.

2.10.4.2 Transportation and Commercial/Residential Development Projects

TGP identified planned transportation and commercial/residential development projects in the counties that would be crossed by the Project. Although the exact location and schedule for many of these projects was not determined, TGP noted that it is not aware of any transportation and commercial/residential development projects that would be crossed by the Project. In addition, the majority of these projects consist of short-term, localized activities (e.g., bridge repairs) that are located at least 5 miles from the Project facilities and which are scheduled for completion prior to substantial construction of the Project. We also expect that these transportation and commercial/residential development projects would require state or local approval and that Best Management Practices (BMPs) would be implemented to minimize environmental impacts such as erosion and sedimentation. As a result and considering that the Project would be constructed and operated in accordance with our approved procedures and other measures that may be required by federal, state, or local permitting authorities, we conclude that construction and operation of the Project and the transportation and commercial/residential development projects would result in negligible cumulative impacts in the region.

2.10.5 Potential Cumulative Impacts of the Proposed Action

The potential impacts that we view as most cumulatively significant pertain to soils; groundwater, surface water, and wetlands; vegetation and wildlife; land use, recreation, special interest areas, and visual resources; socioeconomics; and air quality and noise.

Based on comments raised during a consultation meeting concerning the possible historic significance of Bear Swamp Road and Bear Swamp Bridge, TGP has agreed to evaluate the eligibility of these properties for listing on the NRHP. If they are found to be eligible for listing on the NRHP, TGP would need to assess whether the Project would have an adverse effect on those resources, and TGP's Project and Spectra's proposed New Jersey – New York Expansion Project (CP11-56-000) could result in cumulative impacts on Bear Swamp Road and Bear Swamp Bridge. In general, use of this access road for both projects is consistent with its current vehicular use, but would present a cumulative impact by temporarily increasing traffic. Any upgrades to the road by either project could also result in cumulative impacts. Our recommended condition in section 2.6 would ensure that the FERC's responsibilities under section 106 of the NHPA and its implementing regulations are met prior to TGP's proposed use of these resources.

In the following analysis we discuss the potential cumulative impacts associated with the development of the Marcellus Shale, nearby FERC jurisdictional projects, and the proposed Moxie Liberty Generation Plant. For reasons discussed above, we did not further consider nonjurisdictional Project-related facilities, more distant FERC jurisdictional projects, the Susquehanna-Roseland electric transmission line project, or transportation and commercial/industrial development projects in our analysis.

2.10.5.1 Soils

The facilities associated with the Project would have a direct but temporary impact on near-surface soils. During construction, temporary impacts on soils could lead to poor revegetation potential

and indirectly affect wildlife and aquatic resources as a result of poor vegetative cover and increased erosion and sedimentation. The soil stabilization and revegetation requirements included in TGP's ECP would prevent or minimize any indirect impacts. Revegetation of the right-of-way in accordance with TGP's ECP would ensure that the disturbed areas are stabilized to prevent erosion. Construction and restoration activities as well as operation and maintenance activities would be monitored throughout the process to ensure compliance. Other nearby projects under our jurisdiction would be required to implement similar construction and restoration practices to minimize impacts on soils. Consequently, any potential cumulative impacts on soils would be temporary and minor with respect to FERC jurisdictional projects.

In Pennsylvania, the permitting of upstream facilities associated with the development of the Marcellus Shale is under the jurisdiction of the PADEP Bureau of Oil and Gas Management. The PADEP has developed BMPs for the construction and operation of upstream oil and gas production facilities. These BMPs include erosion and sediment control practices; setback requirements from springs, wetlands, and waterbodies; wetland and waterbody crossing procedures; access road construction practices; soil amendment procedures; and right-of-way restoration measures. Implementation of these measures would avoid or minimize cumulative impacts of Marcellus Shale development activities on soil resources in the Project area.

Construction and operation of the Moxie Liberty Generation Plant would result in temporary and permanent impacts on soils within the approximately 30-acre site. However, we expect that Moxie Energy would also be required to implement BMPs to minimize impacts on soils and to control erosion and, thus, the project would not result in significant cumulative impacts on soils.

2.10.5.2 Groundwater, Surface Water, and Wetlands

Project construction could have a minor, temporary, and localized effect on groundwater and surface water resources. Groundwater impacts could include increased turbidity, reduced water levels, and contamination. Nearby water wells could also be damaged by construction. The greatest potential impacts of pipeline construction on surface waters would result from an increase in sediment loading to surface waters either during active construction within a waterbody or due to runoff from construction near waterbodies. The level of impact of the Project on surface waters would depend on precipitation events, sediment loads, stream area/velocity, channel integrity, and bed material. Project impacts on water resources would be greatest during construction and would quickly diminish after construction, as the right-of-way is restored and revegetated. Furthermore, Project impacts on water resources would be avoided or minimized by the use of standard and specialized construction techniques, including those specified in TGP's ECP (with the modifications listed in table 1.7-1) and SPCC Plan. TGP would also monitor nearby water supply wells and would repair affected wells or otherwise compensate landowners for Project-related damage to wells.

Concerns have been raised regarding the potential impact that completion of natural gas wells in the Marcellus Shale may have on groundwater quality due to gas migration and the use of chemical additives in the fracking water to stimulate gas flow. In response to these concerns in Pennsylvania, the PADEP has updated its regulations governing the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The recent rulemaking includes updated material specifications and performance testing and amended design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. Oil and gas wells must also be sited at least 200 feet from a drinking water well and at least 150 feet from a spring. According to the PADEP, the additional requirements would provide an increased degree of protection for both public and private water supplies. Drilling companies must now also disclose the chemical additives used in fracking gas wells and appropriately manage drilling return water to prevent impacts on water resources.

Concerns have also been raised regarding the potential impact of Marcellus Shale development on surface water resources. Approximately 1.9 million gallons of water per day is used for Marcellus Shale development in Pennsylvania, or about 0.02 percent of the 9.5 billion gallons of water withdrawn per day in Pennsylvania (Governor's Marcellus Shale Advisory Commission, 2011). The Susquehanna River Basin Commission (SRBC) is responsible for reviewing all consumptive water uses associated with Marcellus Shale development in the Susquehanna River basin, including water used in fracking. For each project, SRBC reviews whether a proposed withdrawal would cause adverse impacts on other water uses, fish, wildlife, threatened and endangered species, recreation, flow regime, and other resources, and can place conditions in its approvals to protect these resources. The Delaware River Basin Commission (DRBC) has enacted a drilling ban in the Delaware River watershed while it considers what regulations related to fracking are necessary for protection of water resources in the watershed. The Project would require approximately 8.1 million gallons of water during construction, primarily for hydrostatic testing. The SRBC does not consider hydrostatic test water as a consumptive use; whereas the DRBC considers a small amount (usually between 2 and 10 percent) of hydrostatic test water as consumptive use. TGP stated that it would comply with any stipulations within the authority of the DRBC, SRBC, PADEP, and NJDEP in the water withdrawal application approval process.

Flowback water from fracking operations could also threaten water quality. Operators report that approximately 15 percent of the 5 million gallons of water used on average to fracture a Marcellus Shale well is returned to the surface. The flowback water contains pollutants of concern, particularly high levels of Total Dissolved Solids (TDS); however, some of the municipal waste treatment plants that well drillers previously used to treat and dispose of the flowback water were unable to adequately remove TDS to meet state drinking water standards. At the request of Governor Corbett, the Pennsylvania well drilling industry agreed to cease taking flowback water to waste treatment plants lacking the appropriate technology to remove TDS. PADEP's recently promulgated Chapter 95 regulations address the remaining treatment facilities and completely eliminate any potential cumulative impact from natural gas development wastewater discharges (Governor's Marcellus Shale Advisory Commission, 2011) and well drillers are implementing other measures, such as recycling, to reduce the volume of flowback water for treatment and disposal. Furthermore, as previously noted, the PADEP requires operators to implement BMPs during construction and operation of upstream facilities, including wells and gathering systems, to avoid or reduce potential impacts on sensitive resources including water resources.

In conclusion, the PADEP and SRBC have recently enacted regulations to specifically protect surface and groundwater resources from potential impacts associated with the development of the Marcellus Shale, and the DRBC is considering further regulation of Marcellus Shale drilling activities. Development of the Marcellus Shale is expected to continue in proximity to and during construction and operation of portions of the Project in Pennsylvania (the Marcellus Shale does not extend into New Jersey). However, because the Project and other FERC jurisdictional projects in the area would not have a significant adverse impact on water resources, and considering the significantly greater geographic and time scale for development of the Marcellus Shale, the Project and other FERC jurisdictional projects in the area would not contribute in any significance to cumulative impacts on water resources that may be associated with development of the Marcellus Shale.

The Project would result in temporary short-term impacts on 49.1 acres of wetlands and long-term impacts on 5.5 acres of wetlands. Outside the permanent right-of-way, 43.6 acres of wetlands affected by the Project would be allowed to revert back to preconstruction conditions. The remaining 5.5 acres would be maintained in an herbaceous or scrub-shrub state within a 30-foot-wide corridor that would be used for maintenance and emergency access. The COE and NJDEP oversee permitting of wetland impacts in Pennsylvania and New Jersey, respectively, and TGP has proposed wetland enhancement and preservation at two sites in Pennsylvania and one site in New Jersey to mitigate for wetland impacts (see section 2.2.4.2). Although construction and operation of the Project, along with the

other projects we considered in the area, could result in the conversion or reduction in the amount of existing wetlands in the vicinity, the creation of new wetlands and restoration or enhancement of existing wetlands as required by the COE, the State of Pennsylvania, and the State of New Jersey are expected to appropriately mitigate for impacts on wetland resources.

Construction and operation of the proposed Moxie Liberty Generation Plant would also be subject to review and approval by applicable local, state, and federal agencies. We anticipate that these approvals would include BMPs to avoid, minimize, or mitigate for impacts on water resources and wetlands; thus, the project would not contribute significantly to cumulative impacts on water resources or wetlands.

2.10.5.3 Vegetation and Wildlife

Right-of-way clearing and grading and other construction activities associated with the Project would result in the removal of vegetation; alteration of wildlife habitat; displacement of wildlife; and other potential secondary effects such as increased population stress, predation, and the establishment of invasive plant species. Construction of the Project would temporarily impact about 652 acres of vegetated land, of which about 116 acres would be retained for permanent operation for maintenance and emergency access purposes. The Project would result in the permanent loss of approximately 1.1 acre of vegetation, and would convert about 78 acres of forest to scrub-shrub or herbaceous vegetative cover.

When projects are constructed in the same general location and time frame, they could have a cumulative impact on local vegetation and wildlife communities. As previously noted, development of the Marcellus Shale may occur over 20 to 40 years and would include clearing for access roads, well pads, gathering systems, and other facilities. Proposed Loops 317 and 319 and proposed modifications at existing Compressor Stations 319 and 321 are located in areas of active Marcellus Shale development. These Project elements would temporarily impact about 97.8 acres of vegetated land but would not result in any permanent loss of vegetation, although approximately 7.6 acres of forest would be converted to scrub-shrub or herbaceous vegetative cover. In comparison, 38,000 to 90,000 acres of forest could be cleared in Pennsylvania by 2030 due to Marcellus Shale development activities (Governor's Marcellus Shale Advisory Commission, 2011), or approximately 0.2 to 0.5 percent of the 17,000,000 acres of forest in Pennsylvania.

Due to their smaller scale and short time frames for construction when compared to the development of the Marcellus Shale, the Project, other nearby FERC jurisdictional projects, and the Moxie Liberty Generation Plant would not contribute significantly to cumulative impacts on vegetation and wildlife resources in the region. In addition, we have consulted with the FWS in accordance with section 7 of the ESA to ensure that impacts on threatened and endangered species are avoided, minimized, and, where necessary, appropriately mitigated. TGP has also consulted with the PADEP and NJDEP to minimize potential impacts on state-listed species of concern and would implement measures, such as construction timing restrictions, that would minimize potential cumulative effects on fish and other species.

The development of the Project and other projects in the area could result in habitat fragmentation, although the cumulative impact of the Project on fragmentation is considered to be minor for a number of reasons. The proposed pipeline segments would be installed as loops within and adjacent to TGP's existing maintained right-of-way for the majority of their length and the proposed compressor station modifications would occur within or adjacent to the fence lines of existing facilities. In addition, TGP would utilize existing roads to construct and operate the proposed facilities and no other linear elements (e.g., electric transmission lines), would be constructed. Therefore, the Project would utilize previously disturbed rights-of-way as much as possible, thereby minimizing the areas of previously

undisturbed vegetation that would be affected, and reducing additional cumulative impacts on vegetation communities and wildlife habitats. The potential for habitat fragmentation resulting from the Project would be further reduced because the majority of the disturbed areas would be allowed to return to pre-existing conditions. The geographic extent and duration of disturbances caused by construction of the Project would be minimal and further minimized by the implementation of TGP's ECP and site-specific crossing plans prepared in consultation with the FERC and other agencies.

2.10.5.4 Land Use, Recreation, Special Interest Areas, and Visual Resources

Other projects that we considered in the area would affect land use and result in temporary and long term visual impacts, and could impact recreational activities and special interest areas if crossed by the projects. For similar reasons discussed below, other nearby FERC jurisdictional projects and the Moxie Energy project near Towanda, Pennsylvania, would not be expected to significantly impact these resources. The impact of Marcellus Shale development activities on land use, recreation, special interest areas, and visual resources would vary widely depending on the location of specific facilities and access roads, but would be minimized to the extent possible through the PADEP review and permitting process. One advantage of the horizontal drilling technique used in the Marcellus Shale is that numerous wells can be drilled from a single well pad, thereby reducing the land use requirements for access roads, gathering pipelines, and individual well pads.

Construction and operation of the Project has been designed to minimize impacts on existing and future land uses by collocation with an existing TGP right-of-way to the extent possible. The new permanent right-of-way for the Project would result in the permanent alteration of about 78 acres of upland forest land to scrub-shrub or herbaceous cover. All other land use types are anticipated to be restored after construction, thus, Project effects on land use would be negligible.

During construction, recreational activities or the use of special interest areas could be prevented, postponed, or diminished in the immediate Project area. Effects on these areas would be minimized by utilizing existing rights-of-way and access roads to the extent possible and by a relatively short duration for construction. The Project would not cross the DWGNRA, thus avoiding impacts on this federal recreation and special interest area, and TGP has consulted with the NPS to minimize impacts on the Appalachian Trail. In addition, TGP has developed site-specific crossing plans for the special interest areas and would obtain the necessary state permits and approvals to cross areas such as state parks, state forests, and the Highlands Region of New Jersey. As a result, significant long-term impacts on recreational activities and special interest areas are not anticipated.

Temporary visual impacts would be evident during Project construction due to clearing, grading, and construction activities. After construction, restoration in accordance with TGP's ECP and other permitting agency requirements would promote revegetation of the construction work areas, thereby limiting permanent visual impacts on those areas where previously existing forest would not be allowed to reestablish within the new permanent right-of-way due to pipeline safety and operational requirements. Because the proposed loops would be collocated within or adjacent to TGP's existing permanently maintained right-of-way for the majority of their length, the permanent visual impact in previously forested areas would typically consist of widening the existing corridor from 50 feet to 75 feet. Whereas these permanent visual impacts may be locally noticed, they would not be inconsistent with the existing visual character of the area.

Based on the above, construction and operation of the Project would not contribute to cumulative, long-term impacts on land use, recreation, special interest areas, and visual resources within the region.

2.10.5.5 Socioeconomics

Construction and operation of the Project would have no significant impact on the socioeconomic character of the region in which it lies. The gradual social and economic changes due to widespread interest in drilling for Marcellus Shale gas reserves have been and would continue to benefit communities and landowners in this region, as demand for products and services increases and municipal agencies, business-owners, and landowners experience financial benefit. According to the Pennsylvania Department of Labor and Industry, from the end of 2009 to the beginning of 2011, there were 72,000 new hires in the Marcellus Shale core and ancillary industries, of which 71 percent were Pennsylvanians. By 2020, the Marcellus Shale industry could create more than $18 billion in value added revenue; generate more than $1.8 billion in state and local tax revenues; and support more than 211,000 jobs (Considine et al., 2010). Negative impacts relating to this activity could include increased demand for housing beyond what rural areas are able to support; traffic congestion; damage to roads and local infrastructure; and increased demand on services such as police and medical personnel.

Construction of the Project and other projects we considered in the area is expected to augment these effects for a brief period of time and at a negligible cumulative scale.

2.10.5.6 Air Quality and Noise

The Project, the ongoing drilling activities of Marcellus Shale natural gas reserves, and other projects in the area would involve the use of heavy equipment that would generate emissions of air contaminants, fugitive dust, and noise during construction. Because pipeline construction moves through an area quickly, air emissions associated with the pipeline loops would be intermittent and short term. The majority of these impacts would be minimized further because the construction activities would occur over a large geographical area and, in many cases, construction schedules would not directly overlap. Although these projects would result in short-term construction air emissions, they are not likely to significantly affect long-term air quality in the region.

Operation of the Project, Marcellus Shale drilling activities, and other projects would also contribute cumulatively to existing air emissions. Each of the projects would need to comply with federal, state, and local air regulations, which may require controls to limit the emission of certain criteria pollutants or HAPs. Although outside the scope of our analysis, it is anticipated that Marcellus Shale development activities would result in increased long-term emissions of criteria pollutants, HAPs, and GHGs within the region. The Project's associated operating emissions would be mitigated by federal, state, and local permits and approvals. Thus, the Project is not anticipated to contribute to the cumulative impact on regional air quality as a result of operation.

The Project, the Marcellus Shale drilling activities, and other projects would all produce noise during construction; however, this noise would be temporary annoyances to noise receptors in the vicinity of the projects. Noise impacts during the construction phase would be localized and would attenuate quickly as the distance from the noise source increases. However, because construction proceeds as a moving assembly line along the proposed pipeline loops, the duration of construction activities, and therefore noise impacts, at any one location would be limited and short term. Because the impact of noise is highly localized and attenuates quickly as the distance from the noise source increases, cumulative impacts associated with the Project, including operation of the modified compressor stations, would not result in significant cumulative impacts.

Climate Change

Climate change is the change in climate over time, whether due to natural variability or as a result of human activity, and cannot be represented by single annual events or individual anomalies. For example, a single large flood event or particularly hot summer are not indications of climate change, while a series of floods or warm years that statistically change the average precipitation or temperature over years or decades may be climate-related.

The leading U.S. scientific body on climate change is the U.S. Global Change Research Program (USGCRP). Thirteen federal departments and agencies participate in the USGCRP, which began as a presidential initiative in 1989 and was mandated by Congress in the Global Change Research Act of 1990.

In June 2009, the USGCRP issued a report, *Global Climate Change Impacts in the United States*, summarizing the impacts that climate change has already had on the United States and what projected impacts climate change may have in the future (USGCRP, 2009). The report includes a break down of overall impacts by resource and impacts described for various regions of the United States. Although climate change is a global concern, for this cumulative analysis, we will focus on the potential cumulative impacts of climate change in the Project area.

The USGCRP's report notes the following observations of environmental impacts that may be attributed to climate change in the Northeast region:

- more frequent days with temperatures above 90°F;
- a longer growing season;
- increased heavy precipitation;
- less winter precipitation falling as snow and more as rain; and
- rising sea surface temperatures and sea level.

The GHG emissions associated with construction and operation of the Project were identified in section 2.7.4. Emission of GHGs from the Project would not have any direct impacts on the environment in the Project area. Currently, there is no standard methodology to determine how the Project's relatively small incremental contribution to GHGs would translate into physical effects on the global environment. The GHG emissions from the construction and operation of TGP's Project would be negligible compared to the global GHG emission inventory. Additionally, natural gas is a lower CO_2 emitting fuel as compared to other fuel sources (e.g., fuel oil or coal). Because fuel oil is widely used as an alternative to natural gas in the region in which the Project would be located, it is anticipated that the Project would result in the displacement of some fuel oil use, thereby regionally offsetting some GHG emissions.

Conclusion

We identified recently completed, ongoing, and planned projects in the Project area that meet the criteria for inclusion in the cumulative impact analysis study. Our analysis specifically included the development of natural gas reserves in the Marcellus Shale. As discussed in the preceding sections, the Commonwealth of Pennsylvania regulates the siting, permitting, construction, and operation of Marcellus Shale gas wells and it, along with the SRBC and other state agencies, have implemented regulations to reduce environmental impacts associated with Marcellus Shale development. Due to the implementation of specialized construction techniques, the relatively short construction timeframe in any one location, and carefully developed resource protection and mitigation plans designed to minimize and control environmental impacts for the Project as a whole, only small cumulative effects are anticipated when the impacts of TGP's Project are added to the identified ongoing projects in the immediate area.

3.0 ALTERNATIVES

We identified and evaluated alternatives to the Project including the No Action or Postponed Action Alternatives; system alternatives; and route alternatives and variations. The criteria used to evaluate potential alternatives included whether they:

- offer a significant environmental advantage over the Project;
- are technically and/or economically feasible and practical;
- are permittable within the same general timeframe of the Project; and
- meet TGP's stated Project objectives, which are to:

    - increase natural gas delivery capacity to the northeast region of the United States by approximately 636,000 Dth/d, all of which is fully subscribed for a minimum of 20 years pursuant to executed precedent agreements with two shippers;

    - help to alleviate already constrained pipeline capacity in the region; and

    - provide access to the Marcellus Shale natural gas supply area from which production is anticipated to increase.

Our alternatives analysis is based on information provided by TGP; our review of aerial photographs, USGS topographic maps, and other publicly available information; information from site visits; and input from resource agencies and the public. Unless noted otherwise, we utilized the same assumed land requirement widths and the same desktop sources of information to standardize the comparison between the Project and alternatives. Therefore, some of the information presented in this section relative to the Project may differ from the information presented in section 2.0, which is based on Project-specific sources of information including field surveys and engineered drawings.

3.1 NO ACTION OR POSTPONED ACTION ALTERNATIVES

If the Commission denies or postpones TGP's application, the environmental impacts identified in this EA would not occur or would be delayed; however, the Project shippers would need to obtain equivalent natural gas capacity from either new or existing natural gas pipeline systems. As discussed in section 3.2, we did not identify any other existing pipeline systems in the region that could provide the capacity of the Project; therefore, new natural gas facilities in the same region would be required to provide the subscribed Project capacity. TGP's proposal involves pipeline looping and modifications at existing compressor stations (rather than a new greenfield pipeline alignment and compressor stations); whereas the No Action Alternative would require new natural gas facilities to meet the subscribed Project capacity, which would likely result in similar or greater impacts than those associated with the Project. Postponing the Project would prevent TGP from meeting its contractual commitments, which may lead to a resolution similar to that described for the No Action Alternative.

Therefore, the No Action and Postponed Action Alternatives are not considered reasonable because they would not accomplish the Project objectives and would likely result in the construction of other facilities that would not offer a significant environmental advantage over the Project.

3.2 SYSTEM ALTERNATIVES

System alternatives would make use of other existing, modified, or proposed pipeline systems to meet the stated objectives of the Project. A system alternative would make it unnecessary to construct all or part of the Project, although some modifications or additions to another existing pipeline system may

be required to increase its capacity, or another entirely new system may need to be constructed. Such modifications or additions would result in environmental impact; however, the impact could be less than, similar to, or greater than that associated with construction of the Project.

3.2.1 Other Existing Pipeline Systems

Three interstate pipelines, including TGP, currently transport gas through Pennsylvania from upstream out-of-state sources into New Jersey. However, all three pipelines, including TGP, are fully subscribed in this region during the peak heating season. Additionally, in late 2009, the Rockies Express pipeline tied into the pipeline systems that serve the northeast, with the potential to add 1.8 Bcf/d of new gas supply to compete for capacity on the constrained pipelines in the region.

An existing system other than TGP's 300 Line could potentially deliver the subscribed volume of natural gas to the northeastern United States. However, due to the already constrained pipeline condition in the region, another existing system would also require modification or expansion to transport the volume of natural gas proposed by TGP. Because the existing 300 Line already connects to the Project shippers' specified receipt and delivery points, the modification or expansion of another existing pipeline system that does not connect to the specified receipt and delivery points would require construction with similar or greater environmental impact than TGP's proposal. Therefore, we did not evaluate the expansion of another existing pipeline system to meet the Project objectives.

3.2.2 300 Line System Alternatives

During the design phase of the Project, TGP evaluated several alternatives of loop and/or compression on its 300 Line that could potentially meet the Project objectives that we independently reviewed and analyzed.

3.2.2.1 Looping Only Alternative

Based on hydraulic modeling, TGP determined that the new 22,310 hp of compression proposed at Compressor Stations 321 and 323 and modifications at the Mahwah Meter Station and existing Compressor Stations 319 and 325 could be eliminated by constructing approximately 42 miles of 36-inch-diameter pipeline loop in addition to the proposed 40.3 miles of 30-inch-diameter loop included in the Project.

The Project's horsepower additions and modifications to other aboveground facilities would occur within or adjacent to the fenceline of TGP's existing facilities and on land owned by TGP (or Algonquin in the case of the Mahwah Meter Station modifications). In comparison, assuming a 100-foot-wide construction right-of-way and 25-foot-wide additional operational right-of-way, the Looping Only Alternative would impact about 509 additional acres during construction and 127 acres during operation.

Based on the significantly greater land requirements and correspondingly greater environmental impacts that would be associated with constructing an additional 42 miles of pipeline loop, we concluded that the Looping Only Alternative is not an environmentally preferable system alternative to the Project.

3.2.2.2 Compression Only Alternative

The Compression Only Alternative would involve increasing compression on the existing 300 Line pipeline system instead of constructing the proposed 40.3 miles of pipeline loop included in the Project. However, the construction of new mid-point compressor stations was not a viable option due to the relatively close spacing (approximately 30 miles) of the existing compressor stations. Further, adding

more compression at existing stations to eliminate the proposed pipeline loops was not hydraulically feasible because, without the proposed looping, the 300 Line would consist of a single, 24-inch-diameter pipeline, and transporting the current and proposed gas volumes through only the existing pipeline would result in gas velocity significantly above TGP's recommended maximum design velocity of approximately 40 feet per second. This increased velocity could compromise the pipeline's integrity and safety. In addition, the increased gas velocity would reduce operating pressures to delivery points and compressor station suction.

Based on the above information, we concluded that the Compression Only Alternative is not a viable or feasible system alternative to the Project.

3.2.2.3 Delaware Water Gap National Recreation Area System Alternative

As proposed, Loop 323 would deviate from TGP's existing 24-inch-diameter pipeline between approximate MPs 2.9 and 9.3 to route around the DWGNRA (see section 3.3.1 for additional information regarding the DWGNRA). We evaluated the DWGNRA System Alternative which would require TGP to collocate Loop 323 with TGP's existing pipeline through this area, except for the 1-mile-long segment that would cross the DWGNRA. If the DWGNRA System Alternative were implemented, TGP's system would consist of two pipelines on either side of the DWGNRA, with only the original 24-inch-diameter pipeline crossing the DWGNRA (i.e., leaving a "gap" in Loop 323).

Implementing the DWGNRA System Alternative would avoid construction within the DWGNRA. The gap in Loop 323 would, however, create a "bottleneck," resulting in gas velocity within the existing 24-inch-diameter pipeline substantially above TGP's recommended maximum design velocity of approximately 40 feet per second. As noted in the preceding section, this increased velocity could threaten pipeline integrity and safety. In addition, the increased gas velocity would reduce operating pressures to delivery points and compressor station suction. The reduced compressor station suction pressure would result in increased compressor fuel use and higher compressor station discharge temperatures which, in turn, would reduce pipeline capacity and increase downstream fuel consumption.

Based on the above safety concerns and adverse operational effects, we conclude that the DWGNRA System Alternative is infeasible.

3.3 ROUTE ALTERNATIVES

We considered both route alternatives and route variations (section 3.4) in evaluating the proposed pipeline alignments. A route alternative deviates from a significant segment of a proposed pipeline alignment for a substantial length and distance in an effort to reduce overall environmental impacts. Route alternatives would involve construction of new rights-of-way and not be collocated with TGP's existing 300 Line, but would ultimately serve the same delivery points as the proposed alignment.

3.3.1 Delaware Water Gap National Recreation Area Route Alternatives – Loop 323

The DWGNRA is a nearly 70,000-acre unit of the NPS that straddles the Pennsylvania and New Jersey sides of the Delaware River for approximately 40 miles. The mission of the DWGNRA is to provide outdoor recreational opportunities for an estimated 5 million annual visitors while conserving the natural, cultural, and scenic resources in the area. The Delaware River is designated as a National Scenic and Recreational River within the DWGNRA.

TGP initially proposed to construct Loop 323 adjacent to its existing 24-inch-diameter pipeline across the DWGNRA. The existing pipeline crosses the proclamation boundary of the DWGNRA for 1

mile in Pike County, Pennsylvania and Sussex County, New Jersey (the existing pipeline was installed in the mid-1950s, predating the establishment of the DWGNRA in 1965).

In comments filed with the Commission and in meetings and other communications with TGP and the FERC Staff, the Superintendant of the DWGNRA, Mr. John Donahue, stated that a pipeline crossing this 1-mile-long segment of the DWGNRA would certainly have significant impact on the numerous natural and cultural resources of the area and that the NPS has been entrusted by the U.S. Congress to preserve the DWGNRA, which belongs to all U.S. citizens. Superintendant Donahue stated that any new right-of-way across the DWGNRA would require legislation by the U.S. Congress, and that the NPS would likely strenuously oppose such legislation as inconsistent with the purpose of the DWGNRA. One non-governmental organization, Save the Park, also objected to a route that would cross the DWGNRA.

TGP concluded that, given the lack of support from the NPS, successful passage of federal legislation enabling construction of Loop 323 across the DWGNRA was highly unlikely and, further, any such legislation could not be expected to occur within a time frame consistent with the proposed November 1, 2013 in-service date for the Project. Due to this uncertainty, TGP revised its original alignment during the pre-filing process and now proposes to route Loop 323 around the northern end of the DWGNRA.

We received comments from government agencies, non-governmental organizations, and landowners regarding routing in proximity to the DWGNRA. Some of these comments favored collocating Loop 323 with TGP's existing pipeline across the DWGNRA, whereas others favored an alignment that would avoid the DWGNRA. In response to these comments, we examined two route alternatives for Loop 323 near the DWGNRA. Figure 3.3.1-1 depicts the proposed and alternative routes and table 3.3.1-1 provides comparative environmental factors for the alternatives and the corresponding segment of proposed Loop 323 (MP 2.9 to MP 9.3).

3.3.1.1 Delaware Water Gap Alternative 1

Two private landowners who would be affected by the proposed alignment of Loop 323 around the DWGNRA commented regarding potential environmental impact on their properties and recommended that Loop 323 be routed adjacent to TGP's existing right-of-way across the DWGNRA. In Pennsylvania, the Pike County Office of Community Planning and the Pike County Planning Commission each filed comments in support of collocating Loop 323 along the existing pipeline right-of-way across the DWGNRA. Pike County further commented that an alignment following the existing right-of-way would be the shortest route and result in the least overall environmental impact, particularly on undeveloped forested lands. Pike County also noted that the proposed route would impact several high quality or exceptional value streams in Pennsylvania as well as a number of small businesses along U.S. Highway 6 and other landowners that are not affected by TGP's existing right-of-way.

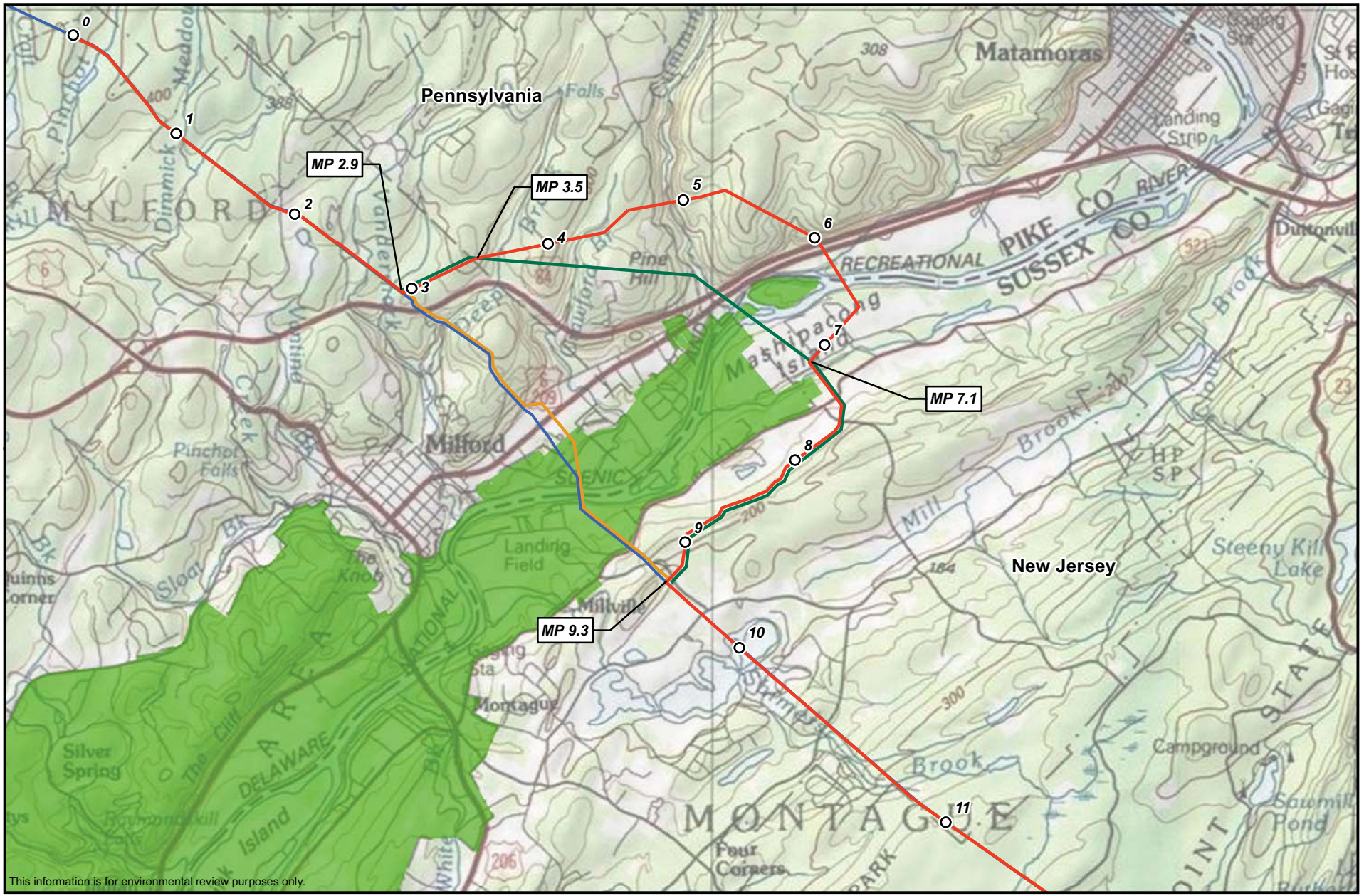
TABLE 3.3.1-1

Comparison of Delaware Water Gap National Recreation Area Route Alternatives – Loop 323

Factor	Proposed Route		Alternative 1		Alternative 2		Information Sources [a]
	Total	Within DWGNRA	Total	Within DWGNRA	Total	Within DWGNRA	
Length (miles)	6.4	0	2.9	1.0	5.3	0.1	B
Length adjacent to existing right-of-way (miles/percent)	0	0	2.2/76	0.7/70	0	0	B
Construction right-of-way (acres)[b]	76.4	0	39.5	10.8	56.8	0	A, B
Permanent right-of-way (acres)[b]	36.6	0	11.0	3.2	28.1	0	A, B
Construction impact on forest (acres)[b]	59.4	0	20.5	4.5	45.4	0	A, B
Operation impact on forest (acres)[b]	29.0	0	5.6	1.0	22.3	0	A, B
Construction impact on wetlands (acres)[b]	1.3	0	0.3	0.1	1.1	0	A, B, C
Operation impact on wetlands (acres)[b]	0.5	0	<0.1	0	0.4	0	A, B, C
Waterbody crossings (minor-intermediate/major) (no.)	5/1	0/0	1/1	0/1	4/1	0/0	B
Length of Delaware River HDD (feet)	2,300	0	1,200	1,200	3,417	381	A, B
Duration of HDD (estimated)	3-4 weeks	--	3-4 weeks	--	4 months	--	A, D
NSAs within 0.25 mile of HDD (no.)/ Distance to nearest (feet)	20/100	0/NA	0/NA	0/NA	4/1,125	0/NA	A, E
Previously recorded cultural resources (no.)	0	0	3	3	0	0	F
Parcels crossed (no.)	41	0	23	2	31	1	G
Residences within 50 feet of the construction right-of-way (no.)	1	0	0	0	0	0	E
Commercial buildings within 50 feet of the construction right-of-way (no.)	2	0	3	0	0	0	E
Road crossings (no.)	9	0	8	0	8	0	B

[a] Sources of information for environmental factors: A = alignment sheets/engineered plans; B = Geographic Information Systems data; C = National Wetland Inventory maps; D = field survey; E = aerial photographic interpretation; F = consultation with applicable regulatory agencies; G = tax maps.

[b] Based on engineering footprint.



Milepost
Proposed Loop 323
Existing TGP Pipeline System
Alternative 1
Alternative 2
Delaware Water Gap National Recreation Area

0 2,500 5,000 Feet

Figure 3.3.1-1
Northeast Upgrade Project
Delaware Water Gap Route Alternatives
Pike County, PA and Sussex County, NJ

In response to these comments, we examined the Delaware Water Gap Alternative 1, which would be collocated with TGP's existing pipeline across the DWGNRA. Approximately 0.5 mile of the existing crossing length is on the west side of the Delaware River on land owned by Pike County; the remainder of the crossing is in New Jersey on land owned by the U.S. Government. The existing pipeline crosses the Delaware River approximately 2 miles downstream from the northern extent of the DWGNRA. Within the DWGNRA, the existing pipeline crosses primarily open and agricultural land in Pennsylvania and primarily wooded land in New Jersey. In proximity to the existing pipeline, the DWGNRA is bounded by residential and commercial development along U.S. Highway 6 and Interstate Highway 84 in Pennsylvania and by rural residences and open and wooded land in New Jersey.

The Delaware Water Gap Alternative 1 would be 2.9 miles long and collocated with TGP's existing pipeline for 2.2 miles (76 percent), deviating from the existing right-of-way at one location in Pennsylvania to avoid commercial buildings near the right-of-way. This deviation would extend onto the western side of the DWGNRA such that the Delaware Water Gap Alternative 1 would be collocated with the existing right-of-way for 0.7 mile (70 percent) of the DWGNRA crossing length. The corresponding segment of the proposed route is 6.4 miles long, none of which would be collocated with an existing right-of-way.

Due to its shorter length and higher degree of collocation, construction and operation of the Delaware Water Gap Alternative 1 would impact 36.9 and 26.6 acres less, respectively, than the proposed route. The Delaware Water Gap Alternative 1 would impact 10.8 and 3.2 acres of the DWGNRA during construction and operation, respectively, whereas the proposed route would not impact the DWGNRA.

Construction of the Delaware Water Gap Alternative 1 would impact 20.5 acres of forest and 0.3 acre of wetland, whereas construction of the proposed route would impact 59.4 acres of forest and 1.3 acres of wetland. Operation of the Delaware Water Gap Alternative 1 would permanently impact 23.4 acres less of forest and about 0.5 acre less of wetland as the proposed route. Within the DWGNRA, approximately 4.5 acres of forest would be disturbed during construction of the Delaware Water Gap Alternative 1. Of this amount, 3.5 acres would be restored and allowed to revert to preconstruction condition and the remaining 1 acre would be maintained in an herbaceous, non-forested condition during operation. Except for 0.1 acre of wetland that would be affected during construction, the Delaware Water Gap Alternative 1 would largely avoid impacts on wetlands within the DWGNRA.

The Delaware Water Gap Alternative 1 would cross one waterbody, the Delaware River, which would be crossed by a 1,200-foot-long HDD within the DWGNRA. The HDD of the Delaware River would extend from predominantly open land in New Jersey to primarily wooded land in Pennsylvania, and would take approximately 3 to 4 weeks to complete. Recreational use of the river would not be interrupted during HDD activities and no NSAs would be within 0.25 mile of the HDD, although nearby visitors to the DWGNRA could potentially see and hear construction activity during the HDD process.

The corresponding segment of proposed Loop 323 would cross five waterbodies, one of which, the Delaware River, is greater than 100 feet wide at the crossing location. As discussed in section 2.2.2.3, the Delaware River would be crossed by a 2,300-foot-long HDD estimated to take 3 to 4 weeks to complete. Twenty NSAs are within 0.25 mile of the HDD exit point in Pennsylvania but, as discussed in section 2.8.1, TGP would implement measures to mitigate noise and other impacts on nearby NSAs. Based on land elevations and setbacks from the river, the HDD construction process would not impact recreational users of the Delaware River. The Delaware River is not designated as a Wild, Scenic, or Recreational River at the proposed crossing location.

Three previously recorded cultural resource sites would be potentially impacted by the Delaware Water Gap Alternative 1, whereas no previously recorded cultural resource sites occur along the proposed

route. If the Delaware Water Gap Alternative 1 were selected, however, TGP would be required to consult with applicable regulatory agencies and implement measures to mitigate potential impacts on previously recorded or newly identified cultural resource sites.

Regarding impacts on the developed environment, the Delaware Water Gap Alternative 1 would impact 23 parcels as compared to the proposed route, which would impact 41 parcels. Because Alternative 1 would be largely collocated with TGP's existing pipeline, the majority of the 23 parcels affected by the alternative are affected by the existing pipeline right-of-way, whereas all 41 of the parcels along the proposed route would be newly affected by pipeline construction and operation. The construction right-of-way for the Delaware Water Gap Alternative 1 would be located within 50 feet of no residences and three commercial buildings, as compared to the construction right-of-way for the proposed route, which would be located within 50 feet of one residence and two commercial buildings. The proposed route would require one additional road crossing than the Delaware Water Gap Alternative 1.

Based on our analysis, the Delaware Water Gap Alternative 1 would result in less environmental impact on most natural resources as compared to the proposed route. Notably, the Delaware Water Gap Alternative 1 would impact 38.9 acres less forest during construction and 23.4 acres less forest during operation than the corresponding segment of the proposed route. Construction and operation of the Delaware Water Gap Alternative 1 would also result in slightly reduced impacts on wetlands when compared to the proposed route and would require four fewer waterbody crossings. The Delaware Water Gap Alternative 1 would also impact 18 fewer individual land parcels, and the majority of landowners along the alternative are already encumbered by TGP's existing pipeline. In conclusion, we believe that the Delaware Water Gap Alternative 1 has an environmental advantage over the proposed route. However, because of NPS opposition and the need for federal legislation enabling construction across NPS property, authorizing Delaware Water Gap Alternative 1 would in essence result in the No Action Alternative, which we do not recommend. Although the Delaware Water Gap Alternative 1 offers an environmental advantage to the proposed route, as detailed in section 2.0, the proposed route would not result in significant environmental impacts.

3.3.1.2 Delaware Water Gap Alternative 2

The Delaware Water Gap Alternative 2 was initially developed by TGP in an effort to avoid the DWGNRA, but subsequent review of land ownership records determined that the Delaware Water Gap Alternative 2 would cross 381 feet of the DWGNRA on an island within the Delaware River. Although the crossing of the DWGNRA would be accomplished by the HDD method, a new permanent right-of-way would still be required on the ground surface above the HDD segment, including on the DWGNRA.

The Delaware Water Gap Alternative 2 would diverge to the north from TGP's existing 24-inch-diameter pipeline right-of-way near MP 2.9 of proposed Loop 323 and then follow the proposed route for approximately 0.6 mile before turning east and then southeast, rejoining the proposed Loop 323 alignment near MP 7.1. Thus, the Delaware Water Gap Alternative 2 would follow the proposed route for 53 percent of its length, including 79 percent of its length in New Jersey. Neither the Delaware Water Gap Alternative 2 nor the proposed route would follow existing rights-of-way.

Referring to table 3.3.1-1, the Delaware Water Gap Alternative 2 would be 5.3 miles long, or 1.1 miles shorter than the corresponding segment of proposed Loop 323. As a result, the Delaware Water Gap Alternative 2 would impact 19.6 acres less during construction and 8.5 acres less during operation than the proposed route. Construction and operation of Alternative 2 would also impact 14.0 and 6.7 acres less of forest land, respectively, than the proposed route, and nearly all of this difference would occur in Pennsylvania. Construction and operation of the Delaware Water Gap Alternative 2 and the proposed route would have similar impact on wetlands. the Delaware Water Gap Alternative 2 would

require one less waterbody crossing and both routes would involve an HDD crossing of the Delaware River. Due to topography and route alignments, the HDD associated with the proposed route would be 2,300 feet long and take 3 to 4 weeks to complete, whereas the HDD associated with the Delaware Water Gap Alternative 2 would be 3,417 feet long and take up to 4 months to complete. Twenty NSAs are within 0.25 mile of the HDD associated with the proposed route as compared to 4 NSAs within 0.25 mile of the HDD associated with the Delaware Water Gap Alternative 2.

The Delaware Water Gap Alternative 2 would impact 10 fewer parcels and require one less road crossing than the proposed route. One residence would be located within 50 feet of the construction work area of the proposed route, whereas no residences would be located within 50 feet of the alternative work area.

In comments filed with the Commission, the PADCNR stated its preference for the Delaware Water Gap Alternative 2 compared to the proposed route, citing reduced impacts due to its shorter length; closer proximity to Interstate Highway 84; and avoidance of an active bald eagle nest near the proposed route.[21]

We believe that the Delaware Water Gap Alternative 2 has an environmental advantage over the proposed route, but not as great an environmental advantage as the Delaware Water Gap Alternative 1. However, for the same reasons as discussed for Alternative 1, the Delaware Water Gap Alternative 2 has a permitting conflict that requires legislation to cross the NPS' property. Should the Commission authorize this alternative route, TGP would most likely not be able to construct this segment of its project in time to meet its contract commitments. As previously discussed, TGP's proposed route for the corresponding segment of Loop 323 ensures that TGP would meet its Project objective and does not result in any significant environmental impact.

3.3.2 Montague Township, New Jersey Alternatives – Loop 323

As discussed in section 3.3.1, Loop 323 would cross the Delaware River outside the northern boundary of the DWGNRA and extend into Montague Township, Sussex County, New Jersey. In TGP's March 31, 2011 Certificate application, the originally proposed alignment of Loop 323 extended diagonally from the Delaware River HDD entry point in northern Montague Township to TGP's existing 24-inch-diameter pipeline right-of-way, and included a 6,700-foot-long greenfield crossing of a largely contiguous block of forest.

In comments dated December 15, 2010, the New Jersey Field Office of the FWS raised concern with the diagonal crossing of the forest block including direct habitat loss, habitat fragmentation, and potential impacts on a documented location of the federally listed bog turtle. The New Jersey Field Office of the FWS recommended that alternative routes be evaluated to avoid or reduce impacts on the contiguous forest block by more closely following patterns of existing development in the area. Four route alternatives were considered in response to the New Jersey Field Office of the FWS concerns including one referred to as TGP Alternative B which was designed to minimize fragmentation of the contiguous forest block, avoid the documented bog turtle habitat, generally parallel River Road, and utilize TGP's existing pipeline right-of-way to a greater extent than the originally proposed route. On July 18, 2011, the NJDEP filed comments in support of TGP Alternative B citing reduced impacts on the contiguous forest block and reduced land requirements as a result of a more direct reconnection with TGP's existing right-of-way. As noted in section 1.4, on July 27, 2011, we issued a notice soliciting

[21] As discussed in section 2.3.3.4, a survey by TGP identified an active bald eagle nest approximately 0.5 mile from the proposed alignment near the Delaware River crossing. A second bald eagle nest was identified in proximity to the proposed alignment, although a determination whether the nest is active was not made and additional survey is on-going.

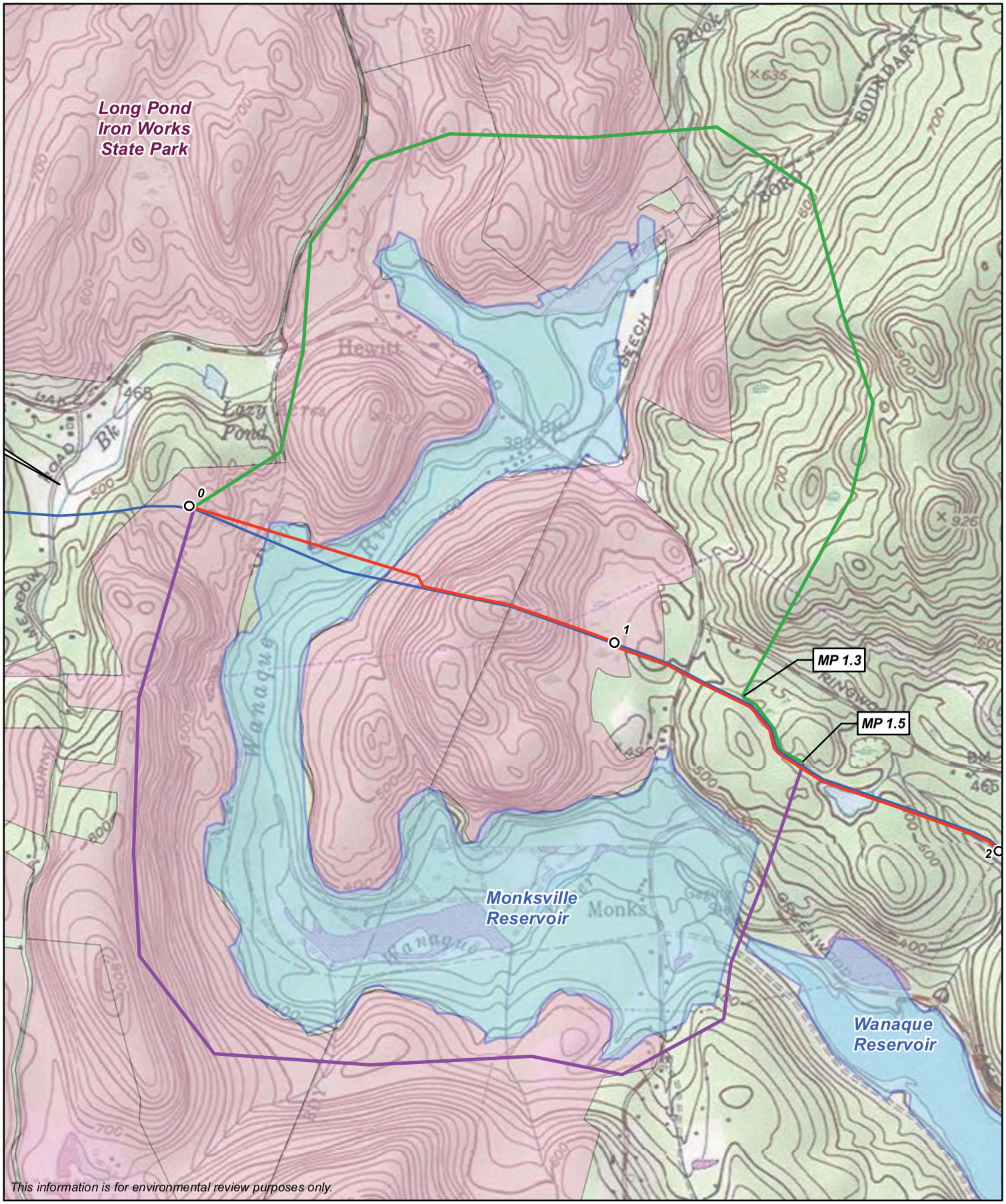
comments from potentially affected landowners along TGP Alternative B; no landowner comments have been received to date. In its August 31, 2011 supplemental filing, TGP modified its originally proposed route for Loop 323 to incorporate Revised TGP Alternative B (TGP Alternative B had been revised upon final engineering to include very minor modifications), which satisfied the New Jersey Field Office of the FWS concern regarding the contiguous forest block. We have included Revised TGP Alternative B in our analysis of the Project in section 2.0.

The New Jersey Field Office of the FWS had also suggested an alternative route that would utilize the Interstate Highway 84 corridor to avoid or minimize impacts on the contiguous forested block. However, Interstate Highway 84 crosses the Delaware River approximately 3 miles north of the proposed crossing location and extends northeasterly into New York, whereas TGP's existing right-of-way extends southeasterly through northern New Jersey. As a result of this divergence, any alternative for Loop 323 that would utilize Interstate Highway 84 to avoid the forested block would require substantially greater length of pipeline, resulting in increased environmental impacts. Therefore, we did not consider an alternative along Interstate Highway 84 in our analysis. For similar reasons we did not consider an alternative along State Route 23 in northwestern New Jersey as suggested by an individual commentor.

3.3.3 Monksville Reservoir Alternatives – Loop 325

The Monksville Reservoir is a 505-acre impoundment of the Wanaque River in Passaic County, New Jersey. The Monksville Reservoir, together with the adjacent 2,310-acre Wanaque Reservoir, form an important regional water supply operated by the North Jersey District Water Supply Commission. TGP's existing 24-inch-diameter pipeline was installed approximately 30 years before the creation of the Monksville Reservoir in 1987, and now crosses the northern end of the reservoir where water depths approach 40 feet. As discussed in section 2.2.2.3, TGP proposes to install Loop 325 across the reservoir by implementing a 2,870-foot-long HDD between approximate MPs 0.0 and 0.5. The path of the HDD would generally follow the alignment of the existing pipeline across the northern end of the reservoir. Installation of Loop 325 would also impact Long Pond Ironworks State Park, which surrounds the Monksville Reservoir near the proposed crossing.

We considered two alternatives that would avoid crossing the Monksville Reservoir in response to comments concerning potential impacts on the reservoir. These alternatives, referred to as the North Alternative and the South Alternative, are discussed below and depicted on figure 3.3.3-1, and comparative environmental criteria used in the analysis are presented in table 3.3.3-1. For this analysis, the alternatives are compared to MP 0.0 to MP 1.5 of the proposed route.



Milepost
Existing TGP Pipeline System
Proposed Loop 325
North Alternative
South Alternative
Surface Water Reservoir
Long Pond Iron Works State Park
0 1,000 2,000 Feet

Figure 3.3.3-1
Northeast Upgrade Project
Monksville Reservoir Route Alternatives
Sussex County, NJ

TABLE 3.3.3-1

Comparison of Monksville Reservoir Route Alternatives – Loop 325

Factor	Proposed Route	North Alternative	South Alternative	Information Sources [a]
Length (miles)	1.5	3.4	3.1	A
Length adjacent to existing rights-of-way (miles/percent)	1.5/100	0.2/6	0.0/0	A
Construction right-of-way (acres)[b]	18.3	41.2	37.0	A
Permanent right-of-way (acres)[b]	9.2	20.6	18.5	A
Construction impact on forest (acres) [b]	12.2	38.4	33.4	A
Operation impact on forest (acres) [b]	3.1	19.2	16.7	A
Construction impact on wetlands (acres) [c]	0.9	0.9	0.3	A
Operation impact on wetlands (acres) [c]	0.6	0.6	0.2	A
Waterbody crossings (no.)	2	3	3	A
Length of horizontal directional drill (feet)	2,870	0	1,264	A, B
Hydrostatic text water (gallons) [d]	396,077	595,587	653,082	A
Long Pond Ironworks State Park crossed by open cut (miles)	0.7	1.2	2.3	A
Parcels crossed (no.)	7	5	6	B, C
Residences within 50 feet of the construction right-of-way (no.)	5	2	12	D
Road crossings (no.)	1	3	3	A

[a] Sources of information for environmental factors: A = Geographic Information Systems data; B = alignment sheets/engineered plans; C = tax maps; D = aerial photographic interpretation.

[b] Based on a 50-foot-wide temporary and 50-foot-wide permanent right-of-way.

[c] Based on a 75-foot-wide temporary and 50-foot-wide permanent right-of-way.

[c] Assumes all hydrostatic test and HDD water would come from the Monksville Reservoir.

3.3.3.1 North Alternative

The North Alternative would diverge from the proposed alignment at MP 0.0, traverse around the north end of the Monksville Reservoir, and rejoin the proposed route near MP 1.3. The North Alternative and the proposed route would be common between MPs 1.3 and 1.5. The North Alternative would be collocated with existing rights-of-way for 0.2 mile (6 percent) whereas the proposed route would be collocated with existing rights-of-way for 1.5 miles (100 percent).

The North Alternative would be 3.4 miles long, or 1.9 miles longer than the corresponding segment of the proposed route. Due to its greater length, minimal degree of collocation, and conventional overland construction installation, the North Alternative would impact about 22.9 acres more during construction and 11.4 acres more during operation than the proposed route. Compared to the proposed route, the North Alternative would also impact 26.2 acres more of forest during construction and 16.1 acres more of forest during operation. Wetland impacts would be similar for both routes. The North Alternative would involve one more waterbody crossing than the proposed alignment although the alternative would not involve any major waterbody crossings. Due to its added length, hydrostatic testing of Loop 325 with the North Alternative would require approximately 199,510 gallons more water than the proposed route.

Each route would involve construction within Long Pond Ironworks State Park. For the proposed route, this would involve the clearing of temporary HDD entry and exit workspaces and approximately 0.7 mile of conventional overland pipeline construction. TGP estimates that the HDD of the Monksville Reservoir would take 23 weeks to complete, during which users of the park and reservoir may see and hear HDD activity. The North Alternative would not include an HDD but would cross the park for 1.2 miles via conventional overland construction, during which users of the park may see and hear construction activity.

The North Alternative would cross two fewer land parcels than the proposed route but would require two additional road crossings. Based on aerial photograph review, the North Alternative workspace would be located within approximately 50 feet of two residences, whereas the construction workspace for the proposed route would be located within 50 feet of five residences.

In conclusion, the North Alternative would not cross the Monksville Reservoir and, therefore, would avoid any potential impact on water quality in the reservoir. The North Alternative would also be constructed in close proximity to three fewer residences than the proposed route, although all of the residences that would be affected by the North Alternative would be newly affected by pipeline construction and operation, whereas the proposed route would result in an expansion of TGP's existing facilities on residences and other properties.

Due to its added length, however, the alternative would have a substantially greater construction and operational footprint and impact considerably more forest than the proposed route. The alternative would also create a new right-of-way, including 1.2 miles of new right-of-way within Long Pond Ironworks State Park; whereas, the proposed route would be collocated with TGP's existing pipeline right-of-way for its entire length. Based on these factors, we conclude that the North Alternative is not environmentally preferable to the proposed route and HDD crossing of the Monksville Reservoir; therefore, we do not recommend the North Alternative.

3.3.3.2 South Alternative

The South Alternative would diverge from the proposed alignment at MP 0.0, traverse around the south end of the Monksville Reservoir, and rejoin the proposed route near MP 1.5. The South Alternative would not be collocated with any existing rights-of-way whereas the proposed route is collocated with existing rights-of-way for 1.5 miles (100 percent).

The South Alternative would be 3.1 miles long, or 1.6 miles longer than the corresponding segment of the proposed route. Due to its greater length and lack of collocation, the South Alternative would impact about 18.7 acres more during construction and 9.3 acres more during operation than the proposed route. Compared to the proposed route, the South Alternative would also impact 21.2 acres more of forest during construction and 13.6 acres more of forest during operation. Wetland impacts would be minimal for both routes. The South Alternative would involve one more waterbody crossing than the proposed alignment including a major waterbody crossing of the Wanaque River near the spillway between the Monksville and Wanaque Reservoirs. TGP indicated that the crossing of the Wanaque River would be accomplished by a 1,264-foot-long HDD, as compared to the 2,870-foot-long HDD crossing of the Monksville Reservoir on the proposed route. Due to its added length and HDD, hydrostatic testing of Loop 325 with the South Alternative would require approximately 257,005 gallons more water than the proposed route.

Each route would involve construction within Long Pond Ironworks State Park. For the proposed route, this would involve the clearing of temporary HDD entry and exit workspaces and approximately 0.7 mile of conventional overland pipeline construction. TGP estimates that the HDD of the Monksville

Reservoir would take 23 weeks to complete, during which users of the park and reservoir may see and hear HDD activity. The HDD associated with the South Alternative would occur just outside park boundaries and, thus, would have a similar, but shorter duration impact on park and reservoir users. The South Alternative would also require 2.3 miles of conventional overland pipeline construction within the park, as compared to 0.7 mile of conventional pipeline construction within the park for the proposed route.

The South Alternative would cross one fewer land parcel than the proposed route but would require two additional road crossings. Based on aerial photograph review, the South Alternative workspace would be located within approximately 50 feet of 12 residences, whereas the construction workspace for the proposed route would be located within 50 feet of 5 residences.

In conclusion, the South Alternative would avoid a direct crossing of the Monksville Reservoir but would still cross the Monksville/Wanaque Reservoir system by HDD. Thus, the potential impact on the reservoir system due to HDD operations for either route would be similar and, therefore, was not a decisive factor in our analysis. However, due to its added length, the alternative would have a substantially greater construction and operational footprint and impact more forest than the proposed route. The alternative would also create a new right-of-way, including 2.3 miles of new right-of-way through Long Pond Ironworks State Park; whereas, the proposed route would be collocated with TGP's existing pipeline right-of-way for its entire length. Based on these factors, we conclude that the South Alternative is not environmentally preferable to the proposed route; therefore, we do not recommend the South Alternative.

3.3.4 New Jersey Highlands Region – Loop 325

Proposed Loop 325 would cross the Preservation Area within the Highlands Region. Comments were received recommending that alternatives be considered to avoid the Highlands Region. However, the segment of TGP's existing pipeline system that would be looped by Loop 325 is located entirely within the Preservation Area, and Loop 325 would complete the 30-inch-diameter loop of TGP's system from the Pennsylvania border through the Project's delivery point at the existing Mahwah Meter Station in Bergen County, New Jersey. Thus, a route alternative for Loop 325 that would entirely avoid the Highlands Region is not feasible.

Loop 325 could potentially be routed from MP 0.0 north into New York and then return south into New Jersey to connect at the Mahwah Meter Station. Such an alignment would still require construction within the HPA, and at least a portion of the alignment would establish a new, greenfield right-of-way. Such an alignment would also result in substantially longer pipeline construction through similar resource areas including in New York. In the end, we conclude that such an alignment is clearly not environmentally preferable when compared to the proposed route which is collocated with TGP's existing right-of-way for nearly 100 percent of its length.

3.4 ROUTE VARIATIONS

Route variations are identified to reduce impact on specific localized resource issues such as residences, cultural resources sites, and biological resources. Additionally, route variations may be examined to avoid conflicts with other projects or in response to scoping comments. Because route variations are considered in response to specific, localized issues, they may not always clearly display an environmental advantage other than to reduce targeted impacts or address a landowner or agency concern.

Other than the 6.4-mile-long segment of Loop 323 that would deviate from TGP's existing pipeline right-of-way to avoid the DWGNRA, the proposed loops would be collocated with TGP's

existing 24-inch-diameter pipeline for 33.8 miles of the remaining 33.9 miles of looping. The only location where the proposed pipeline would be off-set by more than approximately 25 feet from the existing pipeline occurs at MP 13.0 on Loop 323, where the loop would deviate from the existing pipeline by about 100 feet for 0.1 mile to reduce impacts on a waterbody and wetland complex.

Comments were received from David and Barbara Katz regarding potential impacts of proposed Loop 323 on their property in Pike County, Pennsylvania. Mr. and Mrs. Katz own 748 acres of largely undeveloped land on the bluff overlooking the Delaware River, but plan to develop the property in a project referred to as Rosetown Trail. The Katz property extends for nearly 2 miles along the bluff; Loop 323 would cross the southern-most corner of the property near MP 6.0 and Interstate Highway 84. In their comments, Mr. and Mrs. Katz proposed realigning Loop 323 to the south of their property.

TGP has been unable to gain survey access to the Katz property and some uncertainty remains regarding the Katz property line in this area. However, in response to the Katz' comments, TGP adjusted its original alignment slightly to the south to reduce impacts on the Katz property. Based on mapping filed by Mr. and Mrs. Katz, TGP's proposed alignment would cross the southern-most corner of the property for approximately 200 feet, requiring approximately 0.3 acre of construction workspace and resulting in about 0.2 acre of permanent easement. As such, the proposed alignment would essentially leave the Katz property as contiguous. Furthermore, the proposed alignment across the Katz property serves as the approach to the Interstate 84 road bore crossing and the HDD crossing of the Delaware River, the location of which is limited toward the south (further from the Katz property) by the DWGNRA. In conclusion, the proposed alignment would have limited impact on the Katz property and, as discussed in section 2.4.1.6, Mr. and Mrs. Katz would be compensated by TGP for the right-of-way on their property if the Project is approved and constructed. We were unable to identify a preferable route variation to avoid the Katz property and do not recommend modification of the proposed route due to the limited impact on this parcel.

Comments were received recommending that alternatives be considered to avoid or minimize impacts on residential developments. The Project would be located near residences in some areas (see table 2.4.2-1); however, the majority of the Project would be collocated with TGP's existing right-of-way and traverse non-developed areas, thus minimizing impacts on residences. In response to landowner concerns, TGP also incorporated specific elements into the Project, such as reduced right-of-way widths, cross-overs, and special construction methods, to further minimize impact on residences (see section 2.4.2).

3.5 COMPRESSOR STATION SITE ALTERNATIVES

The proposed modifications to existing compressor stations would occur within or adjacent to TGP's existing facilities and entirely within land already owned by TGP. Construction and operation of similar compression facilities at undeveloped alternative sites would result in greater environmental impact and affect new landowners other than TGP. Therefore, we did not examine any alternative locations for the proposed compressor station modifications.

4.0 STAFF CONCLUSIONS AND RECOMMENDATIONS

The OEP staff concludes that approval of the Project would not constitute a major federal action significantly affecting the quality of the human environment. This finding is based on the above environmental analysis, TGP's application and supplements, and the implementation of TGP's proposed measures and our recommended mitigation measures. The OEP staff recommends that the FERC Order contain a finding of no significant impact and include the mitigation measures listed below as conditions of any Certificate the Commission may issue.

1. TGP 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. TGP must:

    a. request any modification to these procedures, measures, or conditions in a filing with the Secretary;

    b. justify each modification relative to site-specific conditions;

    c. explain how that modification provides an equal or greater level of environmental protection than the original measure; and

    d. receive approval in writing from the Director of OEP before using that modification.

2. The Director of OEP has delegated authority to take whatever steps are necessary to ensure the protection of all environmental resources during construction and operation of the Project. This authority shall allow:

    a. the modification of conditions of the Order; and

    b. the design and implementation of any additional measures deemed necessary (including stop-work authority) to assure continued compliance with the intent of the environmental conditions as well as the avoidance or mitigation of adverse environmental impact resulting from Project construction and operation.

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

4. The authorized facility locations shall be as shown in the EA, as supplemented by filed alignment sheets. **As soon as they are available, and before the start of construction**, TGP 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.

    TGP'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. TGP's right of eminent domain granted under NGA section 7(h) does not

authorize it to increase the size of its natural gas facilities to accommodate future needs or to acquire a right-of-way for a pipeline to transport a commodity other than natural gas.

5. TGP 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 **before construction in or near that area**.

   This requirement does not apply to extra workspace allowed by TGP's ECPs 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, TGP shall file an Implementation Plan with the Secretary for review and written approval by the Director of OEP. TGP must file revisions to the plan as schedules change. The plan shall identify:

   a. how TGP 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 TGP 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 loop segment and aboveground facility sites, 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 TGP will give to all personnel involved with construction and restoration (initial and refresher training as the Project progresses and personnel change, with the opportunity for OEP staff to participate in the training sessions);

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

g. the procedures (including use of contract penalties) TGP 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. Beginning with the filing of its Implementation Plan, TGP 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 TGP'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, and their cost;

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 TGP from other federal, state, or local permitting agencies concerning instances of noncompliance, and TGP's response.

8. **Prior to receiving written authorization from the Director of OEP to commence construction of any Project facilities**, TGP shall file with the Secretary documentation that it has received all applicable authorizations required under federal law (or evidence of waiver thereof).

9. TGP must receive written authorization from the Director of OEP **before placing each phase of 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.

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

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

    b. identifying which of the Certificate conditions TGP 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.

11. **Within 30 days of placing the facilities in service**, TGP shall file a report with the Secretary identifying all water supply wells/systems damaged by construction and how they were repaired. The report shall also include a discussion of any other complaints concerning well yield or water quality and how each problem was resolved.

12. **Prior to construction**, TGP shall file with the Secretary for review and written approval from the Director of OEP a revised Pennsylvania ECP that includes in-stream construction timing windows consistent with section V.B.1 of the FERC's Procedures.

13. TGP **shall not begin construction of Loop 323 until**:

    a. TGP files with the Secretary and the New Jersey Field Office of the FWS the results of:

        (1) the Phase I bog turtle survey between approximate MPs 7.6 and 9.3 of Loop 323;
        (2) the outstanding habitat assessments for the dwarf wedgemussel; and
        (3) all outstanding small whorled pogonia surveys. If small whorled pogonia are identified in any of the proposed construction work spaces, TGP shall consult with the FWS for measures that avoid impacts on this species;

    b. the FERC staff completes any necessary section 7 consultation with the FWS; and

    c. TGP receives written notification from the Director of OEP that construction and/or use of mitigation (including implementation of conservation measures) may begin.

14. TGP shall adopt a seasonal restriction for clearing trees greater than 5-inch-diameter breast height from April 1 to September 30 along the eastern 2.5 miles of Loop 325.

15. TGP **shall not begin construction of Loops 321, 323, and 325 until**:

    a. TGP files with the Secretary the results of mist net surveys for Indiana bats along the unsurveyed portions of Loops 321 and Loop 323;

    b. TGP files with the New Jersey Field Office of the FWS and the Secretary the final mitigation plans for forest resources in the Highlands Preservation Area and on state-

owned lands in New Jersey, that specifies the approximate number of each tree species it would replant that are suitable for Indiana bat roost habitat;

c. the FERC staff completes any necessary section 7 consultation with the FWS; and

d. TGP receives written notification from the Director of OEP that construction and/or use of mitigation (including implementation of conservation measures) may begin.

16. **Prior to construction**, TGP shall file the results of any outstanding surveys for Pennsylvania and New Jersey state-listed species and identify any additional mitigation measures developed in consultation with the applicable state agencies.

17. **Prior to construction**, TGP shall file with the Secretary for the review and written approval of the Director of OEP evidence of landowner concurrence with the site-specific residential construction plan at MP 8.3 of Loop 323.

18. TGP **shall not begin construction** of facilities, including the pipeline loops and compressor stations, meter stations, and/or use of all staging, storage, or temporary work areas and new or to-be-improved access roads **until:**

a. TGP files with the Secretary the following:

(1) the updated Phase IA survey report for New Jersey;
(2) Phase I cultural resources survey report(s) for any previously unreported areas for Pennsylvania and New Jersey, including the Revised TGP Alternative B route and the Wallkill River Mitigation Site;
(3) Phase II site evaluation reports, as required, to provide NRHP-eligibility recommendations for sites in Pennsylvania and New Jersey, including additional geomorphological testing;
(4) any other reports, plans, or special studies not yet submitted, including archaeological site avoidance and treatment plans, historic architectural avoidance plans, and unanticipated discovery plans;
(5) comments on the cultural resource reports and plans from the PA SHPO, NJ SHPO, and any other consulting parties; and
(6) the records of continued consultation with the Ramapough Lenape Nation, Delaware Nation, the Delaware Tribe of Indians, the Oneida Indian Nation, the Eastern Shawnee Tribe of Oklahoma, and the Stockbridge Munsee Community of Wisconsin, and any other American Indian tribe that have not yet been filed;

b. the ACHP is afforded an opportunity to comment if historic properties would be adversely affected; and

c. the FERC staff reviews and the Director of OEP approves the cultural resources reports and plans, and notifies TGP in writing that treatment plans/mitigation measures may be implemented and/or construction may proceed.

All material filed with the Commission containing **location, character, and ownership** information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: **"CONTAINS PRIVILEGED INFORMATION--DO NOT RELEASE."**

19. **Prior to construction**, TGP shall file for the review and written approval of the Director of OEP a plan detailing the additional noise mitigation measures TGP would use to ensure that the noise levels attributable to the 24-hour HDD activities do not exceed an L_{dn} of 55 dBA at the NSAs near the Susquehanna River HDD entry site.

20. TGP shall file noise surveys with the Secretary **no later than 60 days** after placing the authorized units at the Compressor Stations 321 and 323 in service. If the noise attributable to the operation of all of the equipment at the identified compressor stations at full load exceeds an L_{dn} of 55 dBA at the nearby NSAs, TGP shall install additional noise controls to meet the level **within 1 year** of each stations in-service date. TGP shall confirm compliance with the above requirement by filing a second set of noise surveys with the Secretary **no later than 60 days** after it installs the additional noise controls.

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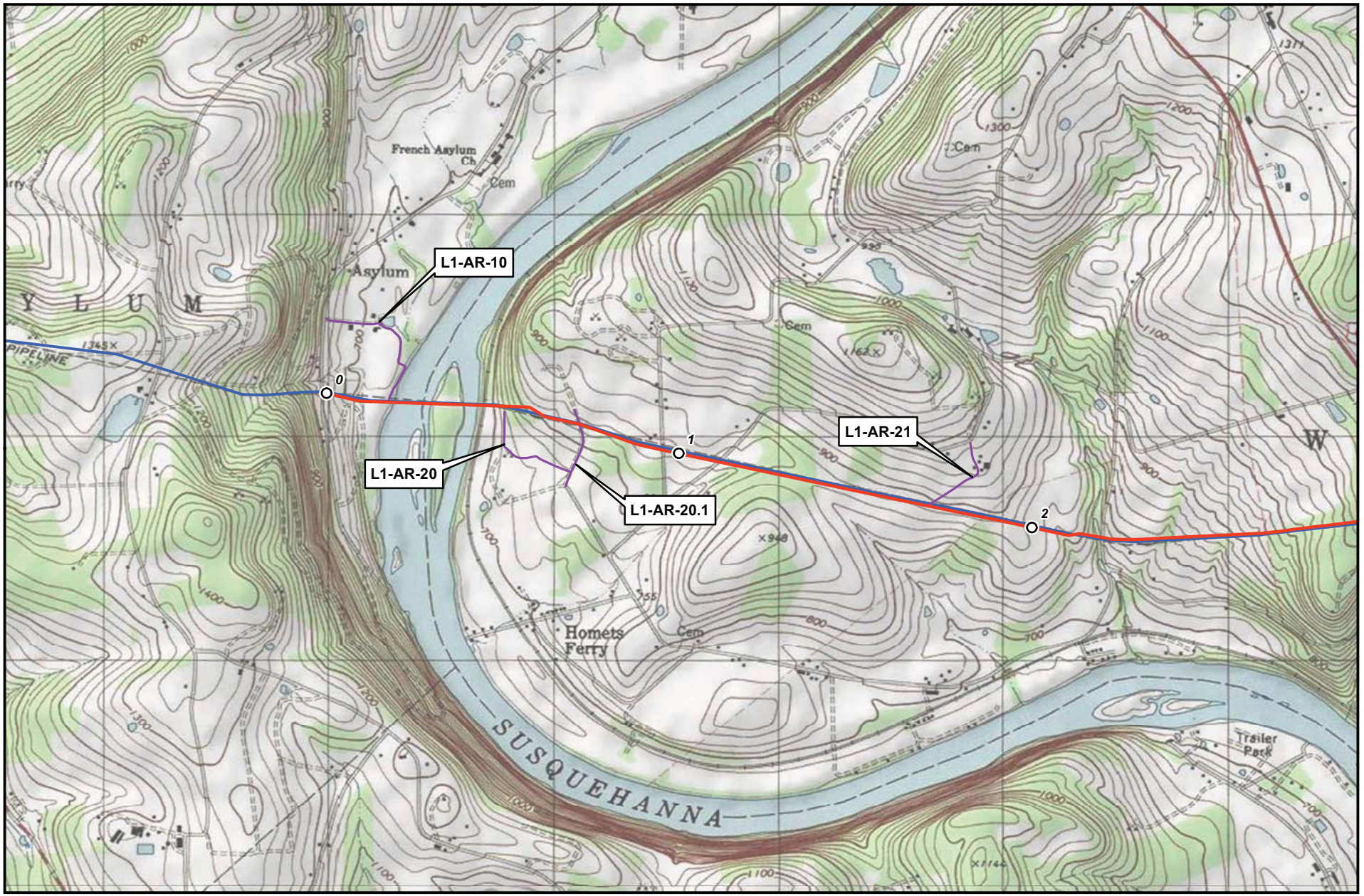
APPENDIX A

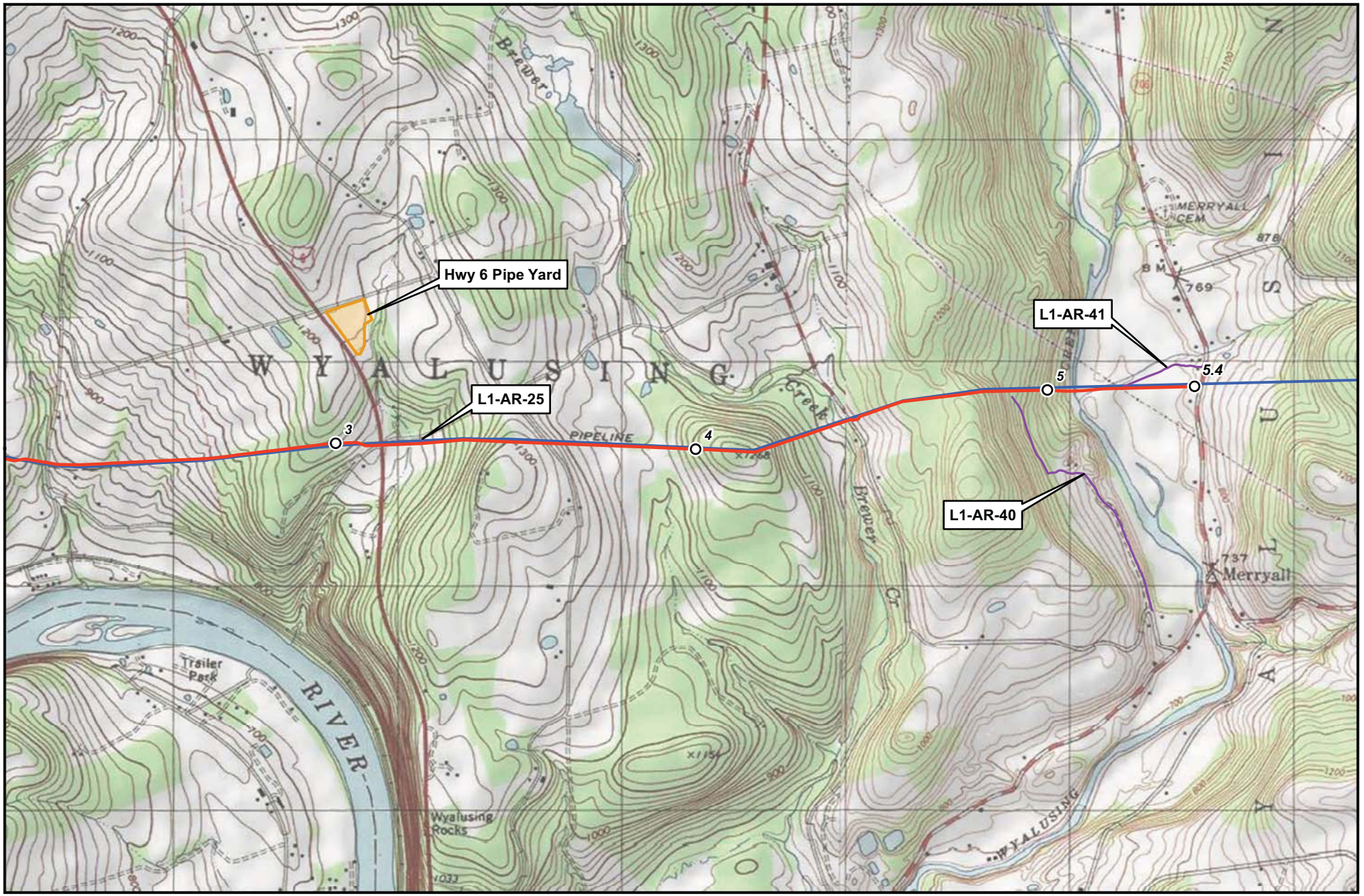
MAPS OF THE NORTHEAST UPGRADE PROJECT



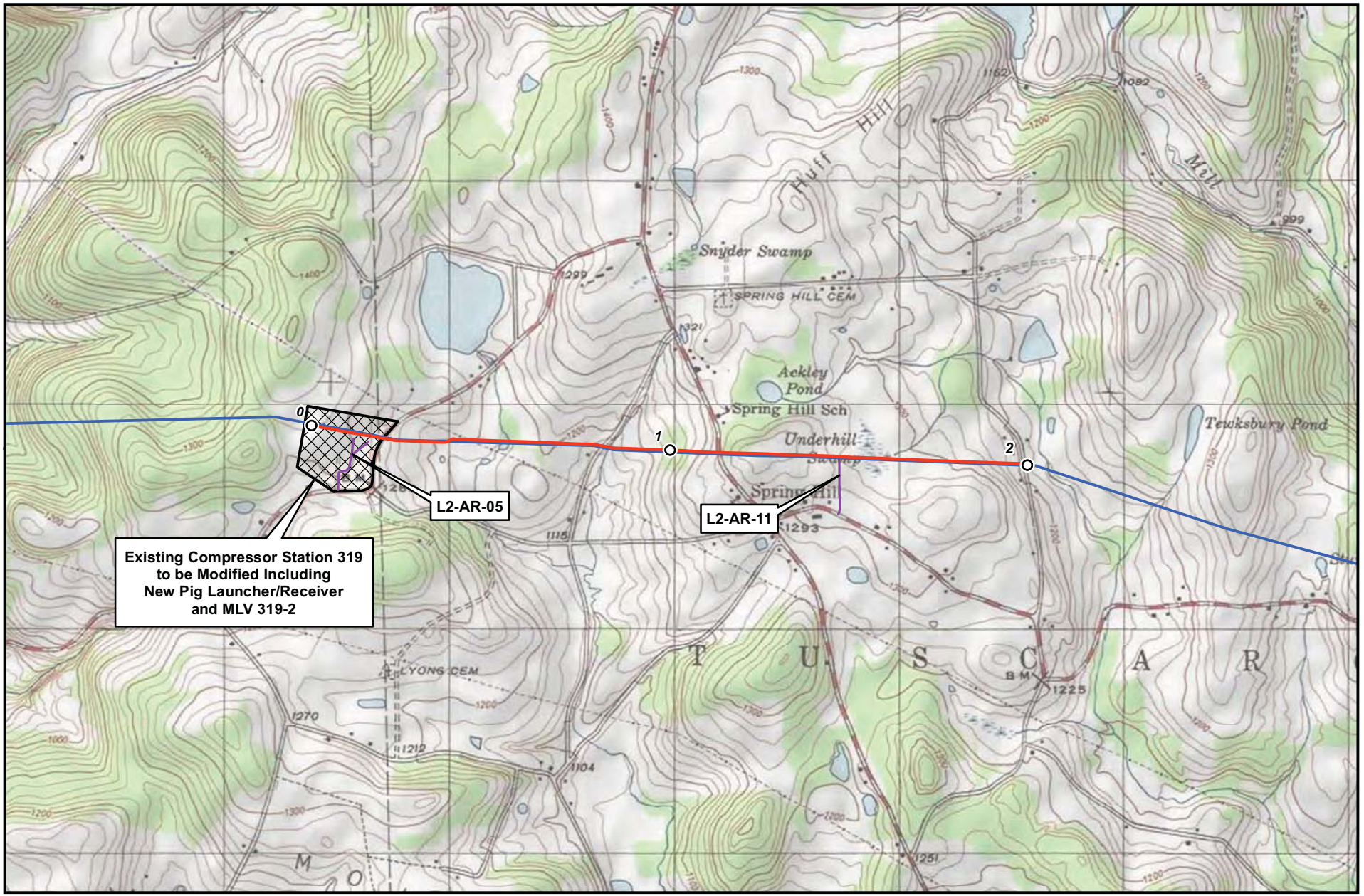
Milepost
Existing TGP Pipeline System
Proposed 30-inch-diameter Loop 317
Proposed Access Road
Proposed Pipe/Contractor Yard

0 1,000 2,000 Feet

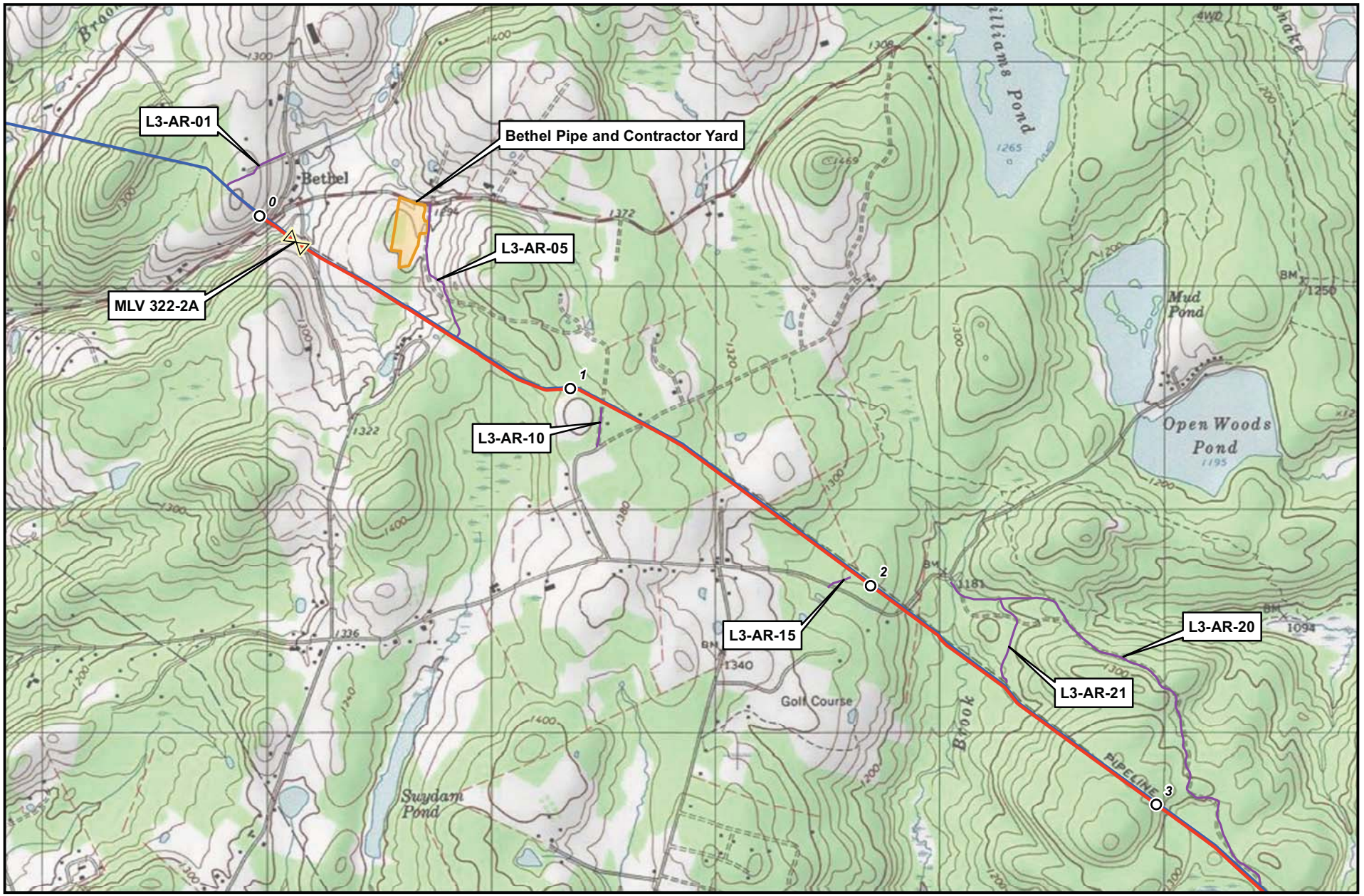
Appendix A
Northeast Upgrade Project
Loop 317
Bradford County, PA
Page 1 of 2



Appendix A
Northeast Upgrade Project
Loop 317
Bradford County, PA
Page 2 of 2



Appendix A
Northeast Upgrade Project
Loop 319
Bradford County, PA
Page 1 of 1

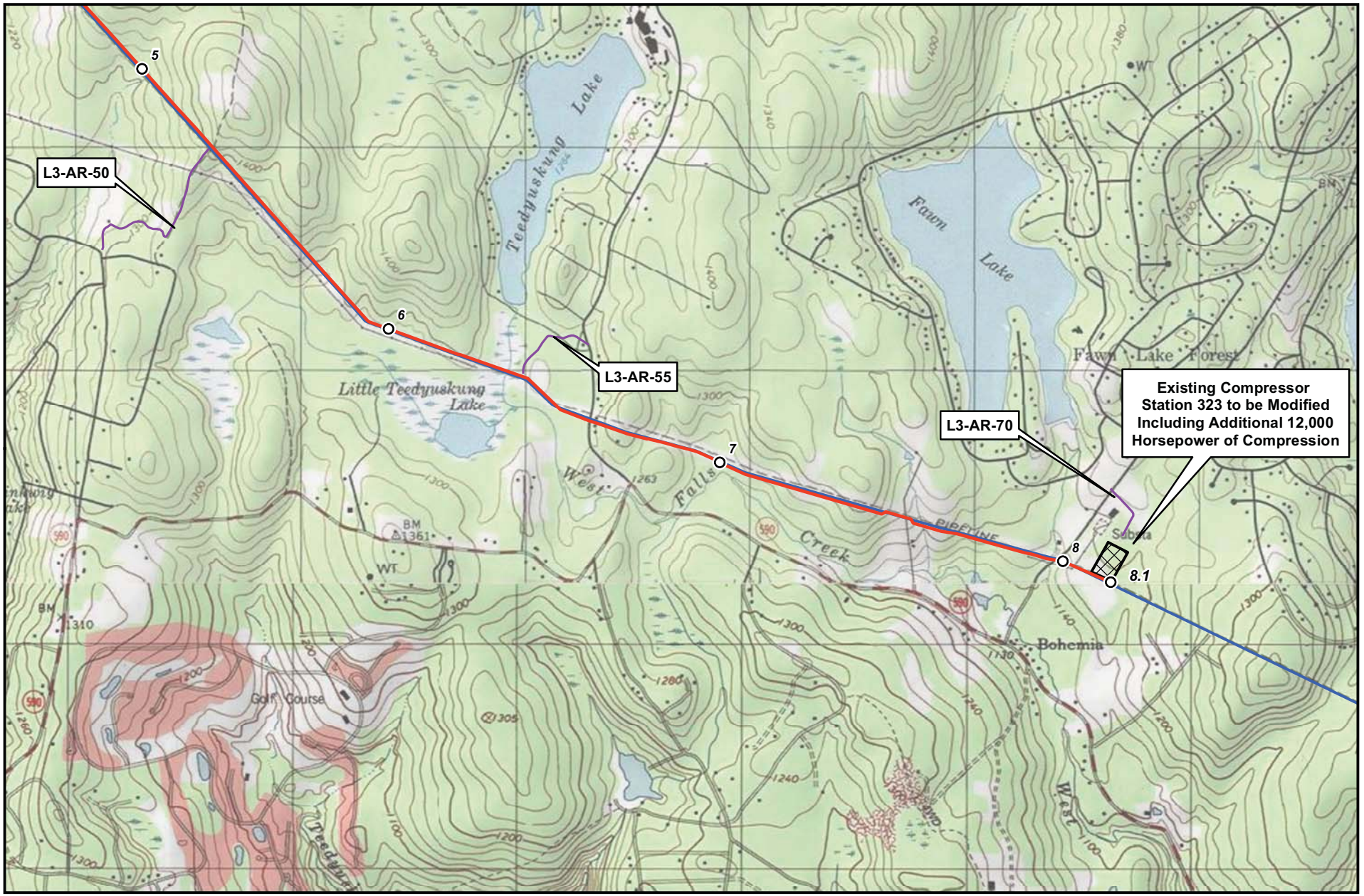


Milepost
Existing TGP Pipeline System
Proposed 30-inch-diameter Loop 321
Proposed Main Line Valve
Proposed Access Road
Proposed Pipe/Contractor Yard

0 1,000 2,000 Feet

Appendix A
Northeast Upgrade Project
Loop 321
Wayne County, PA
Page 1 of 3

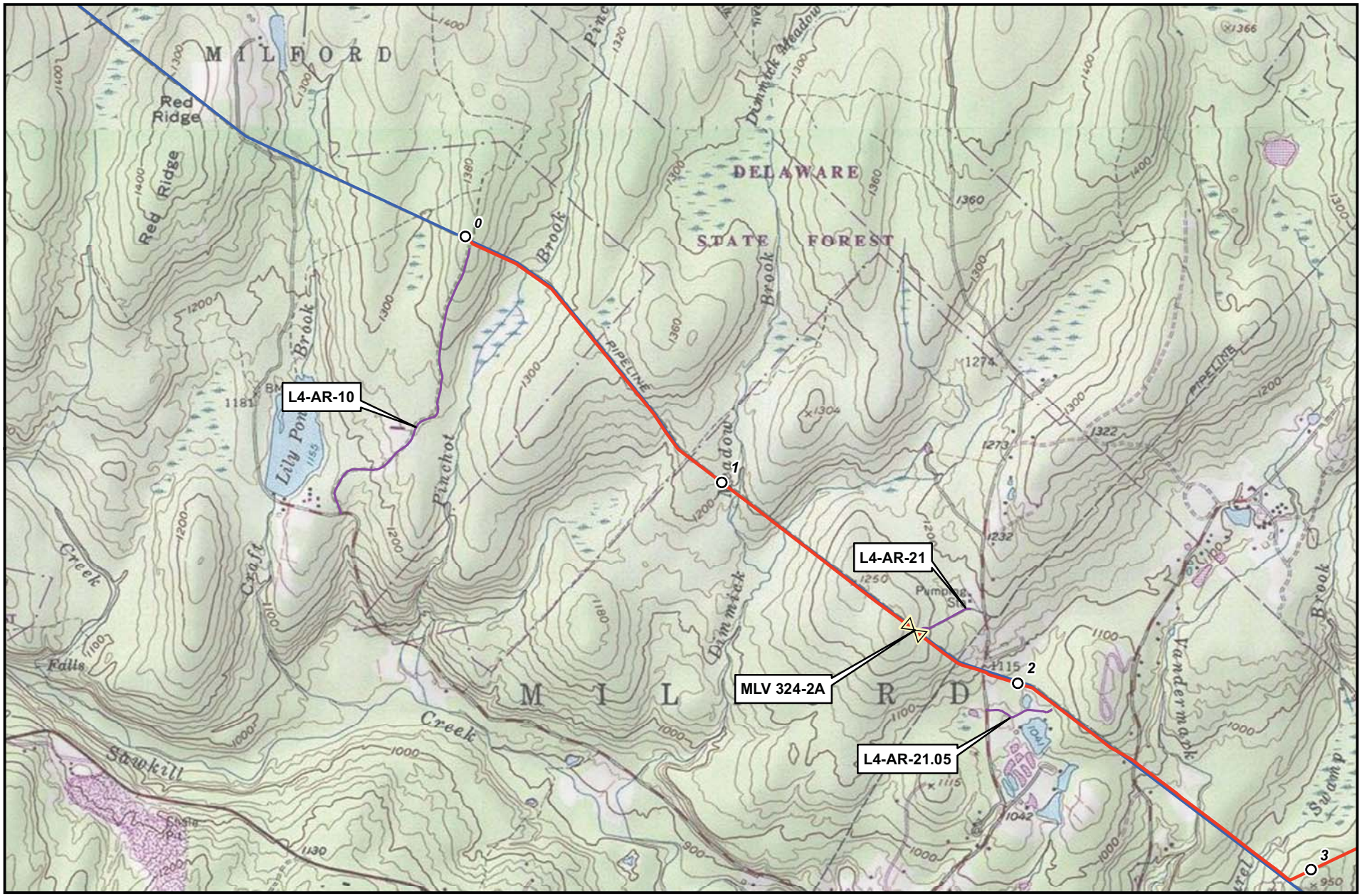
Appendix A
Northeast Upgrade Project
Loop 321
Wayne and Pike Counties, PA
Page 2 of 3



Milepost
Existing TGP Pipeline System
Proposed 30-inch-diameter Loop 321
Proposed Main Line Valve
Proposed Access Road
Proposed Pipe/Contractor Yard

0 1,000 2,000 Feet

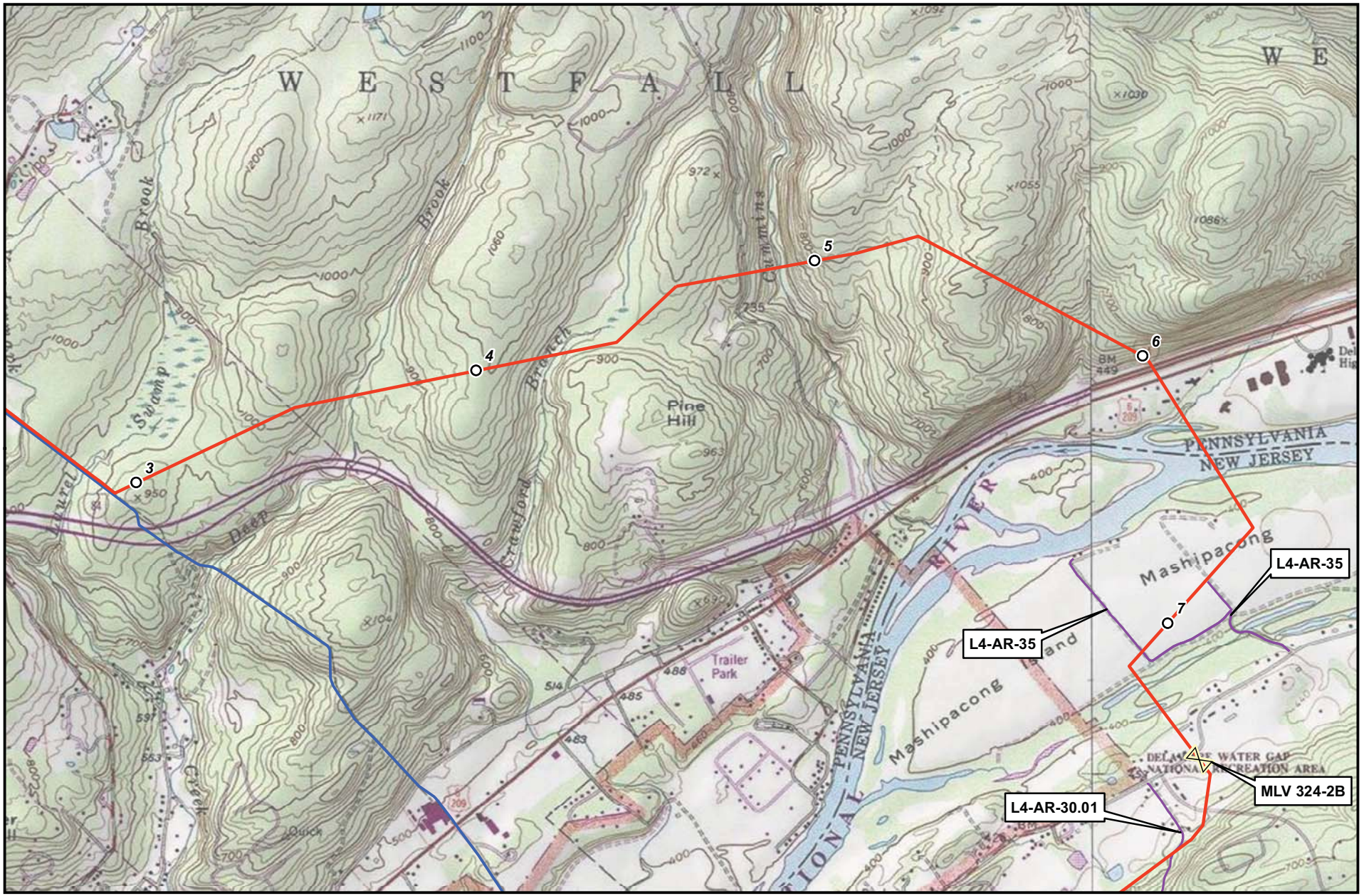
Appendix A
Northeast Upgrade Project
Loop 321
Pike County, PA
Page 3 of 3



Milepost
Existing TGP Pipeline System
Proposed 30-inch-diameter Loop 321
Proposed Main Line Valve
Proposed Access Road
Proposed Pipe/Contractor Yard

0 1,000 2,000 Feet

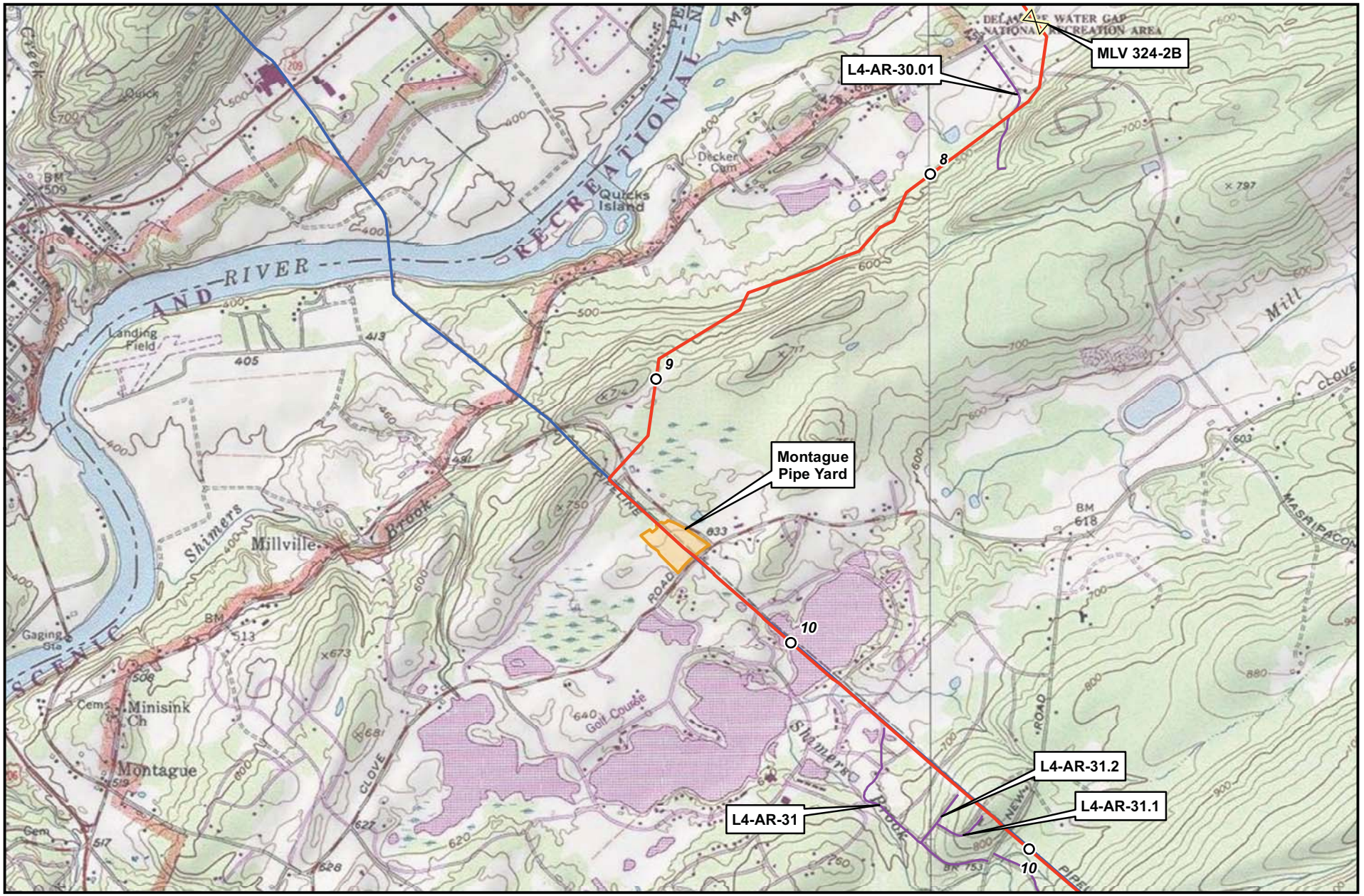
Appendix A
Northeast Upgrade Project
Loop 323
Pike County, PA



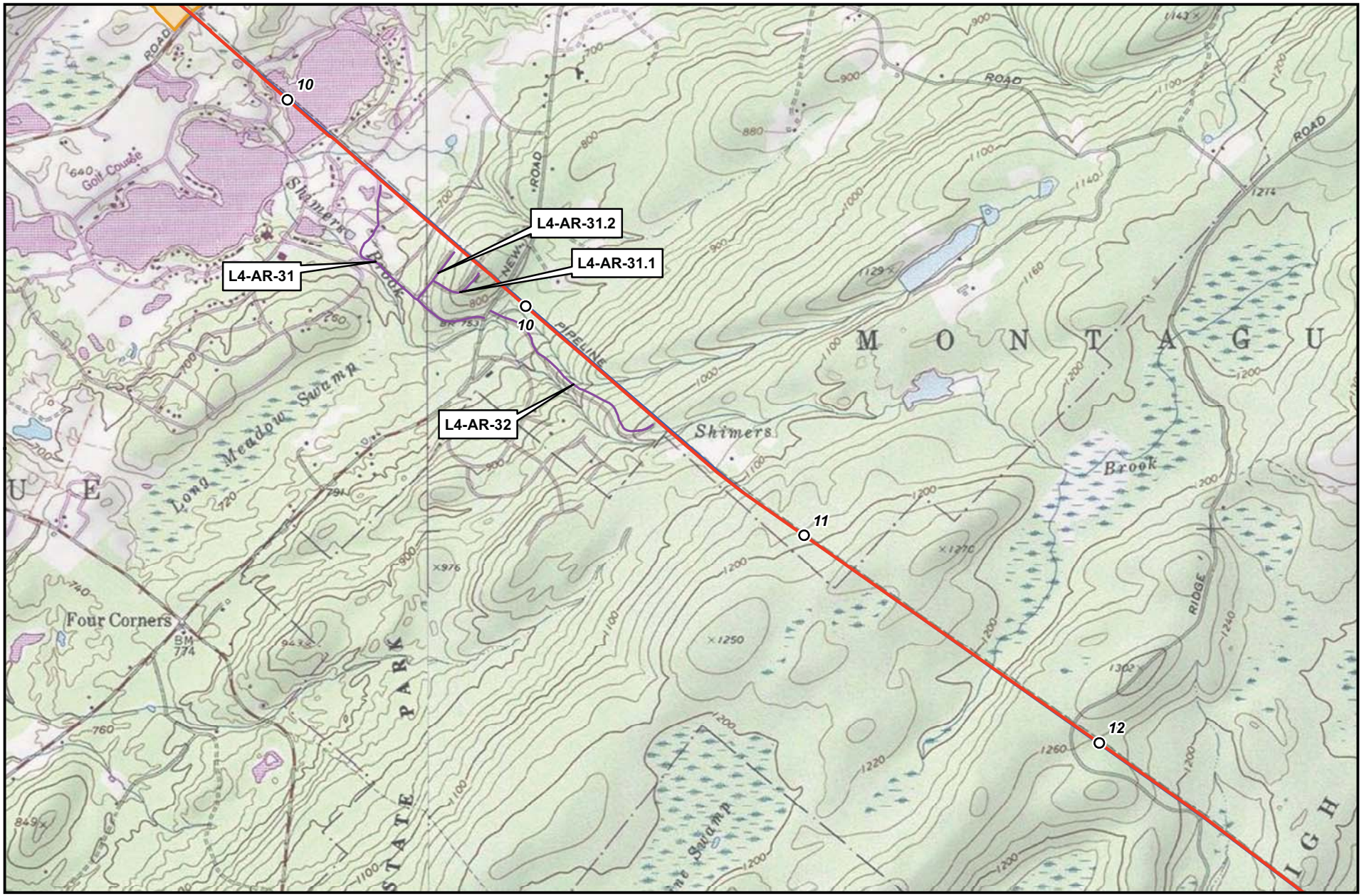
Milepost
Existing TGP Pipeline System
Proposed 30-inch-diameter Loop 321
Proposed Main Line Valve
Proposed Access Road
Proposed Pipe/Contractor Yard

0 1,000 2,000 Feet

Appendix A
Northeast Upgrade Project
Loop 323
Pike County, PA and Sussex County, NJ
Page 2 of 6



Appendix A
Northeast Upgrade Project
Loop 323
Sussex County, NJ
Page 3 of 6

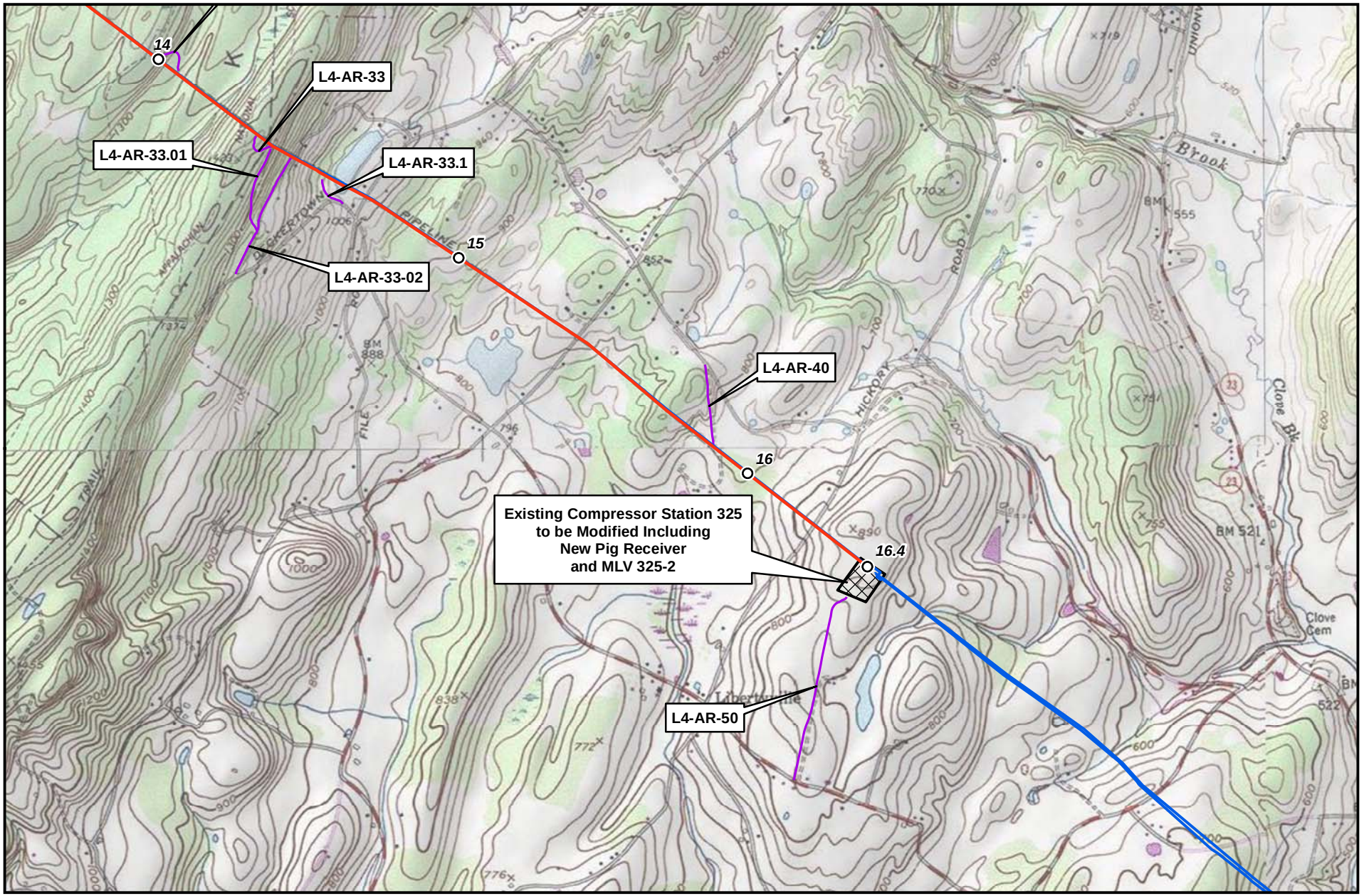


Milepost
Existing TGP Pipeline System
Proposed 30-inch-diameter Loop 321
Proposed Main Line Valve
Proposed Access Road
Proposed Pipe/Contractor Yard

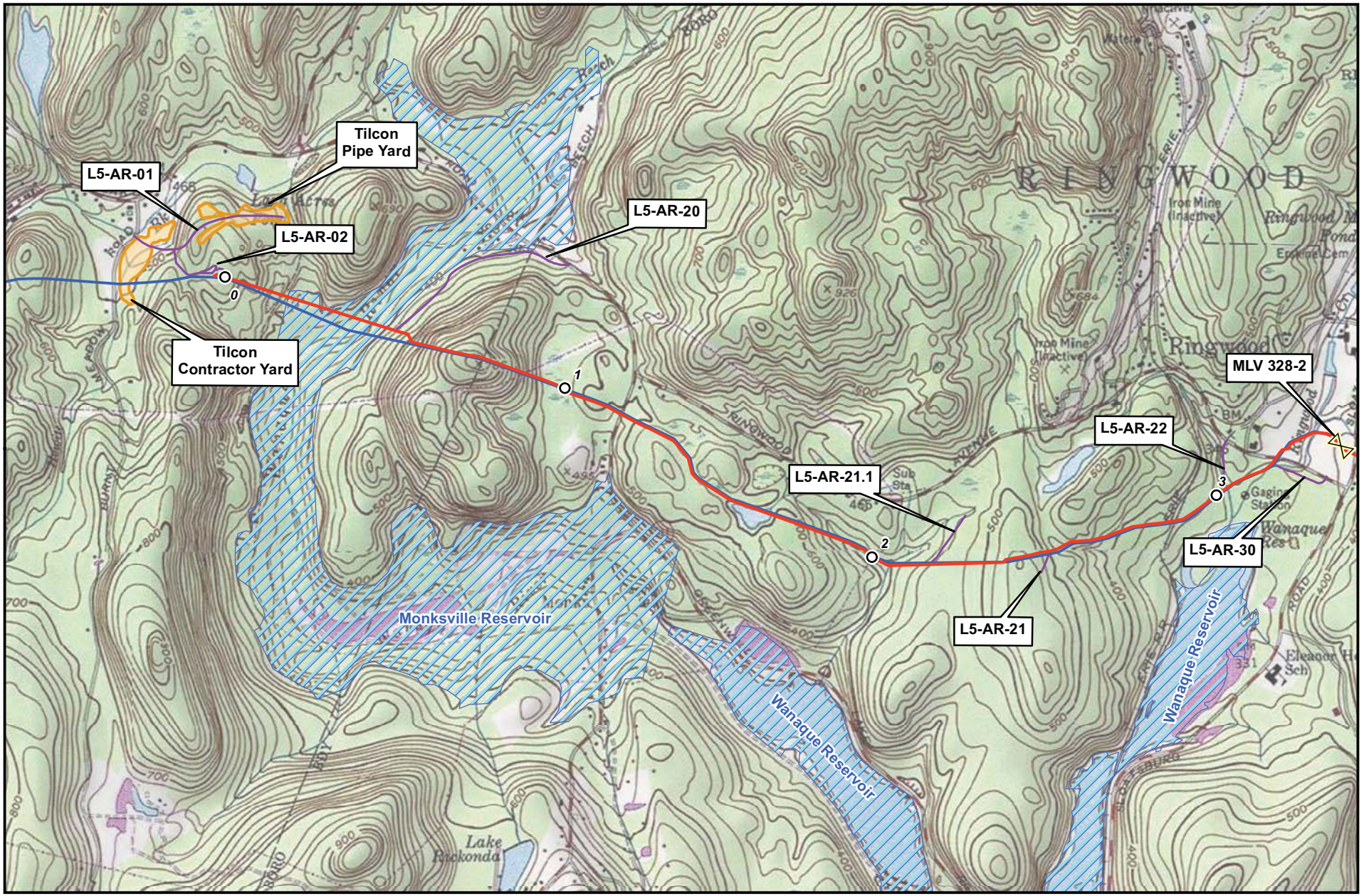
0 1,000 2,000 Feet

Appendix A
Northeast Upgrade Project
Loop 323
Sussex County, NJ
Page 4 of 6

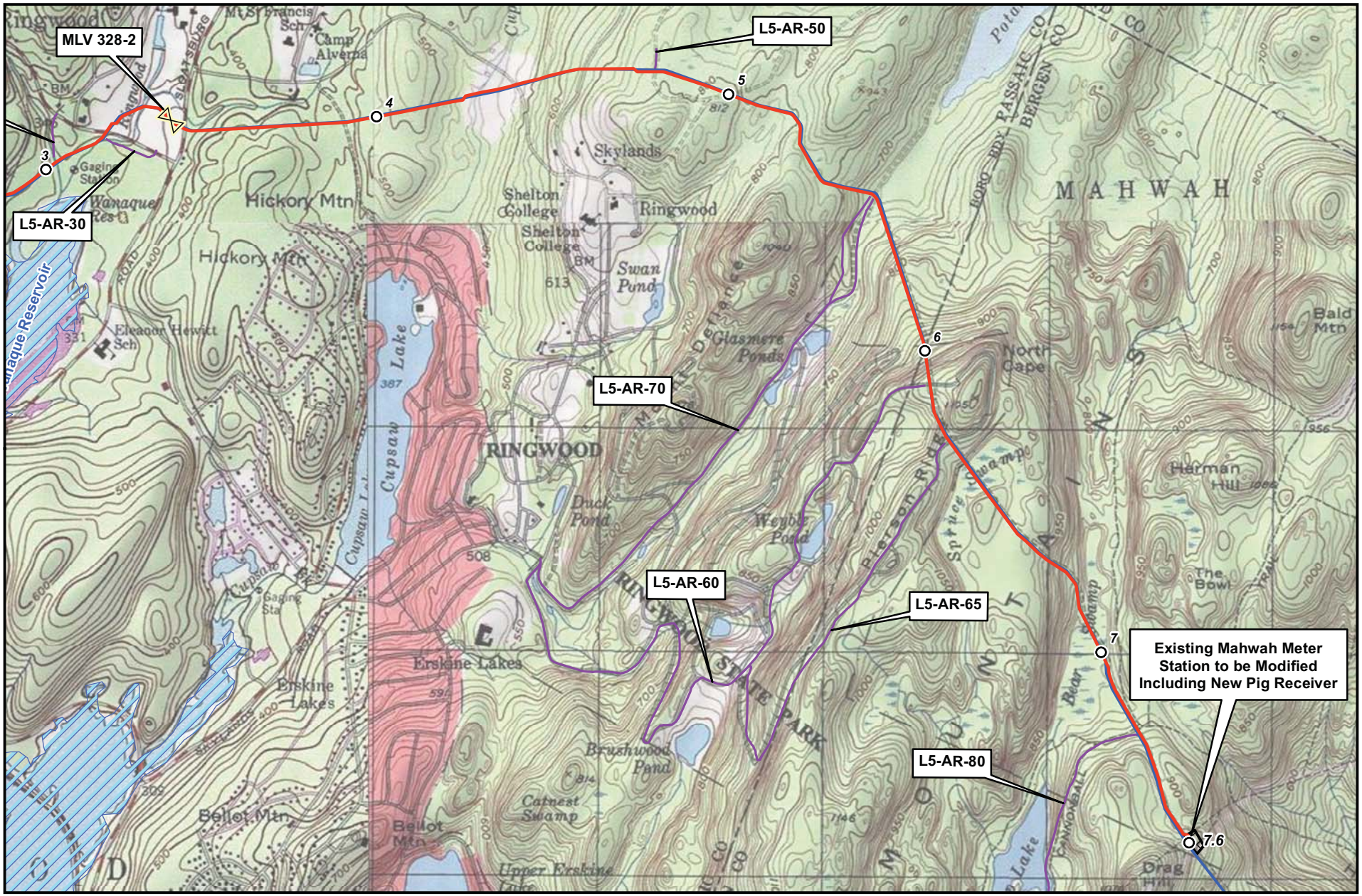
Appendix A
Northeast Upgrade Project
Loop 323
Sussex County, NJ
Page 5 of 6



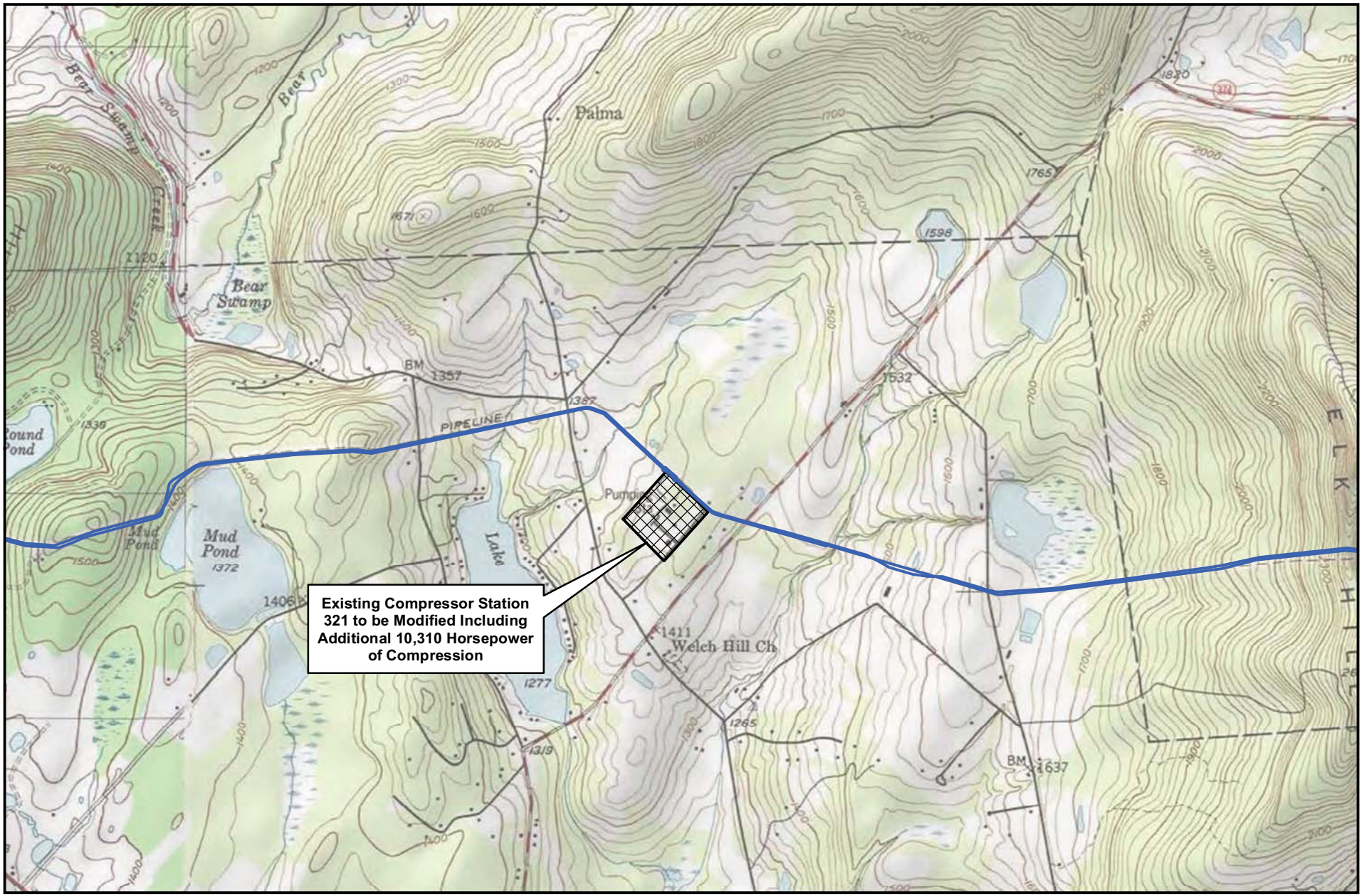
Appendix A
Northeast Upgrade Project
Loop 323
Sussex County, NJ
Page 6 of 6



Appendix A
Northeast Upgrade Project
Loop 325
Passaic County, NJ
Page 1 of 2



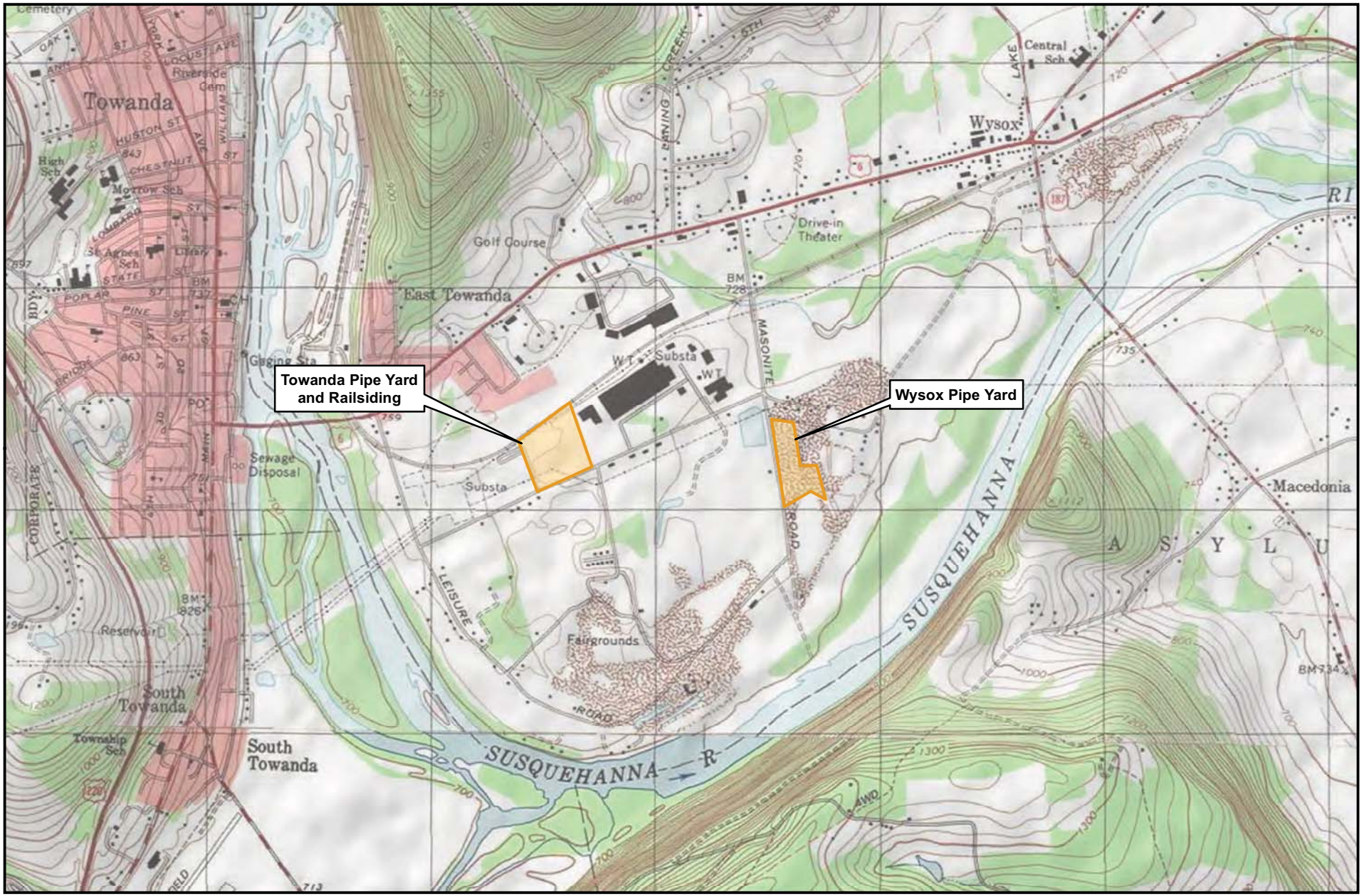
Appendix A
Northeast Upgrade Project
Loop 325
Passaic and Bergen Counties, NJ
Page 2 of 2



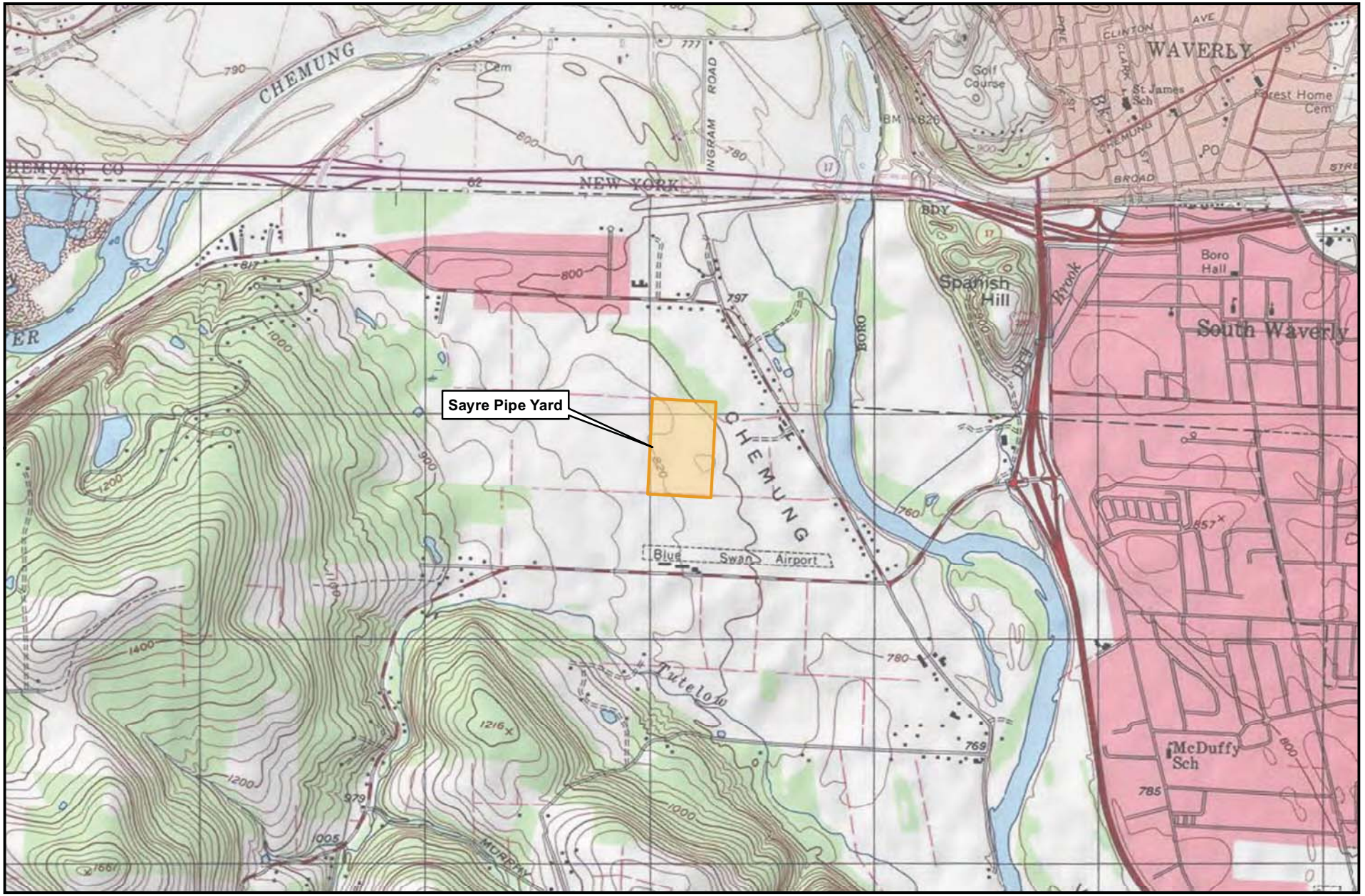
Existing TGP Pipeline System

0 1,000 2,000 Feet

Appendix A
Northeast Upgrade Project
Compressor Station 321
Susquehanna County, PA
Page 1 of 1



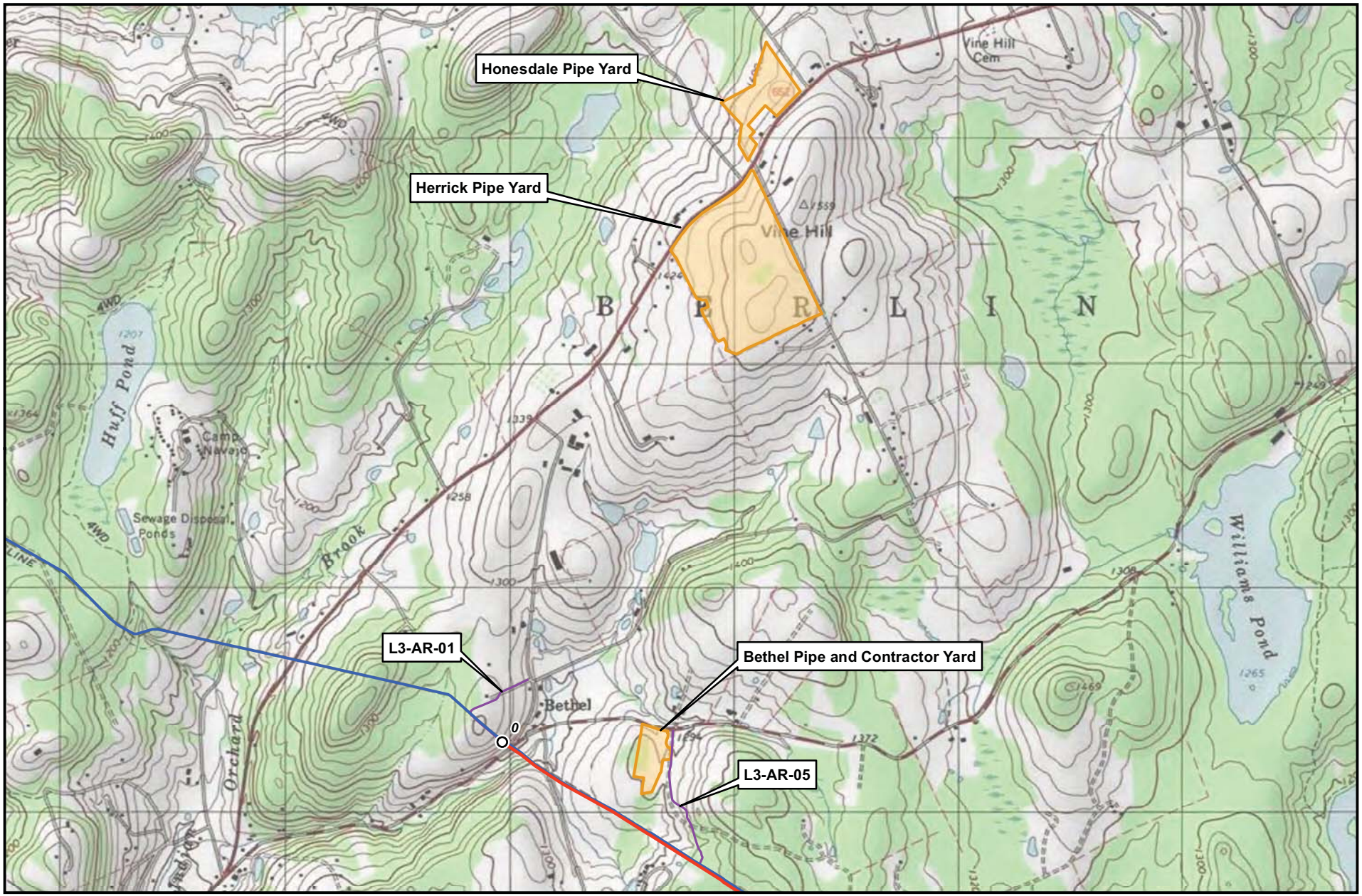
Appendix A
Northeast Upgrade Project
Towanda and Wysox Pipe Yards
Bradford County, PA



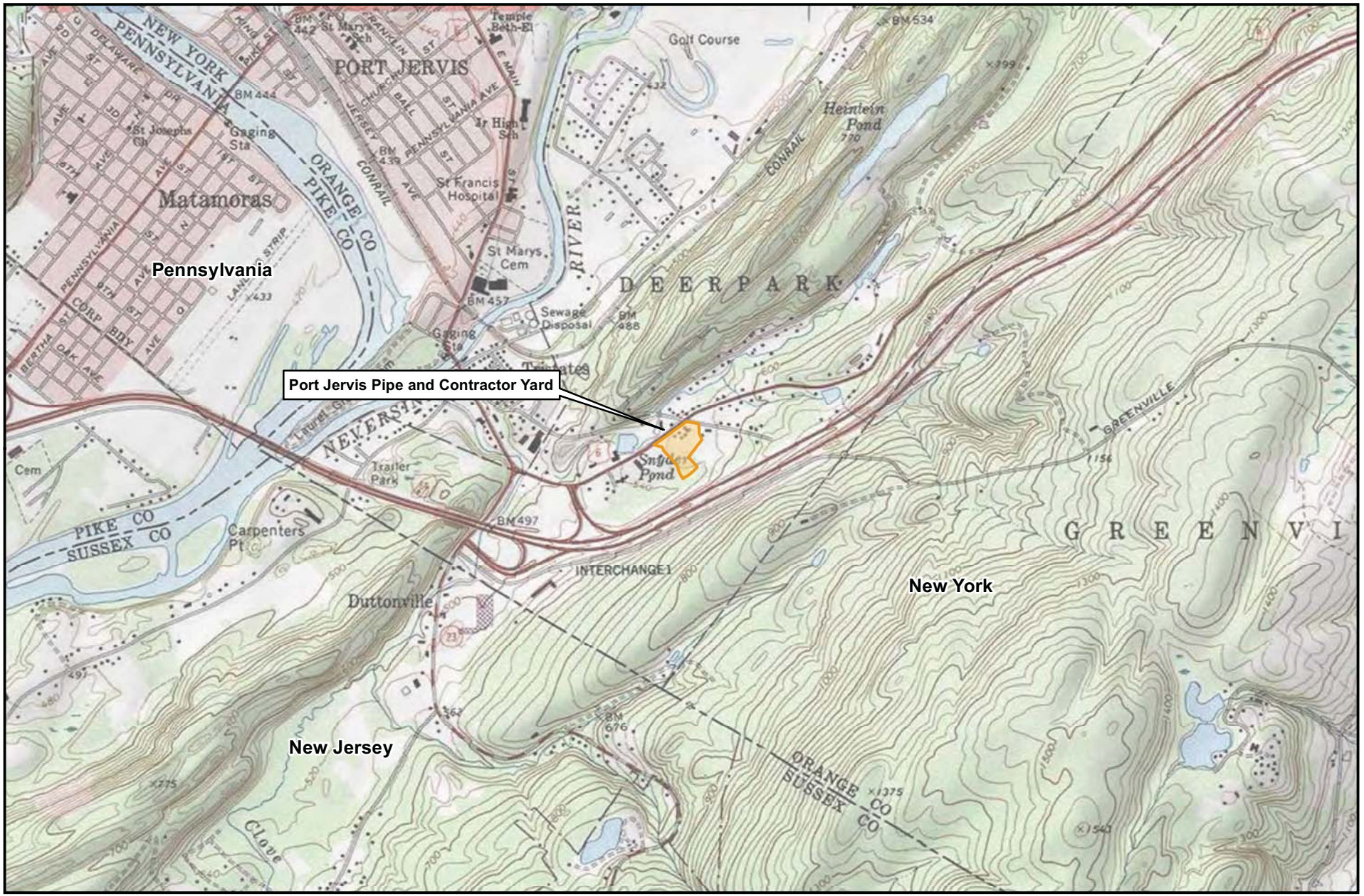
Proposed Pipe/Contractor Yard

0 1,000 2,000 Feet

Appendix A
Northeast Upgrade Project
Sayre Pipe Yard
Bradford County, PA



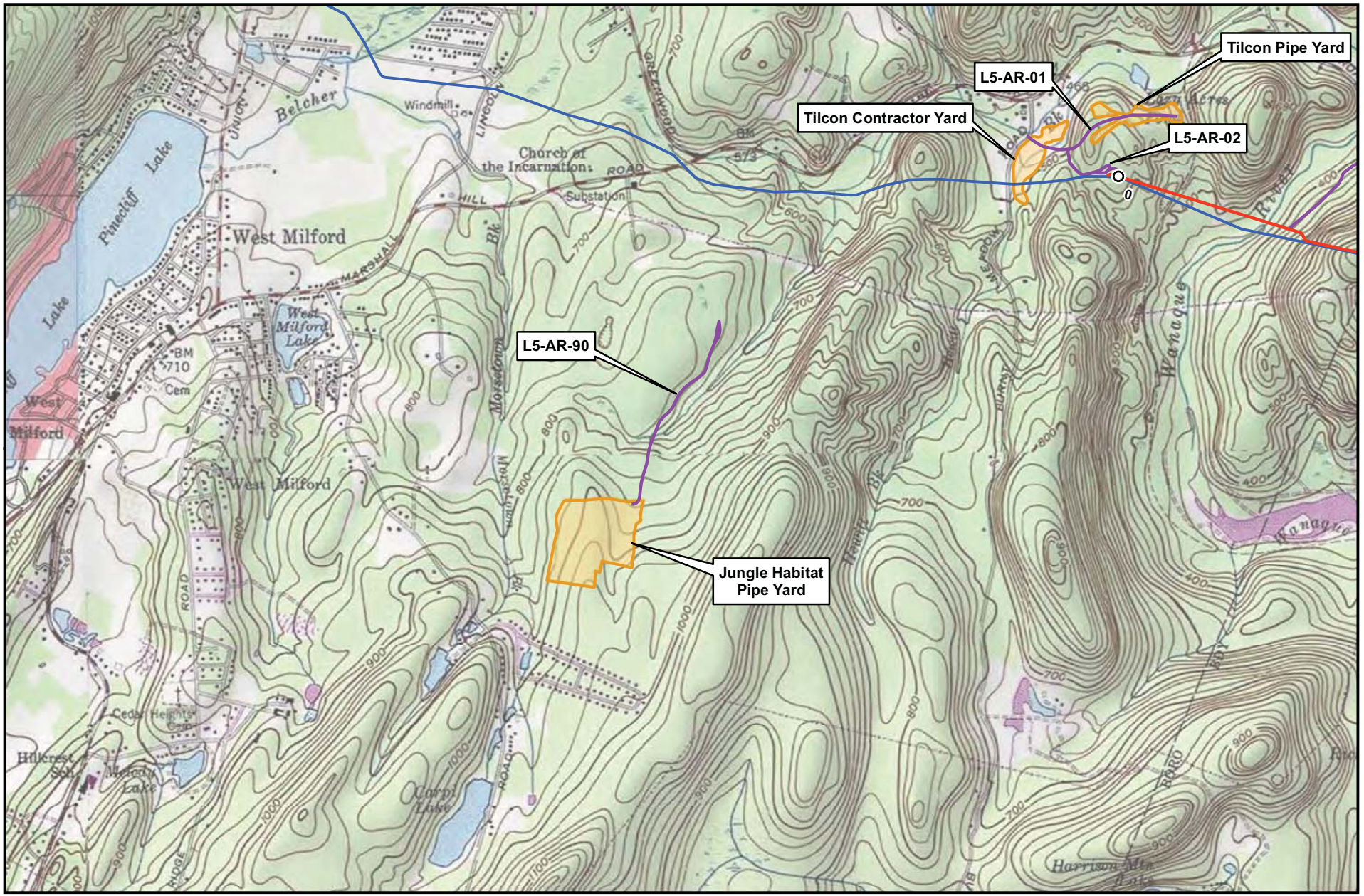
Appendix A
Northeast Upgrade Project
Herrick, Honesdale, and Bethel Pipe and Contractor Yards
Wayne County, PA



Proposed Pipe/Contractor Yard

0 1,000 2,000 Feet

Appendix A
Northeast Upgrade Project
Port Jervis Pipe and Contractor Yard
Orange County, NY



Appendix A
Northeast Upgrade Project
Jungle Habitat Pipe Yard
Passaic County, NJ

APPENDIX B

ADDITIONAL TEMPORARY WORKSPACE AREAS ASSOCIATED WITH THE NORTHEAST UPGRADE PROJECT

APPENDIX B

Additional Temporary Workspace Areas Associated with the Northeast Upgrade Project

State/Loop/County	Start Milepost	End Milepost	Length (feet)	Area Affected (acres)	Existing Land Use	Justification [a]
Pennsylvania						
Loop 317						
Bradford	0.0	0.0	80	0.0	Open	m
	0.0	0.0	200	0.2	Open, Wetland, Forest	u
	0.1	0.1	250	0.5	Wetland, Forest	j
	0.1	0.1	250	0.3	Wetland, Forest	j
	0.6	0.6	250	2.6	Agriculture, Road	k
	0.9	1.0	150	0.2	Agriculture, Forest	e
	1.0	1.0	150	0.2	Open, Agriculture	e
	1.1	1.1	130	0.1	Agriculture, Open	d
	1.2	1.2	150	0.2	Forest	i, r, c
	1.3	1.3	150	0.2	Forest	i, r
	1.4	1.5	150	0.2	Forest, Open	a
	1.7	1.7	125	0.1	Open	d
	1.7	1.7	125	0.1	Agriculture	d
	1.9	1.9	150	0.2	Agriculture	a, r, i
	2.0	2.0	150	0.2	Agriculture	a, r, i
	2.1	2.2	200	0.2	Agriculture	n
	2.1	2.1	200	0.3	Agriculture	n
	2.2	2.2	200	0.1	Forest, Agriculture	d
	2.2	2.2	200	0.2	Agriculture, Forest	d
	2.3	2.4	100	0.1	Agriculture	g, r
	2.3	2.4	100	0.1	Forest	g, r
	2.6	2.6	100	0.1	Forest	g, r
	2.7	2.7	200	0.3	Agriculture, Forest	g, r
	3.0	3.1	270	0.3	Forest, Open	e, n
	3.1	3.1	210	0.2	Forest	e, n
	3.1	3.2	140	0.2	Wetland	e, r
	3.2	3.2	200	0.1	Road, Wetland, Open	e, r
	3.6	3.6	200	0.3	Agriculture	d
	3.6	3.6	200	0.2	Road, Agriculture	d
	3.7	3.7	100	0.1	Agriculture	g
	3.8	3.8	100	0.1	Agriculture	a, r
	3.8	3.9	100	0.1	Agriculture, Forest	a, r, i, c
	3.9	3.9	100	0.1	Forest, Open	a, r, i
	4.4	4.4	125	0.2	Forest	a, e, r
	4.5	4.5	250	0.3	Forest	e
	4.5	4.5	175	0.2	Commercial/Industrial, Forest, Open	e
	4.6	4.7	150	0.2	Forest	i, r
	5.0	5.1	255	0.2	Wetland, Forest	h
	5.0	5.1	250	0.3	Forest, Wetland, Open	h
	5.1	5.1	250	0.3	Open, Forest, Wetland, Water	h
	5.4	5.4	150	0.2	Agriculture	m, u
Loop 317 Subtotal				10.2		
Loop 319						
Bradford	0.0	0.2	1,094	6.7	Agriculture, Commercial/Industrial, Road	m, e
	0.2	0.2	100	0.1	Agriculture	e

APPENDIX B

Additional Temporary Workspace Areas Associated with the Northeast Upgrade Project

State/Loop/County	Start Milepost	End Milepost	Length (feet)	Area Affected (acres)	Existing Land Use	Justification [a]
	0.2	0.2	100	0.1	Agriculture	e
	0.2	0.2	150	0.2	Agriculture	e
	0.3	0.3	100	0.1	Agriculture	i, r
	0.4	0.4	200	0.3	Agriculture	p, c
	0.5	0.5	200	0.2	Agriculture	a, r, i
	0.6	0.7	200	0.2	Open, Forest	a, r, i
	0.8	0.8	127	0.1	Open	d
	0.8	0.8	33	0.0	Open	d, i
	0.9	0.9	65	0.1	Open	d
	1.0	1.0	150	0.2	Forest	a, r
	1.1	1.1	150	0.2	Agriculture	e
	1.1	1.2	41	0.1	Forest	e
	1.5	1.5	200	0.2	Agriculture	a, r, i
	1.5	1.5	100	0.1	Agriculture	a, r, i
	1.7	1.7	369	0.2	Agriculture	a, r
	1.8	1.8	100	0.1	Agriculture	a
	1.9	1.9	200	0.2	Agriculture	e
	2.0	2.0	95	0.1	Agriculture	e, u, m
Loop 319 Subtotal				9.4		
Loop 321						
Wayne	0.0	0.0	180	0.2	Open, Road	e
	0.0	0.0	220	0.8	Open, Agriculture, Road	e, m
	0.0	0.1	150	0.2	Open, Wetland, Forest	e
	0.1	0.1	150	0.2	Open, Agriculture	a
	0.1	0.2	100	0.1	Road, Open	d
	0.2	0.3	100	0.1	Open, Forest	a, d, r
	0.4	0.5	100	0.1	Forest	a, r, i
	0.7	0.8	540	0.3	Open, Forest	a, r, i
	1.1	1.1	100	0.1	Forest	a, r
	1.2	1.2	85	0.1	Road, Forest	d
	1.2	1.3	125	0.2	Forest	d
	1.3	1.3	100	0.1	Forest	a, r
	1.4	1.4	100	0.1	Forest	a, r, i
	1.5	1.5	100	0.1	Forest	a, r, i
	1.5	1.6	100	0.1	Agriculture	a, r, i
	1.8	1.8	100	0.1	Forest	a, r, i
	1.9	1.9	100	0.1	Forest	a, r, i
	2.1	2.1	125	0.2	Forest, Open	e
	2.1	2.1	125	0.1	Open	a, r
	2.3	2.3	80	0.1	Open	a, r
	2.4	2.5	160	0.2	Forest	a, r, i
	2.4	2.5	172	0.1	Open	a, r
	3.0	3.1	100	0.1	Open, Forest	a, r
	3.2	3.2	100	0.1	Forest	a, r, i, c
	3.2	3.3	100	0.1	Forest	a, r, i
	3.4	3.4	100	0.1	Open, Forest	a, d, r
	3.5	3.5	100	0.1	Forest	a, r
	3.9	4.0	450	0.3	Open, Forest	a, r, i

APPENDIX B

Additional Temporary Workspace Areas Associated with the Northeast Upgrade Project

State/Loop/County	Start Milepost	End Milepost	Length (feet)	Area Affected (acres)	Existing Land Use	Justification [a]
Pike	4.2	4.2	100	0.1	Forest	a, r, i
	4.3	4.4	125	0.1	Forest	a, r, i
	4.4	4.4	100	0.1	Forest	a, r, i
	6.0	6.0	100	0.1	Forest	a, r, i
	6.2	6.2	150	0.1	Open	a, r, i
	6.2	6.3	67	0.1	Forest	a, r, i
	6.4	6.4	100	0.1	Forest	a, r, i
	6.5	6.5	100	0.1	Forest	a, r, i
	6.6	6.6	125	0.1	Wetland, Road	e
	6.6	6.6	125	0.2	Wetland, Road	e
	6.6	6.7	125	0.1	Forest	e
	7.5	7.5	150	0.3	Open, Forest	d, p, n, c
	7.5	7.6	235	0.2	Open, Wetland, Road	d, p, n
	7.7	7.7	100	0.1	Open, Forest	a, r, i
	7.8	7.8	100	0.1	Forest	a, r, i
	8.0	8.0	150	0.1	Open, Forest	a, r, d, c
	8.0	8.0	190	0.1	Open, Forest	a, r, d
Loop 321 Subtotal				6.5		
Loop 323 (PA)						
Pike	0.1	0.2	200	0.1	Open	a, r
	0.2	0.2	100	0.1	Forest	a, r, g
	0.3	0.3	100	0.1	Forest	a, r, g
	1.0	1.0	100	0.1	Forest	a, r, g
	1.2	1.2	100	0.1	Forest	a, r, g
	1.3	1.3	100	0.1	Forest	a, r, g
	1.9	1.9	150	0.2	Open	d
	2.0	2.0	100	0.1	Forest	a, r, g
	2.4	2.4	100	0.1	Road, Forest	e
	2.4	2.4	100	0.1	Open, Residential, Forest	e
	2.8	2.8	100	0.1	Forest	a, r, g
	2.9	2.9	150	0.1	Open	o
	4.8	4.8	130	0.2	Road, Forest	d
	4.8	4.8	130	0.2	Forest	d
	5.0	5.1	100	0.1	Forest	a, r
	5.1	5.2	100	0.1	Forest	a, r
	5.3	5.3	200	0.1	Forest	o
	6.0	6.1	110	0.1	Forest	o, c
	6.1	6.2	155	0.3	Forest, Open	e
	6.1	6.2	155	0.3	Forest, Open	e
	6.2	6.3	667	0.2	Commercial/Industrial, Residential, Open, Forest, Water	e, j
Loop 323 (PA) Subtotal				2.9		
Pennsylvania Subtotal				*28.9*		
New Jersey						
Loop 323 (NJ)						
Sussex	6.7	6.7	50	<0.1	Agriculture	j
	6.7	6.7	250	1.8	Agriculture, Forest	j
	7.1	7.1	89	0.2	Agriculture, Road, Residential	o, h

APPENDIX B

Additional Temporary Workspace Areas Associated with the Northeast Upgrade Project

State/Loop/County	Start Milepost	End Milepost	Length (feet)	Area Affected (acres)	Existing Land Use	Justification [a]
	7.2	7.2	250	0.1	Forest, Agriculture	h
	7.2	7.2	332	0.2	Forest, Agriculture	h
	7.3	7.4	102	0.1	Open, Forest	e
	7.5	7.5	150	0.1	Special/Other	e
	7.5	7.5	150	0.1	Special/Other	e
	7.6	7.7	150	0.1	Commercial/Industrial, Open, Forest	e
	7.6	7.7	150	0.1	Commercial/Industrial, Forest	e
	7.7	7.7	150	0.1	Forest	E
	7.7	7.7	150	0.1	Forest	e
	7.7	7.7	100	0.1	Forest	e
	7.8	7.8	100	0.1	Forest	b
	7.9	7.9	100	0.1	Forest	b
	9.2	9.2	100	0.1	Forest	a, r, i
	9.3	9.3	100	0.1	Residential	a, r, i
	9.4	9.4	100	0.1	Forest	e
	9.4	9.4	150	0.1	Forest	e
	9.5	9.5	100	0.1	Forest	a, r, i
	9.7	9.7	100	0.1	Open	a, r, i
	9.7	9.8	553	0.3	Commercial/Industrial, Open, Special, Forest	a, r, i
	9.9	9.9	100	0.1	Forest	d
	9.9	10.0	200	0.1	Open, Road, Forest	d
	10.0	10.0	100	0.1	Open, Forest, Wetland	e, r
	10.2	10.2	100	0.1	Forest	a, r, g
	10.3	10.3	100	0.1	Forest	a, r, g
	10.4	10.4	100	0.1	Special, Forest	a, r, g, c
	10.5	10.5	100	0.1	Open, Road, Forest	a, r, g, i
	10.6	10.6	100	0.1	Open, Forest	a, r, i
	10.7	10.7	100	0.1	Forest	a, r, i
	10.9	10.9	100	0.1	Forest	a, r, i
	11.2	11.3	100	0.1	Forest	a, r, i
	11.5	11.5	150	0.2	Forest	a, r, i
	11.7	11.8	200	0.2	Forest	a, r, i
	11.9	11.9	150	0.1	Forest	e
	11.9	12.0	150	0.1	Forest, Road, Open	e
	11.9	12.0	150	0.1	Forest, Road	e
	12.2	12.3	100	0.1	Forest	a, r, i
	12.6	12.6	150	0.2	Forest	a, r, i
	12.8	12.8	100	0.1	Forest	a, r, i
	13.0	13.1	200	0.3	Forest	o
	13.1	13.2	150	0.2	Forest	e
	13.2	13.2	80	0.1	Road, Forest	e
	13.4	13.4	100	0.1	Forest	a, r, i
	13.8	13.8	100	0.1	Forest	a, g, r
	14.1	14.1	100	0.1	Forest	a, g, r
	14.2	14.2	100	0.1	Forest	a, r
	14.3	14.3	100	0.1	Forest	a, r
	14.5	14.6	250	0.3	Forest	h, e

APPENDIX B

Additional Temporary Workspace Areas Associated with the Northeast Upgrade Project

State/Loop/County	Start Milepost	End Milepost	Length (feet)	Area Affected (acres)	Existing Land Use	Justification [a]
	14.6	14.6	110	0.1	Forest	h, e
	14.7	14.8	366	0.2	Forest, Open	e
	14.7	14.9	680	0.8	Residential, Forest, Open	e
	15.2	15.2	125	0.1	Residential	e
	15.3	15.4	200	0.1	Agriculture	e
	15.4	15.4	125	0.1	Agriculture, Road	e
	15.4	15.4	150	0.2	Agriculture, Forest	e
	15.5	15.5	100	0.1	Agriculture, Forest	a, r, i
	15.9	15.9	125	0.1	Agriculture	d
	15.9	16.0	150	0.1	Forest	d
	16.0	16.0	100	0.1	Forest	a, r, i
	16.2	16.3	150	0.1	Agriculture	e
	16.3	16.3	300	0.3	Agriculture	e
Loop 323 (NJ) Subtotal				10.4		
Loop 325						
Passaic	0.0	0.0	1,507	2.4	Forest, Open, Wetland, Road	j, k
	0.5	0.6	250	0.5	Open, Forest	j
	0.5	0.5	250	0.2	Forest, Road	j
	0.9	0.9	125	0.1	Forest, Commercial/Industrial	a, r, i
	1.2	1.2	125	0.1	Forest	e
	1.4	1.5	100	0.1	Forest	a, r, i
	1.7	1.7	100	0.1	Forest	a, r, i
	1.9	1.9	100	0.1	Forest	a, r, i, g
	2.1	2.1	100	0.1	Forest	a, r, i, g, c
	2.2	2.2	100	0.1	Forest	a, r, g, c
	2.3	2.3	100	0.1	Forest	a, r, i
	2.4	2.4	91	0.1	Commercial/Industrial	e, p, r
	2.4	2.5	200	0.2	Forest	e
	2.4	2.5	200	0.1	Open	e
	2.5	2.5	150	0.1	Open	i
	2.7	2.8	100	0.1	Forest	i
	2.8	2.8	100	0.1	Forest	a, r, i, c
	3.0	3.0	200	0.1	Forest	a, r, g, d, c
	3.1	3.1	100	0.1	Forest	a, r, g, d, c
	3.2	3.3	215	0.1	Wetland	a, r, g
	3.2	3.2	75	0.1	Wetland	a, r, g
	3.5	3.5	150	0.2	Open, Forest	e
	3.5	3.5	200	0.1	Forest, Open	e
	3.6	3.6	100	0.1	Forest	a, r, i
	3.7	3.8	100	0.1	Forest	a, r, i
	3.9	4.0	86	0.1	Forest	a, r, i, c
	4.2	4.2	100	0.1	Forest	a, r, i, g
	4.4	4.4	100	0.1	Forest	e
	4.6	4.6	100	0.1	Forest	e, r
	4.7	4.8	100	0.1	Forest	a, r, i
	5.0	5.1	100	0.1	Forest	a, r, g, i
	5.3	5.3	100	0.1	Forest	a, r, g, i
	5.4	5.4	86	0.1	Open, Forest	a, r, g, i

APPENDIX B

Additional Temporary Workspace Areas Associated with the Northeast Upgrade Project

State/Loop/County	Start Milepost	End Milepost	Length (feet)	Area Affected (acres)	Existing Land Use	Justification [a]
	5.4	5.4	100	0.1	Forest	
	5.7	5.7	100	0.1	Forest	a, r, i
Bergen	6.3	6.3	150	0.2	Forest	a, r, i, c
	6.4	6.5	150	0.2	Forest	a, r, i
	6.7	6.8	200	0.2	Forest	a, r, i
	7.0	7.0	150	0.2	Forest	a, r, i
Loop 325 Subtotal				7.4		
New Jersey Subtotal				*17.9*		
Project Total				**46.8**		

[a] a=topsoil storage; b=side slope; c=steep slope construction; d=road crossing; e= road crossing with bore pits; f=railroad crossing; g=creek crossing; h=waterbody crossing; i=wetland staging area; j=HDD site; k=HDD layout; l=access road; m=staging area; n=utility crossing; o=horizontal bends >10%; p=swap working side; q=test manifold; r=narrow construction; s=mainline valve setting; t=launcher/receiver install; u=interconnect.

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

APPENDIX C

ACCESS ROADS ASSOCIATED WITH THE NORTHEAST UPGRADE PROJECT

APPENDIX C

Access Roads Associated with the Northeast Upgrade Project

State/Facility/ Access Road ID	Approx. Milepost [a]	County	Modification Required	Road Type	Existing Land Use [b]	Length (feet)	Affected Area (acres)[c]
Pennsylvania							
Loop 317							
L1 AR 10	0.2	Bradford	Gravel, tree trimming	Gravel driveway / Two-track	Agricultural, Open, Roadway, Forest, Residential, Water, Other	2,213	1.2
L1 AR 20	0.5	Bradford	Tree cutting, widening, rock removal	Gravel	Agricultural, Other, Roadway, Forest	1,603	0.9
L1 AR 20.1	0.7	Bradford	Possible minor grading or addition of gravel to repair potholes/washouts.	Gravel	Agricultural, Other, Open, Roadway	1214	0.7
L1 AR 21	1.7	Bradford	Widening	Gravel	Agricultural, Open, Roadway, Residential	1,502	1.0
L1 AR 25	3.2	Bradford	Rock, culvert, widening, mats	Two-track	Open, Roadway	36	<0.1
L1 AR 40	4.9	Bradford	Gravel, culvert, widening, boulder clearing, tree removal/trimming, mats	Gravel / Dirt	Agricultural, Other, Roadway, Forest, Wetland	3,869	2.1
L1 AR 41	5.2	Bradford	Grading, gravel	Gravel / Dirt	Agricultural, Roadway, Forest	1,293	0.7
							6.5
Loop 317 Subtotal							
Loop 319							
L2 AR 05	0.1	Bradford	Gravel	Gravel / Two-track	Agricultural, Commercial/Industrial, Open, Roadway	947	0.7
L2 AR 11	1.5	Bradford	Rock, culvert, widening	Two-track	Agricultural, Roadway, Residential, Forest, Other	843	0.4
Loop 319 Subtotal							1.1
Loop 321							
L3 AR 01	0.0	Wayne	Grading, widening, gravel	Gravel	Agricultural, Open, Roadway, Residential, Forest	1,535	0.9
L3 AR 05	0.7	Wayne	Grading, tree trimming, widening, culvert	Gravel	Agricultural, Open, Roadway, Forest, Other	2,220	1.2
L3 AR 10	1.1	Wayne	Possible minor grading or addition of gravel to repair potholes/washouts.	Gravel	Open, Roadway, Residential, Forest, Commercial/Industrial, Other	583	0.4
L3 AR 15	2.0	Wayne	Widening, gravel	Two-track	Open, Roadway, Forest, Other	376	0.2
L3 AR 21	2.5	Wayne	Tree trimming, grading	Gravel / Dirt	Open, Roadway, Forest, Other	1,400	0.8
L3 AR 20	3.4	Wayne	Possible minor grading or addition of gravel to repair potholes/washouts.	Gravel	Open, Roadway, Commercial/Industrial, Forest, Wetland, Other	18,620	10.2
L3 AR 25	3.6	Wayne	Tree cutting, widening, grading	Dirt	Roadway, Forest, Other	420	0.2
L3 AR 40	4.3	Pike	Tree trimming	Gravel / Grass	Roadway, Residential, Forest, Other, Wetland	3,028	1.6

APPENDIX C

Access Roads Associated with the Northeast Upgrade Project

State/Facility/ Access Road ID	Approx. Milepost [a]	County	Modification Required	Road Type	Existing Land Use [b]	Length (feet)	Affected Area (acres)[c]
L3 AR 50	5.3	Pike	Gravel, tree trimming, widening, grading, culvert	Gravel / Dirt	Open, Roadway, Forest, Commercial/Industrial, Water, Other	2,846	1.6
L3 AR 55	6.4	Pike	Gravel, tree trimming, widening, grading	Gravel	Open, Roadway, Forest, Water, Other, Wetland	1,330	0.7
L3 AR 70	8.1	Pike	None	Paved	Open, Other, Roadway	865	0.1
Loop 321 Subtotal							17.8
Loop 323							
L4 AR10	0.0	Pike	Gravel, tree trimming, widening	Gravel / Two-track	Other, Roadway, Forest	2,684	1.5
L4 AR 21	1.7	Pike	Widening, mats	Gravel	Commercial/Industrial, Roadway, Forest, Open, Other, Wetland	908	0.5
L4 AR 21.05	2.1	Pike	Widening	Two-track	Agricultural, Open, Roadway, Forest, Water, Other, Wetland	1,048	0.6
Loop 323 PA Subtotal							2.6
Pennsylvania Subtotal							*28.0*
New Jersey							
Loop 323 (cont'd)							
L4 AR 36	6.9	Sussex	Grading, widening	Two-track	Agricultural, Roadway, Forest, Other	553	0.3
L4 AR 35	7.1	Sussex	Grading	Gravel / Dirt	Agricultural, Open, Roadway, Residential, Forest, Wetland, Water, Other	4,530	2.1
L4 AR 30.01	7.9	Sussex	Grading	TBD	Roadway, Residential, Forest, Wetland, Other	2,251	0.5
L4 AR 31.2	9.8	Sussex	Grading, widening	Gravel	Open, Roadway	964	0.2
L4 AR 31.1	9.9	Sussex	Grading, widening	Gravel / Two-track	Open, Roadway	904	0.2
L4 AR 31	10.4	Sussex	Tree trimming, widening, grading	Gravel / Two-track	Open, Residential, Roadway, Forest, Other, Wetland	3,300	1.1
L4 AR 32	10.5	Sussex	Tree trimming, widening, grading	Gravel	Open, Roadway, Residential, Wetland, Other	3,255	0.9
L4 AR 33B	13.6	Sussex	Tree trimming, widening, grading	Path	Open, Roadway, Forest, Other	622	0.2
L4 AR 33A	14.0	Sussex	Tree trimming, widening, grading	Two-track	Open, Roadway, Forest, Wetland, Other	600	0.1
L4 AR 33	14.4	Sussex	None	Path	Open, Roadway, Other	484	<0.1
L4 AR 33.01	14.4	Sussex	Grading	Gravel	Open, Roadway, Forest, Other	1,289	0.6
L4 AR 33.02	14.5	Sussex	Possible minor grading or addition of gravel to repair potholes/washouts.	Two-track	Residential, Other	1,922	0.9
L4 AR 33.1	14.6	Sussex	Widening, gravel	Gravel	Roadway, Other	596	0.2

APPENDIX C

Access Roads Associated with the Northeast Upgrade Project

State/Facility/ Access Road ID	Approx. Milepost [a]	County	Modification Required	Road Type	Existing Land Use [b]	Length (feet)	Affected Area (acres)[c]
L4 AR 40	15.9	Sussex	None	Paved	Roadway, Other	1,208	0.2
L4 AR 50	16.3	Sussex	None	Paved	Roadway, Other	2,854	0.0
Loop 323 NJ Subtotal							7.6
Loop 325							
L5 AR 01	0.0	Passaic	Grading, widening	Gravel	Roadway, Other	2,425	1.1
L5 AR 90	0.0	Passaic	None	Paved	Commercial/Industrial, Roadway	3,138	0.1
L5 AR 02	0.0	Passaic	Possible minor grading or addition of gravel to repair potholes/washouts.	Two-track	Roadway, Other, Forest	1,210	0.6
L5 AR 20	0.5	Passaic	Gravel, tree trimming, grading	Paved / Gravel	Roadway, Other	3,306	1.3
L5 AR 21.1	2.2	Passaic	Brush removal	Two-track	Roadway, Other	873	0.2
L5 AR 21	2.5	Passaic	Widening	Gravel	Roadway, Other	408	0.1
L5 AR 22	3.0	Passaic	None	Paved	Roadway, Other	726	0.1
L5 AR 30	3.2	Passaic	Tree trimming, mats, flume pipe	Dirt	Open, Roadway, Water, Wetland	857	0.4
L5 AR 50	4.8	Passaic	Tree trimming, rock removal, culvert, rock	Paved / Dirt	Open, Roadway, Other	324	0.1
L5 AR 70	5.5	Passaic	Widening, tree trimming, culverts, gravel, tree removal, grading	Gravel	Roadway, Forest, Other, Wetland	8,623	3.2
L5 AR 71	5.5	Passaic	Widening	Gravel	Roadway, Other, Wetland	1,837	0.6
L5 AR 60	6.1	Bergen	Tree trimming, tree removal, grading	Rock	Roadway, Forest, Other	13,210	3.6
L5 AR 65	6.3	Bergen	Tree trimming, grading	Rock	Water, Roadway, Other	7,007	1.9
L5 AR 80	7.2	Bergen	Bridges, tree removal, repaving	Paved	Open, Roadway, Forest, Water, Wetland, Other	8,274	4.1
Loop 325 Subtotal							17.4
New Jersey Subtotal							*25.1*
Project Total							**53.1**

[a] Milepost is nearest point where access road connects to the pipeline right-of-way.

[b] The existing land use listed is for the land use adjacent to each access road. In the event that stabilization is needed in a wetland area that an access road crosses, TGP would use mats or other acceptable stabilization methods to ensure that the wetland is not impacted.

[c] Reflects the estimated disturbance that could occur if the access road were modified to a width of 24 feet. Therefore, the area affected may represent a greater impact than would occur where modifications only (e.g., grading, gravel, widening) to access roads are currently expected.

APPENDIX D

WATERBODIES CROSSED BY THE NORTHEAST UPGRADE PROJECT

APPENDIX D

Waterbodies Crossed by the Northeast Upgrade Project

State / Facility / Milepost	Waterbody Name	Crossing Width [a] (feet)	Flow Type [b]	FERC Classification [c]	Fishery Class / Sensitivity [d, e]	In-Stream Work Window [f]	Proposed Crossing Method [g]
Pennsylvania							
Loop 317							
0.0	Unnamed tributary to Susquehanna River	1	Intermittent	MI	WWF		1 or 2
0.1	Unnamed tributary to Susquehanna River	0	Intermittent	N/A	WWF		N/A
0.1	Unnamed tributary to Susquehanna River	0	Intermittent	N/A	WWF		N/A
0.1	Unnamed tributary to Susquehanna River	0	Intermittent	N/A	WWF		N/A
0.1	Unnamed tributary to Susquehanna River	0	Intermittent	N/A	WWF		N/A
0.2	Susquehanna River	576	Perennial	MA	WWF, NRI, Sensitive Mussels, Potable Water		HDD
0.4	Susquehanna River	246	Perennial	MA	WWF, NRI, Sensitive Mussels, Potable Water		HDD
1.2	Unnamed tributary to Susquehanna River	0	Intermittent	N/A	WWF		N/A
1.2	Tributary 29959 to Susquehanna River	33	Perennial	I	WWF		2
1.4	Unnamed tributary to Susquehanna River	0	Intermittent	N/A	WWF		N/A
1.4	Unnamed tributary to Susquehanna River	1	Intermittent	MI	WWF		1 or 2
1.8	Unnamed tributary to Susquehanna River	4	Intermittent	MI	WWF		1 or 2
2.1	Unnamed tributary to Susquehanna River	31	Intermittent	I	WWF		1 or 2
2.2	Tributary 29956 to Susquehanna River	27	Perennial	I	WWF		2
2.4	Unnamed tributary to Susquehanna River	0	Intermittent	N/A	WWF		N/A
2.4	Unnamed tributary to Susquehanna River	12	Intermittent	I	WWF		1 or 2
2.4	Unnamed tributary to Susquehanna River	16	Intermittent	I	WWF		1 or 2
2.5	Unnamed tributary to Susquehanna River	7	Intermittent	MI	WWF		1 or 2
2.6	Unnamed tributary to Susquehanna River	15	Intermittent	I	WWF		1 or 2
2.7	Unnamed tributary to Susquehanna River	6	Intermittent	MI	WWF		1 or 2
3.1	Unnamed tributary to Susquehanna River	1	Intermittent	MI	WWF		1 or 2
3.2	Tributary 29955 to Susquehanna River	12	Perennial	I	WWF		2
3.2	Unnamed tributary to Susquehanna River	0	Intermittent	N/A	WWF		N/A
3.9	Unnamed tributary to Brewster Creek	0	Intermittent	N/A	WWF		N/A

APPENDIX D

Waterbodies Crossed by the Northeast Upgrade Project

State / Facility / Milepost	Waterbody Name	Crossing Width [a] (feet)	Flow Type [b]	FERC Classification [c]	Fishery Class / Sensitivity [d, e]	In-Stream Work Window [f]	Proposed Crossing Method [g]
4.4	Unnamed tributary to Brewster Creek	8	Intermittent	MI	WWF		1 or 2
4.4	Brewster Creek	20	Perennial	I	WWF		2
5.0	Unnamed tributary to Wyalusing Creek	0	Intermittent	N/A	WWF		N/A
5.0	Unnamed tributary to Wyalusing Creek	3	Intermittent	MI	WWF		1 or 2
5.0	Unnamed tributary to Wyalusing Creek	0	Intermittent	N/A	WWF		N/A
5.1	Unnamed tributary to Wyalusing Creek	0	Intermittent	N/A	WWF		N/A
5.1	Unnamed tributary to Wyalusing Creek	0	Intermittent	N/A	WWF		N/A
5.1	Wyalusing Creek	96	Perennial	I	WWF		2
5.1	Wyalusing Creek	10	Intermittent	MI	WWF		2
5.1	Wyalusing Creek	15	Intermittent	I	WWF		2
5.1	Unnamed tributary to Wyalusing Creek	0	Intermittent	N/A	WWF		1 or 2
5.1	Backwater area of Wyalusing Creek	42	Perennial	N/A	WWF		1 or 2
5.2	Unnamed tributary to Wyalusing Creek	131	Perennial	N/A	WWF		1 or 2
Loop 319							
0.8	Unnamed tributary to Little Tuscarora Creek	0	Intermittent	N/A	CWF		N/A
0.8	Tributary 29502 to Little Tuscarora Creek	3	Perennial	MI	CWF		2
Loop 321							
0.1	Tributary 05954 to Indian Orchard Brook	17	Perennial	I	HQ-CWF		2
0.2	Unnamed tributary to Indian Orchard Brook	0	Intermittent	N/A	HQ-CWF		N/A
0.2	Tributary 05956 to Indian Orchard Brook	38	Perennial	I	HQ-CWF		2
0.5	Unnamed tributary to Tributary 05956 to Indian Orchard Brook	2	Intermittent	MI	HQ-CWF		2
1.8	Unnamed tributary to Swamp Brook	0	Intermittent	N/A	HQ-CWF		N/A
2.2	Unnamed tributary to Swamp Brook	21	Perennial	I	HQ-CWF		2
2.3	Swamp Brook	50	Perennial	I	HQ-CWF		2
3.6	Unnamed tributary to Rattlesnake Creek	35	Intermittent	I	HQ-CWF – Class A Wild Trout	April 2 through Sept. 30	1 or 2
4.3	Unnamed tributary to Tinkwig Creek	3	Intermittent	MI	HQ-CWF		1 or 2
4.5	Tinkwig Creek	4	Perennial	MI	HQ-CWF		2
6.3	West Falls Creek	21	POW	I	HQ-CWF		2 or HDD
7.0	Unnamed tributary to West Falls Creek	10	Perennial	I	HQ-CWF		2
7.6	Tributary 05460 to West Falls Creek	18	Perennial	MI	HQ-CWF		2

APPENDIX D

Waterbodies Crossed by the Northeast Upgrade Project

State / Facility / Milepost	Waterbody Name	Crossing Width [a] (feet)	Flow Type [b]	FERC Classification [c]	Fishery Class / Sensitivity [d, e]	In-Stream Work Window [f]	Proposed Crossing Method [g]
8.0	Tributary 05459 to West Falls Creek	0	Perennial	N/A	HQ-CWF		N/A
Loop 323							
0.2	Pinchot Brook	59	Perennial	I	EV		2
0.3	Unnamed tributary to Pinchot Brook	5	Intermittent	MI	EV		1 or 2
1.1	Dimmick Meadow Brook	19	Perennial	I	EV		2
1.2	Tributary 05245 to Dimmick Meadow Brook	0	Perennial	N/A	EV		2
1.2	Tributary 05245 to Dimmick Meadow Brook	12	Perennial	I	EV		2
1.9	Unnamed tributary to Vantine Brook	0	Intermittent	N/A	HQ-CWF		N/A
2.0	Unnamed tributary to Vantine Brook	4	Intermittent	MI	HQ-CWF		1 or 2
2.5	Unnamed tributary to Vandermark Creek	5	Perennial	MI	HQ-CWF – Wild Trout	June 1 through Sept. 30	2
2.6	Vandermark Creek	28	Perennial	I	HQ-CWF – Wild Trout	June 1 through Sept. 30	2
2.8	Laurel Brook	4	Perennial	MI	HQ-CWF		2
3.6	Deep Brook	20	Perennial	I	EV		2
3.8	Unnamed tributary to Deep Brook	0	Intermittent	N/A	EV		2
4.2	Crawford Branch	22	Intermittent	I	HQ-CWF		1 or 2
4.9	Cummins Creek	32	Perennial	I	HQ-CWF		2
5.2	Unnamed tributary to Cummins Creek	30	Intermittent	I	HQ-CWF		2
5.2	Unnamed tributary to Cummins Creek	5	Intermittent	MI	HQ-CWF		2
5.3	Unnamed tributary to Cummins Creek	2	Intermittent	MI	HQ-CWF		2
5.7	Unnamed tributary to Cummins Creek	19	Intermittent	I	HQ-CWF		2
5.7	Unnamed tributary to Cummins Creek	65	Intermittent	I	HQ-CWF		2
5.8	Unnamed tributary to Cummins Creek	6	Intermittent	MI	HQ-CWF		2
5.8	Unnamed tributary to Cummins Creek	17	Intermittent	I	HQ-CWF		2
5.8	Unnamed tributary to Cummins Creek	25	Intermittent	I	HQ-CWF		2
5.8	Unnamed tributary to Cummins Creek	10	Perennial	MI	HQ-CWF		2
6.3	Rosetown Creek (Tributary 05267 to Delaware River)	37	Intermittent	I	HQ-CWF		HDD
6.3	Rosetown Creek (Tributary 05267 to Delaware River)	53	POW	I	HQ-CWF		HDD
6.4	Delaware River	616	Perennial	MA	WWF, Potable Water, Bald Eagle, sensitive mussels		HDD

APPENDIX D

Waterbodies Crossed by the Northeast Upgrade Project

State / Facility / Milepost	Waterbody Name	Crossing Width [a] (feet)	Flow Type [b]	FERC Classification [c]	Fishery Class / Sensitivity [d, e]	In-Stream Work Window [f]	Proposed Crossing Method [g]
New Jersey							
Loop 323							
6.4	Delaware River (Same as above. State line located in the middle of river)						
6.6	Unnamed Tributary to Delaware River	86	POW	I	FW2-NT	N/A	2
7.2	Unnamed Tributary to Delaware River	76	POW	I	FW2 - NT	N/A	2
7.3	Unnamed Backwater area of the Delaware River	42	Perennial	I	FW2 - NT	July 1 through May 1	2
7.9	Unnamed Tributary to Unnamed Backwater area of the Delaware River	9	Intermittent	MI	FW2 - NT	July 1 through May 1	2
7.9	Unnamed Tributary to Unnamed Backwater area of the Delaware River	8	Intermittent	MI	FW2 - NT	July 1 through May 1	2
8.0	Unnamed Tributary to Unnamed Backwater area of the Delaware River	12	Intermittent	I	FW2 - NT	July 1 through May 1	2
8.0	Unnamed Tributary to Unnamed Backwater area of the Delaware River	9	Intermittent	MI	FW2 - NT	July 1 through May 1	2
8.0	Unnamed Tributary to Unnamed Backwater area of the Delaware River	11	Intermittent	I	FW2 - NT	July 1 through May 1	2
8.1	Unnamed Tributary to Unnamed Backwater area of the Delaware River	11	Intermittent	I	FW2 - NT	July 1 through May 1	2
8.1	Unnamed Tributary to Unnamed Backwater area of the Delaware River	9	Intermittent	MI	FW2 - NT	July 1 through May 1	2
8.1	Unnamed Tributary to Unnamed Backwater area of the Delaware River	8	Intermittent	MI	FW2 - NT	July 1 through May 1	2
8.1	Unnamed Tributary to Unnamed Backwater area of the Delaware River	16	Intermittent	I	FW2 - NT	July 1 through May 1	2
8.2	Unnamed Tributary to Unnamed Backwater area of the Delaware River	15	Intermittent	I	FW2 - NT	July 1 through May 1	2
8.4	Unnamed Tributary to Unnamed Backwater area of the Delaware River	17	Intermittent	I	FW2 - NT	July 1 through May 1	2
9.4	Unnamed Tributary to Shimers Brook	7	Intermittent	MI	FW2-TPC1	March 16 through September 14	1 or 2
9.9	Unnamed Pond	0	Pond	N/A	FW2-NT	July 1 through May 1	N/A
10.0	Holliday Lake	1,151	Pond	MA	FW2-NT	July 1 through May 1	1
9.98	Unnamed tributary to Shimers Brook Unnamed Tributary	13	Intermittent	I	FW2-TPC1	March 16 through September 14	1 or 2
10.0	Unnamed tributary to Shimer's Brook Unnamed Tributary	9	Intermittent	MI	FW1-TPC1	March 16 through September 14	1 or 2

APPENDIX D

Waterbodies Crossed by the Northeast Upgrade Project

State / Facility / Milepost	Waterbody Name	Crossing Width [a] (feet)	Flow Type [b]	FERC Classification [c]	Fishery Class / Sensitivity [d, e]	In-Stream Work Window [f]	Proposed Crossing Method [g]
10.3	Shimers Brook Unnamed Tributary	23	Perennial	I	FW1-TPC1	March 16 through September 14	2
10.4	Unnamed tributary to Shimers Brook Unnamed Tributary	0	Intermittent	N/A	FW1-TPC1	March 16 through September 14	N/A
10.4	Unnamed tributary to Shimers Brook Unnamed Tributary	0	Intermittent	N/A	FW1-TP	March 16 through September 14	N/A
10.6	Shimer's Brook	10	Perennial	I	FW1-TPC1	March 16 through September 14	2
11.6	Shimers Brook Unnamed Tributary	5	Intermittent	MI	FW1-TPC1	March 16 through September 14	1 or 2
12.5	Parker Brook Unnamed Tributary	2	Perennial	MI	FW2 – TP	March 16 through September 14	2
13.1	Big Flat Brook	12	Perennial	I	FW2 – NTC1	July 1 through May 1	2
13.9	Big Flat Brook Unnamed Tributary	8	Perennial	MI	FW1	July 1 through May 1	N/A
14.1	Unnamed Tributary to Big Flat Brook Unnamed Tributary	4	Intermittent	MI	FW1	July 1 through May 1	1 or 2
14.6	Clove Brook Unnamed Tributary (McCormack Pond)	202	POW	MA	FW2-NT	July 1 through May 1	2
15.6	Unnamed Tributary West Bank Papakating Creek	3	Intermittent	MI	FW2 – NTC1	--	1 or 2
Loop 325							
0.2	Wanaque River / Monksville Reservoir	1539	Perennial	MA	FW2 – TMC1, Potable Water	June 16 through March 14	HDD
1.0	Unnamed tributary to Wanaque River	13	Perennial	I	FW2 – TMC1	June 16 through March 14	2
1.2	Unnamed tributary to Wanaque River	0	Intermittent	N/A	FW2 – TMC1	June 16 through March 14	N/A
1.9	Unnamed tributary to Wanaque River	12	Perennial	I	FW2 – TMC1	June 16 through March 14	2
2.0	Unnamed tributary to Wanaque River	2	Intermittent	MI	FW2 – TMC1	June 16 through March 14	1 or 2
2.1	Unnamed tributary to Wanaque River	16	Perennial	I	FW2 – TMC1	June 16 through March 14	1 or 2
2.2	Unnamed tributary to Wanaque River	4	Intermittent	MI	FW2 – TMC1	June 16 through March 14	1 or 2
2.6	Unnamed tributary to Wanaque River	4	Intermittent	MI	FW2 – TMC1	June 16 through March 14	1 or 2
3.1	Unnamed tributary to Ringwood Creek	16	Perennial	I	FW2 – TMC1	June 16 through March 14	2
3.1	Ringwood Creek	47	Perennial	I	FW2 – TMC1	June 16 through March 14	2
3.2	Ringwood Creek	29	Perennial	I	FW2 – TMC1	June 16 through March 14	2
3.3	Ringwood Creek	45	Perennial	I	FW2 – TMC1	June 16 through March 14	2
3.7	Unnamed tributary to Ringwood Creek	0	Intermittent	N/A	FW2 – TMC1	June 16 through March 14	N/A
4.3	Cupsaw Brook	21	Perennial	I	FW2 – NTC1	July 1 through May 1	1 or 2

APPENDIX D

Waterbodies Crossed by the Northeast Upgrade Project

State / Facility / Milepost	Waterbody Name	Crossing Width [a] (feet)	Flow Type [b]	FERC Classification [c]	Fishery Class / Sensitivity [d, e]	In-Stream Work Window [f]	Proposed Crossing Method [g]
4.6	Unnamed tributary to Cupsaw Brook	3	Intermittent	MI	FW2 – NTC1	July 1 through May 1	1 or 2
5.2	Unnamed tributary to Cupsaw Brook	5	Intermittent	MI	FW2 – NTC1	July 1 through May 1	1 or 2
5.6	Unnamed tributary to Cupsaw Brook	2	Intermittent	MI	FW2 – NTC1	July 1 through May 1	1 or 2
7.5	Unnamed tributary to Haveemayer Brook	11	Intermittent	MI	FW2 – TPC1	July 1 through May 1	1 or 2
7.5	Unnamed tributary to Haveemayer Brook	0	Intermittent	N/A	FW2 – TPC1	Mar. 16 through Sept. 14	N/A

[a] Waterbody is not crossed by the proposed pipeline but is located within the construction workspace. The milepost provided represents the nearest location of the waterbody to the proposed pipeline.

[b] POW = Palustrine Open Water

[c] MI = Minor (<10 feet); I = Intermediate (10 - 100 feet); MA = Major (>100 feet); N/A = Not Applicable

[d] Pennsylvania Designation and In-Stream Work Windows
WWF = Warmwater Fishery
CWF = Coldwater Fishery
HQ = High Quality Water
EV = Exceptional Value Water

[e] New Jersey Designation and In-Stream Work Windows
WWF = Warmwater Fishery
FW1 = Freshwater One
FW2 = Freshwater Two
C1 = Category One Waters
TP = Trout Production
TM = Trout Maintenance
NT = Waters that support general game fish
DRBC – Zone 1C

[f] Timing restrictions reflect dates during which construction activities may occur

[g] 1 = Conventional, Open-Cut Crossing Method
2 = Dry, Flume or Dam and Pump Crossing Method
HDD = Horizontal Directional Drill
N/A = Waterbody is not crossed by the proposed pipeline but is located within the construction workspace

APPENDIX E

WETLANDS AFFECTED BY THE NORTHEAST UPGRADE PROJECT

APPENDIX E

Wetlands Affected by the Northeast Upgrade Project [a]

State / Facility / Milepost	Wetland ID	Wetland Type [b]	Crossing Length (feet) [c]	Construction Impacts (acres) [d]	Operation Impacts (acres) [e]	Proposed Crossing Method [f]
Pennsylvania						
Loop 317						
0.1	L1 W001	PEM / PFO	543	1.3	0.1	HDD/I
0.4	L1 W001B	PEM/ PFO	0	0.0	0.0	HDD
1.3	L1 W005	PFO / PEM	1033	1.3	0.1	II or III
1.4	L1 W007	PEM	0	0.0	0.0	N/A
2.0	L1 W022	PEM	86	0.1	0.0	II
2.5	L1 W021	PEM	23	0.0	0.0	I
3.2	L1 W008	PEM / PFO	307	0.7	0.0	II
3.7	L1 W011	PEM	29	0.1	0.0	I
3.8	L1 W012	PEM	166	0.2	0.0	II
3.9	L1 W012A	PEM	208	0.3	0.0	II
4.4	L1 W013	PFO / PEM	310	0.4	0.1	II
4.4	L1 W014	PFO	57	0.1	0.0	II
4.7	L1 W014A	PFO	226	0.4	0.1	II
5.0	L1 W015	PFO	27	0.2	0.0	I
5.1	L1 W016	PEM	0	0.0	0.0	N/A
5.1	L1 W025	PFO / PEM	69	0.2	0.0	II
Loop 317 Subtotal			**3,084**	**5.3**	**0.4**	
Loop 319						
0.3	L2 W001	PEM	121	0.3	0.0	II
0.4	L2 W002	PEM	51	0.2	0.0	II
0.5	L2 W003	PEM / PFO / PSS	542	0.9	0.1	II
0.7	L2 W007	PEM	162	0.2	0.0	II
0.8	L2 W008	PEM	56	0.1	0.0	II
0.9	L2 W009	PEM	156	0.3	0.0	II
1.5	L2 W010	PSS / PEM	533	0.8	<0.1	II or III
2.0	L2 W006	PEM	0	0.0	0.0	N/A
Loop 319 Subtotal			**1,621**	**2.7**	**0.1**	
Loop 321						
0.0	L3 W002	PEM	0	0.0	0.0	N/A
0.2	L3 W003	PFO / PEM	31	0.1	0.0	II
0.3	L3 W004	PEM	23	0.0	0.0	II
0.4	L3 W005	PEM	0	0.0	0.0	N/A
0.5	L3 W006	PFO / PEM	74	0.2	0.0	II
0.6	L3 W007	PSS	0	0.0	0.0	N/A
1.2	L3 W008	PFO / PEM	322	0.4	0.1	II
1.4	L3 W009	PFO / PEM	337	0.7	0.1	II
1.5	L3 W015	PEM / PFO	239	0.4	0.1	II
1.9	L3 W016	PFO / PEM	301	0.5	0.1	II
2.2	L3 W017	PEM / PFO	273	0.5	0.1	II
2.4	L3 W019	PFO / PEM	224	0.4	0.1	II
2.5	L3 W020	PFO / PEM	34	0.1	0.0	II
3.1	L3 W021	PFO / PEM	626	0.9	0.2	II
3.3	L3 W024	PFO / PEM	391	0.7	0.1	II
3.4	L3 W025	PEM / PFO / PSS	191	0.3	0.0	II
3.7	L3 W026	PFO / PEM	1,634	2.8	0.4	II

APPENDIX E

Wetlands Affected by the Northeast Upgrade Project [a]

State / Facility / Milepost	Wetland ID	Wetland Type [b]	Crossing Length (feet) [c]	Construction Impacts (acres) [d]	Operation Impacts (acres) [e]	Proposed Crossing Method [f]
4.3	L3 W027	PFO / PEM	198	0.3	0.0	II
4.3	L3 W028	PFO / PEM	134	0.2	0.0	II
4.4	L3 W029	PEM	0	0.0	0.0	N/A
4.5	L3 W030	PFO / PEM	196	0.4	0.0	II
4.6	L3 W032	PEM	333	0.4	0.0	II
5.1	L3 W033	PEM	149	0.1	0.0	II
5.2	L3 W034	PEM	293	0.2	0.0	II
5.3	L3 W035	PEM	0	0.0	0.0	N/A
5.8	L3 W038	PEM / PFO	116	0.1	0.0	II
5.8	L3 W039	PEM	0	0.0	0.0	N/A
6.0	L3 W041	PEM / PFO	545	0.6	0.1	II
6.1	L3 W042	PSS / PEM	85	0.1	0.0	II
6.2	L3 W043	PSS / PEM	197	0.1	<0.1	II
6.2	L3 W044	PEM	0	0.0	0.0	N/A
6.2	L3 W045	PEM	0	0.0	0.0	N/A
6.3	L3 W046	PEM / PSS / PFO	704	1.2	0.1	II
6.6	L3 W047	PFO / PSS	726	1.5	0.1	II
6.8	L3 W048	PEM	0	0.0	0.0	N/A
6.8	L3 W049	PEM	1	0.0	0.0	II
7.0	L3 W053	PFO / PEM	746	1.2	0.1	II
7.2	L3 W054	PEM	0	0.0	0.0	N/A
7.3	L3 W056	PSS	20	0.1	0.0	II
7.6	L3 W057	PEM	39	0.3	0.0	II
7.6	L3 W058	PEM / PSS	0	0.1	0.0	N/A
7.7	L3 W059	PFO / PEM	174	0.4	0.1	II
7.8	L3 W061	PFO / PEM	66	0.2	0.0	II
7.9	L3 W062	PFO / PEM	238	0.4	0.1	II
8.0	L3 W063	PEM	0	0.0	0.0	N/A
8.0	L3 W064	PFO / PEM	14	0.1	0.0	II
8.0	L3 W065	PEM	0	0.0	0.0	N/A
8.1	L3 W066	PFO / PEM	N/A	0.0	0.0	N/A
Loop 321 Subtotal			**9,674**	**15.7**	**2.0**	
Loop 323						
0.2	L4 W035	PFO	N/A	0.0	0.0	N/A
0.2	L4 W036	PFO / PEM / PSS	505	0.7	<0.1	II or III
1.0	L4 W037	PFO / PEM	72	0.1	0.0	II
1.2	L4 W038	PEM	209	0.4	0.0	II or III
1.5	L4 W039	PEM	103	0.1	0.0	II
1.7	L4 W040	PEM	380	0.3	0.0	II
1.8	L4 W041	PEM	22	0.1	0.0	II
2.0	L4 W042	PFO / PEM / PSS	14	0.0	<0.1	II
2.8	L4 W043	PFO / PEM	57	0.1	<0.1	II
2.9	L4 W044	PFO	0	0.0	0.0	N/A
2.9	L4 W045	PEM	0	0.0	0.0	N/A
3.7	L4 W090	PFO	21	<0.1	<0.1	N/A
3.7	L4 W091	PFO	16	<0.1	<0.1	II
3.9	L4 W093	PFO	0	0.0	0.0	N/A

APPENDIX E

Wetlands Affected by the Northeast Upgrade Project [a]

State / Facility / Milepost	Wetland ID	Wetland Type [b]	Crossing Length (feet) [c]	Construction Impacts (acres) [d]	Operation Impacts (acres) [e]	Proposed Crossing Method [f]
4.3	L4 W095A	PFO	233	0.1	0.1	II
5.1	L4 W101	PFO	N/A	0.0	0.0	N/A
5.3	L4 W102	PFO	62	0.1	<0.1	II
6.4	L4 W096	PFO	0	0.0	0.0	HDD
Loop 323 (PA) Subtotal			**1,694**	**2.0**	**0.2**	
Pennsylvania Subtotal			**16,073**	**25.7**	**2.7**	
New Jersey						
Loop 323						
7.2	L4 W060A	PEM	48	0.1	0.0	II
7.3	L4 W060B	PEM	0	<0.1	0.0	N/A
7.3	L4 W060	PEM / PFO	24	0.1	0.0	I
7.4	L4 W061	PEM / PSS	56	0.1	0.0	II
7.9	L4W110	PFO	5	<0.1	0.0	II
8.0	L4W111	PFO	0	<0.1	0.0	II
8.0	L4W114	PFO	0	<0.1	0.0	II
8.0	L4W115	PFO	6	0.1	<0.1	II
8.0	L4W117	PFO	0	0.0	0.0	II
8.1	L4W118	PFO / PEM	68	0.2	<0.1	II
8.1	L4W112	PFO	1	<0.1	0.0	II
8.2	L4W119	PFO	0	<0.1	0.0	II
9.2	L4W121	PFO	198	0.3	0.1	II
9.4	L4 W057	PFO / PEM	289	0.5	0.1	II or III
9.6	L4 W033	PFO / PEM	160	0.3	0.1	II
9.7	L4 W065	PFO	48	0.1	0.0	II
9.8	L4 W058	PFO / PEM	110	0.2	<0.1	II
9.9	L4 W059	PEM	175	0.2	0.0	II
10.0	L4 W075	PFO / PEM	694	1.0	0.2	II or III
10.2	L4 W076	PEM	0	<0.1	0.0	N/A
10.4	L4 W077	PFO / PEM	95	0.2	0.0	II
10.4	L4 W063	PFO / PEM	366	0.6	0.0	II or III
10.5	L4W063D	PEM	6	<0.1	0.0	II or III
10.6	L4 W078	PFO	3	<0.1	0.0	II
10.7	L4 W030	PFO / PEM	229	0.4	<0.1	II
11.0	L4 W031	PFO / PEM	244	0.4	0.1	II
11.3	L4 W025	PFO / PEM	207	0.4	<0.1	II or III
11.5	L4 W026	PEM / PFO	0	0.0	0.0	N/A
11.6	L4 W027	PFO / PEM	830	1.3	0.1	II or III
11.8	L4 W028	PFO	0	<0.1	0.0	N/A
11.9	L4 W029	PEM	250	0.4	0.1	II
11.9	L4 W032	PEM	62	<0.1	0.0	II
12.2	L4 W022	PFO	N/A	0.0	0.0	N/A
12.3	L4 W021	PFO / PEM	410	0.6	0.1	II or III
12.5	L4 W020	PEM / PFO	663	1.2	0.1	II or III
12.6	L4 W019	PFO	0	0.0	0.0	N/A
12.7	L4 W018	PFO	0	0.0	0.0	N/A
12.8	L4 W017	PSS	18	0.0	0.0	II
12.9	L4 W016	PEM / PSS	659	1.1	0.0	II or III

APPENDIX E

Wetlands Affected by the Northeast Upgrade Project [a]

State / Facility / Milepost	Wetland ID	Wetland Type [b]	Crossing Length (feet) [c]	Construction Impacts (acres) [d]	Operation Impacts (acres) [e]	Proposed Crossing Method [f]
13.1	L4 W015	PFO / PEM	71	0.1	0.1	II
13.3	L4 W013	PFO / PEM	484	0.8	0.2	II or III
13.9	L4 W011	PFO / PEM	14	<0.1	0.0	II
14.1	L4 W009	PFO / PEM	63	0.1	<0.1	II
14.2	L4 W008	PFO	0	0.0	0.0	N/A
14.3	L4 W008A	PFO	N/A	0.0	0.0	N/A
14.9	L4 W005	PFO / PEM	83	0.2	<0.1	II
15.5	L4 W003	PFO	0	<0.1	0.0	N/A
15.6	L4 W002A	PFO / PEM	256	0.5	0.1	II
16.0	L4 W002	PFO	0	<0.1	0.0	N/A
Loop 323 (NJ) Subtotal			**6,895**	**11.5**	**1.5**	
Loop 325						
0.0	L5 W035	PFO	0	0.0	0.0	N/A
0.1	L5 W034	PFO	0	0.0	0.0	HDD
1.0	L5 W036	PFO / PEM	366	0.6	0.1	II or III
1.2	L5 W037	PFO / PEM	141	0.2	<0.1	II
1.4	L5 W095	PEM	0	<0.1	0.0	N/A
1.6	L5 W094	PFO / PEM	891	1.5	0.3	N/A
1.9	L5 W093	PFO / PEM	171	0.3	<0.1	II
2.0	L5 W067	PFO / PEM	238	0.5	<0.1	II or III
2.2	L5 W068	PEM	0	<0.1	0.0	N/A
2.2	L5 W069	PFO	25	0.1	<0.1	I
2.3	L5 W070	PFO / PEM	59	0.1	0.0	II
2.6	L5 W085	PFO	56	0.1	<0.1	II
2.8	L5 W088	PFO / PEM	338	0.6	0.1	II
2.9	L5 W089	PFO / PEM	64	0.1	<0.1	II
3.2	L5 W091	PFO / PEM	492	0.8	0.1	II or III
3.2	L5 W040	PFO / PEM	385	0.9	<0.1	II or III
3.3	L5 W038	PFO	0	0.1	<0.1	N/A
3.4	L5 W041	PEM	0	<0.1	0.0	N/A
3.6	L5 W002	PFO / PEM	44	0.1	0.0	II
3.7	L5 W003	PFO / PEM	184	0.4	0.1	II
3.9	L5 W004	PFO / PEM	560	0.9	0.2	II or III
4.3	L5 W007	PFO	273	0.5	0.1	II or III
4.6	L5 W011	PFO	0	<0.1	0.0	N/A
4.6	L5 W010	PFO / PEM	0	<0.1	0.0	II
4.8	L5 W009	PFO / PEM	66	0.1	<0.1	II
4.9	L5 W008	PFO / PEM	262	0.4	0.1	II
5.2	L5 W014	PFO / PEM	395	0.6	0.1	II
5.4	L5 W015	PFO / PEM	353	0.5	<0.1	II
5.4	L5 W016	PFO / PEM	188	0.2	0.1	II
5.6	L5 W017	PFO / PEM	95	0.2	0.0	II
5.7	L5 W017A	PFO	0	<0.1	0.0	N/A
6.4	L5 W018	PFO / PEM	389	0.7	<0.1	II or III
6.5	L5 W027	PEM	0	<0.1	0.0	N/A
7.1	L5 W029	PFO / PSS / PEM	465	1.1	<0.1	II or III
7.2	L5 W030	PEM	0	<0.1	0.0	N/A

APPENDIX E

Wetlands Affected by the Northeast Upgrade Project [a]

State / Facility / Milepost	Wetland ID	Wetland Type [b]	Crossing Length (feet) [c]	Construction Impacts (acres) [d]	Operation Impacts (acres) [e]	Proposed Crossing Method [f]
7.3	L5 W031A	PEM	0	<0.1	0.0	N/A
7.5	L5 W032	PEM	0	<0.1	0.0	N/A
7.5	L5 W033	PFO	0	<0.1	0.0	II or III
Loop 325 Subtotal			**6,500**	**11.8**	**1.4**	
New Jersey Subtotal			**13,395**	**23.3**	**2.8**	
Project Total			**29,468**	**49.1**	**5.5**	

[a] Identifies wetlands crossed by the proposed pipeline. Wetlands that may be impacted by above ground facility modifications, the use of pipe or contractor yards, or by access road improvements are not identified in this table.

[b] Wetland classifications according to Cowardin et al., 1979: PEM = Palustrine Emergent Wetland; PSS Palustrine Scrub-Shrub Wetland; PFO = Palustrine Forested Wetland.

[c] 0.0: Wetland is crossed by the construction corridor but is not crossed by the proposed pipeline.

[d] Includes all areas affected by construction, including ATWS, temporary workspace, and the permanent right-of-way.

[e] Includes the 10-foot permanently maintained right-of-way through scrub-shrub wetlands and the 30-foot permanently maintained right-of-way through forested wetlands.

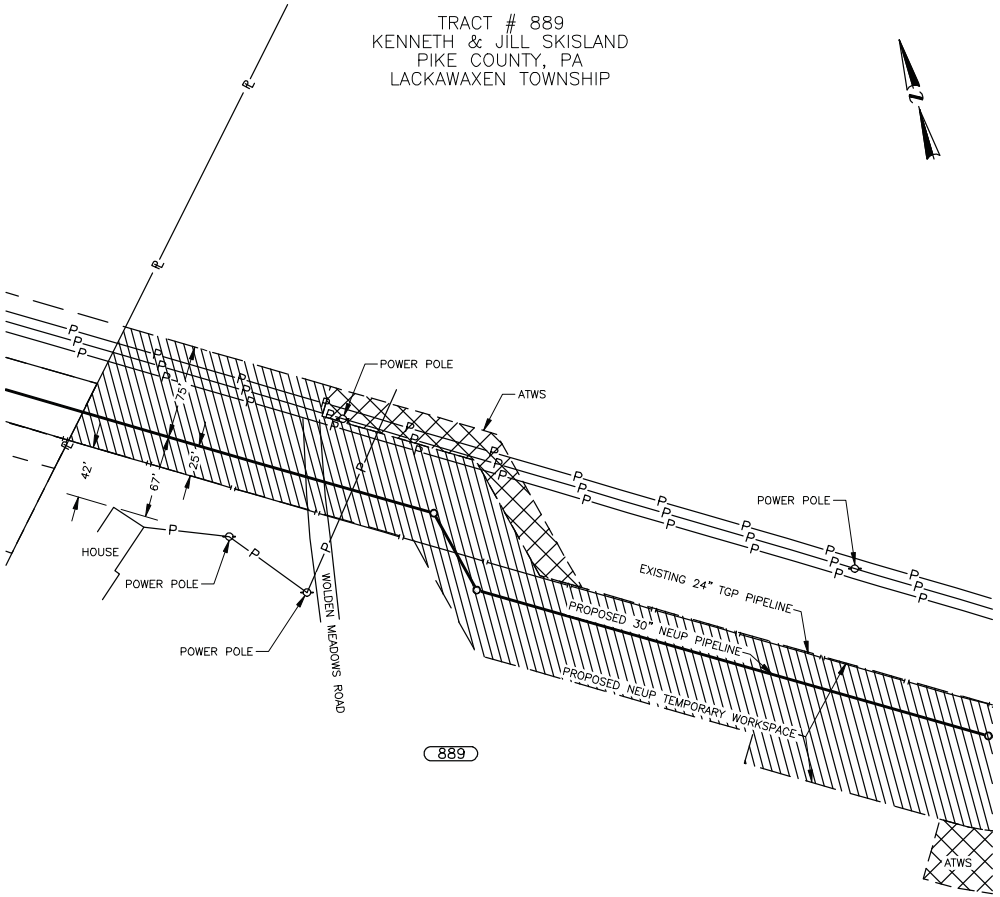
[f] Crossing methods for wetland: I= Standard Crossing; II = Conventional Crossing; III= Push/Pull Crossing; N/A= Wetland not crossed by pipeline.

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

APPENDIX F

SITE-SPECIFIC RESIDENTIAL CONSTRUCTION PLANS

Loop 321 – Pennsylvania



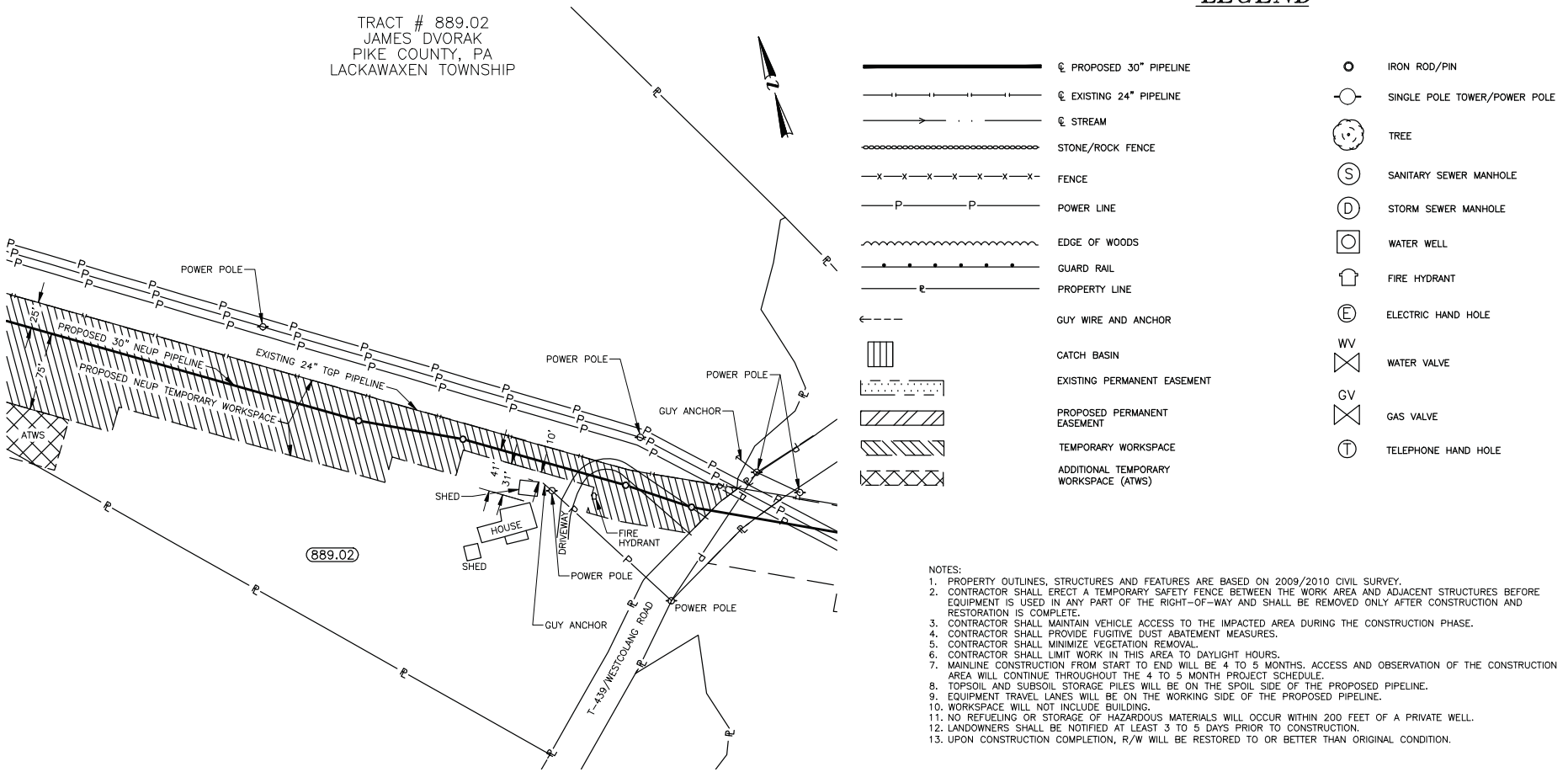
LEGEND

- ℄ PROPOSED 30" PIPELINE
- ℄ EXISTING 24" PIPELINE
- ℄ STREAM
- STONE/ROCK FENCE
- FENCE
- POWER LINE
- EDGE OF WOODS
- GUARD RAIL
- PROPERTY LINE
- GUY WIRE AND ANCHOR
- CATCH BASIN
- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- IRON ROD/PIN
- SINGLE POLE TOWER/POWER POLE
- TREE
- (S) SANITARY SEWER MANHOLE
- (D) STORM SEWER MANHOLE
- WATER WELL
- FIRE HYDRANT
- (E) ELECTRIC HAND HOLE
- WV WATER VALVE
- GV GAS VALVE
- (T) TELEPHONE HAND HOLE

NOTES:
1. PROPERTY OUTLINES, STRUCTURES AND FEATURES ARE BASED ON 2009/2010 CIVIL SURVEY.
2. CONTRACTOR SHALL ERECT A TEMPORARY SAFETY FENCE BETWEEN THE WORK AREA AND ADJACENT STRUCTURES BEFORE EQUIPMENT IS USED IN ANY PART OF THE RIGHT-OF-WAY AND SHALL BE REMOVED ONLY AFTER CONSTRUCTION AND RESTORATION IS COMPLETE.
3. CONTRACTOR SHALL MAINTAIN VEHICLE ACCESS TO THE IMPACTED AREA DURING THE CONSTRUCTION PHASE.
4. CONTRACTOR SHALL PROVIDE FUGITIVE DUST ABATEMENT MEASURES.
5. CONTRACTOR SHALL MINIMIZE VEGETATION REMOVAL.
6. CONTRACTOR SHALL LIMIT WORK IN THIS AREA TO DAYLIGHT HOURS.
7. MAINLINE CONSTRUCTION FROM START TO END WILL BE 4 TO 5 MONTHS. ACCESS AND OBSERVATION OF THE CONSTRUCTION AREA WILL CONTINUE THROUGHOUT THE 4 TO 5 MONTH PROJECT SCHEDULE.
8. TOPSOIL AND SUBSOIL STORAGE PILES WILL BE ON THE SPOIL SIDE OF THE PROPOSED PIPELINE.
9. EQUIPMENT TRAVEL LANES WILL BE ON THE WORKING SIDE OF THE PROPOSED PIPELINE.
10. WORKSPACE WILL NOT INCLUDE BUILDING.
11. NO REFUELING OR STORAGE OF HAZARDOUS MATERIALS WILL OCCUR WITHIN 200 FEET OF A PRIVATE WELL.
12. LANDOWNERS SHALL BE NOTIFIED AT LEAST 3 TO 5 DAYS PRIOR TO CONSTRUCTION. TGP CONTACT NO. 1-877-366-2650
13. UPON CONSTRUCTION COMPLETION, R/W WILL BE RESTORED TO OR BETTER THAN ORIGINAL CONDITION.

F-1

Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 321
MP 7.5



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1. PROPERTY OUTLINES, STRUCTURES AND FEATURES ARE BASED ON 2009/2010 CIVIL SURVEY.
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9. EQUIPMENT TRAVEL LANES WILL BE ON THE WORKING SIDE OF THE PROPOSED PIPELINE.
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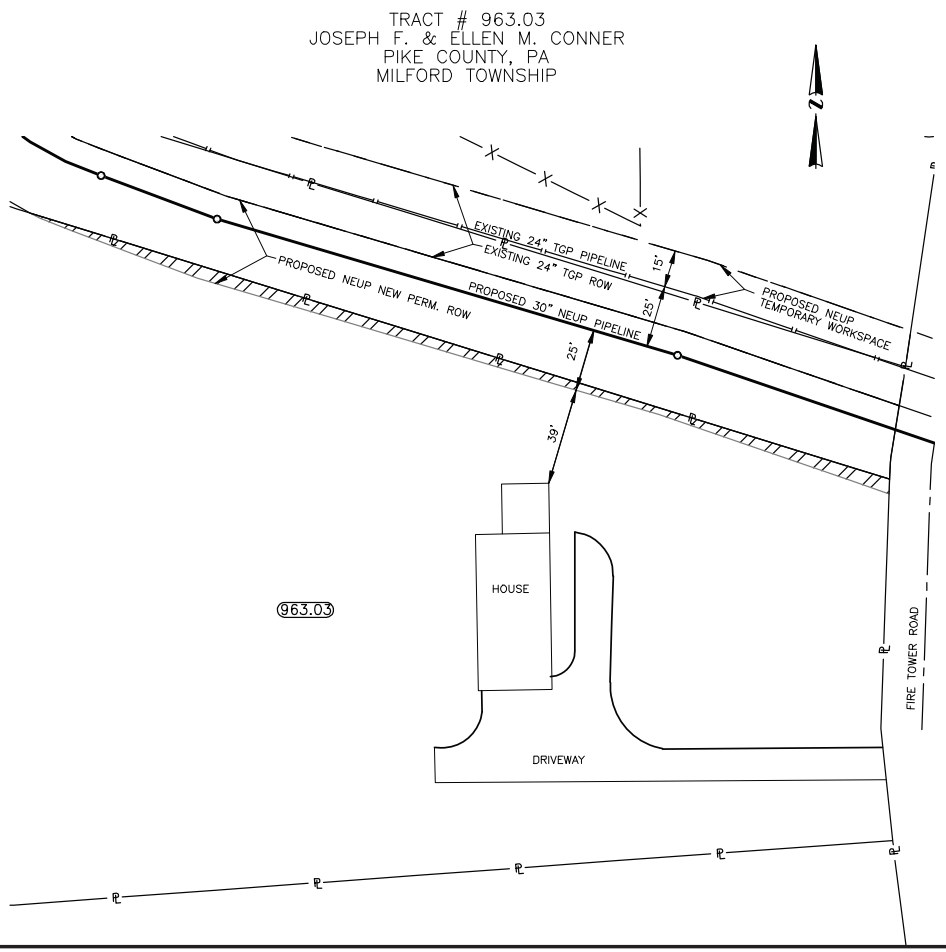
12. LANDOWNERS SHALL BE NOTIFIED AT LEAST 3 TO 5 DAYS PRIOR TO CONSTRUCTION.
13. UPON CONSTRUCTION COMPLETION, R/W WILL BE RESTORED TO OR BETTER THAN ORIGINAL CONDITION.

Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 321
MP 7.9

Loop 323 – Pennsylvania



LEGEND

- ℄ PROPOSED 30" PIPELINE
- ℄ EXISTING 24" PIPELINE
- ℄ STREAM
- STONE/ROCK FENCE
- FENCE
- POWER LINE
- EDGE OF WOODS
- GUARD RAIL
- PROPERTY LINE
- GUY WIRE AND ANCHOR
- CATCH BASIN
- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- IRON ROD/PIN
- SINGLE POLE TOWER/POWER POLE
- TREE
- (S) SANITARY SEWER MANHOLE
- (D) STORM SEWER MANHOLE
- WATER WELL
- FIRE HYDRANT
- (E) ELECTRIC HAND HOLE
- WV WATER VALVE
- GV GAS VALVE
- (T) TELEPHONE HAND HOLE

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3. CONTRACTOR SHALL MAINTAIN VEHICLE ACCESS TO THE IMPACTED AREA DURING THE CONSTRUCTION PHASE.
4. CONTRACTOR SHALL PROVIDE FUGITIVE DUST ABATEMENT MEASURES.
5. CONTRACTOR SHALL MINIMIZE VEGETATION REMOVAL.
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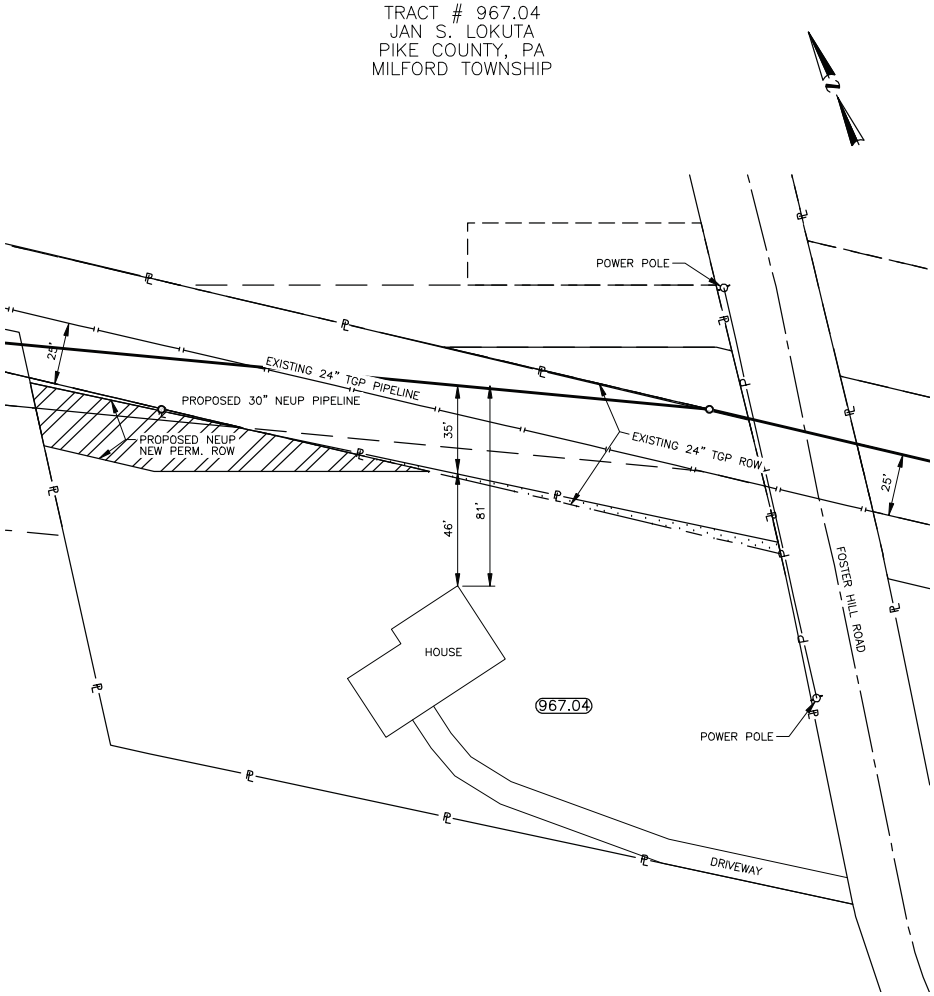
13. UPON CONSTRUCTION COMPLETION, R/W WILL BE RESTORED TO OR BETTER THAN ORIGINAL CONDITION.

Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 323
MP 1.9



LEGEND

- ℄ PROPOSED 30" PIPELINE
- ℄ EXISTING 24" PIPELINE
- ℄ STREAM
- STONE/ROCK FENCE
- FENCE
- POWER LINE
- EDGE OF WOODS
- GUARD RAIL
- PROPERTY LINE
- GUY WIRE AND ANCHOR
- CATCH BASIN
- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- IRON ROD/PIN
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- (S) SANITARY SEWER MANHOLE
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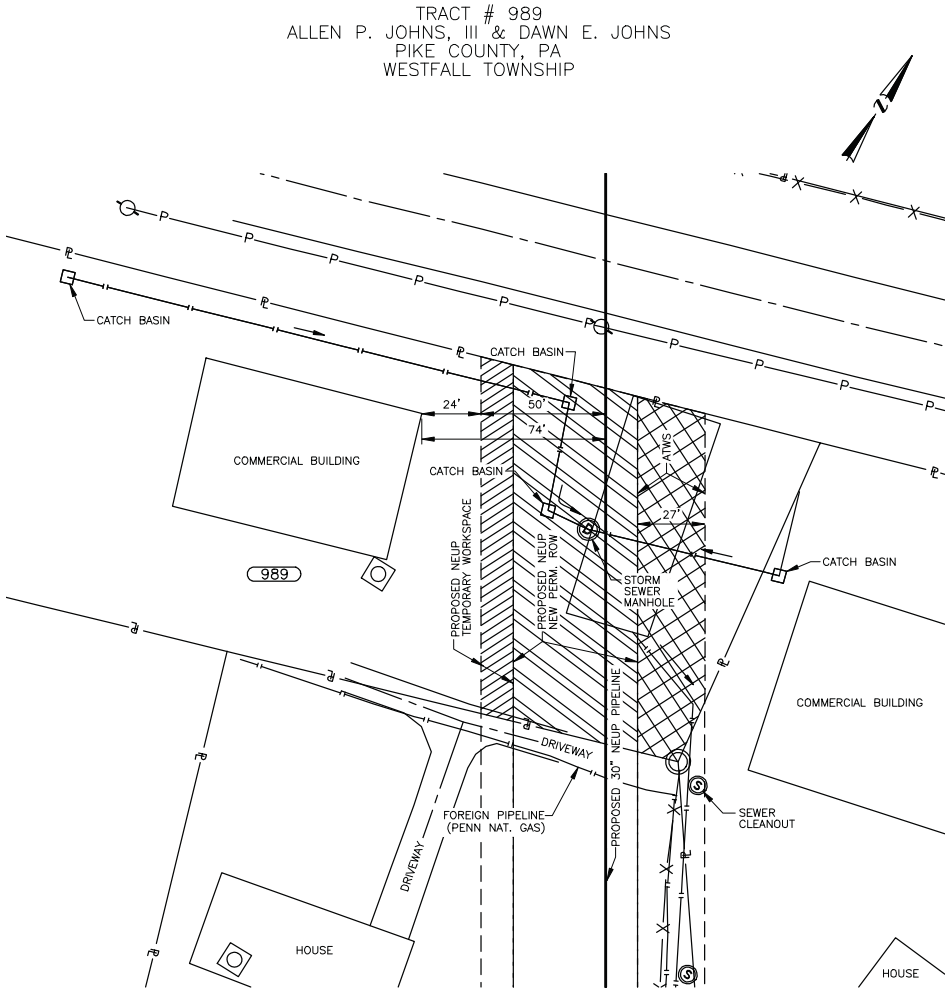
9. EQUIPMENT TRAVEL LANES WILL BE ON THE WORKING SIDE OF THE PROPOSED PIPELINE.
10. WORKSPACE WILL NOT INCLUDE BUILDING.
11. NO REFUELING OR STORAGE OF HAZARDOUS MATERIALS WILL OCCUR WITHIN 200 FEET OF A PRIVATE WELL.
12. LANDOWNERS SHALL BE NOTIFIED AT LEAST 3 TO 5 DAYS PRIOR TO CONSTRUCTION. TGP CONTACT NO. 1-877-366-2650
13. UPON CONSTRUCTION COMPLETION, R/W WILL BE RESTORED TO OR BETTER THAN ORIGINAL CONDITION.

Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 323
MP 2.4



LEGEND

- ℄ PROPOSED 30" PIPELINE
- ℄ EXISTING 24" PIPELINE
- ℄ STREAM
- STONE/ROCK FENCE
- FENCE
- POWER LINE
- EDGE OF WOODS
- GUARD RAIL
- PROPERTY LINE
- GUY WIRE AND ANCHOR
- CATCH BASIN
- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- IRON ROD/PIN
- SINGLE POLE TOWER/POWER POLE
- TREE
- SANITARY SEWER MANHOLE
- STORM SEWER MANHOLE
- WATER WELL
- FIRE HYDRANT
- ELECTRIC HAND HOLE
- WATER VALVE
- GAS VALVE
- TELEPHONE HAND HOLE

NOTES:
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3. CONTRACTOR SHALL MAINTAIN VEHICLE ACCESS TO THE IMPACTED AREA DURING THE CONSTRUCTION PHASE.
4. CONTRACTOR SHALL PROVIDE FUGITIVE DUST ABATEMENT MEASURES.
5. CONTRACTOR SHALL MINIMIZE VEGETATION REMOVAL.
6. CONTRACTOR SHALL LIMIT WORK IN THIS AREA TO DAYLIGHT HOURS.
7. MAINLINE CONSTRUCTION FROM START TO END WILL BE 4 TO 5 MONTHS. ACCESS AND OBSERVATION OF THE CONSTRUCTION AREA WILL CONTINUE THROUGHOUT THE 4 TO 5 MONTH PROJECT SCHEDULE.
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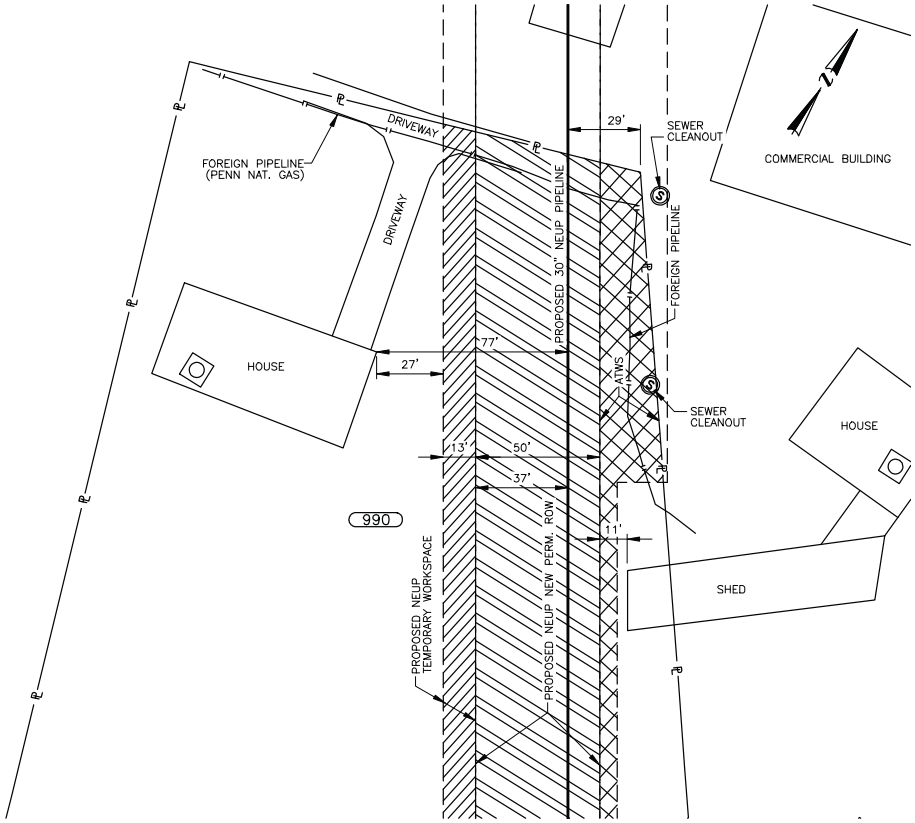
Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 323
MP 6.1



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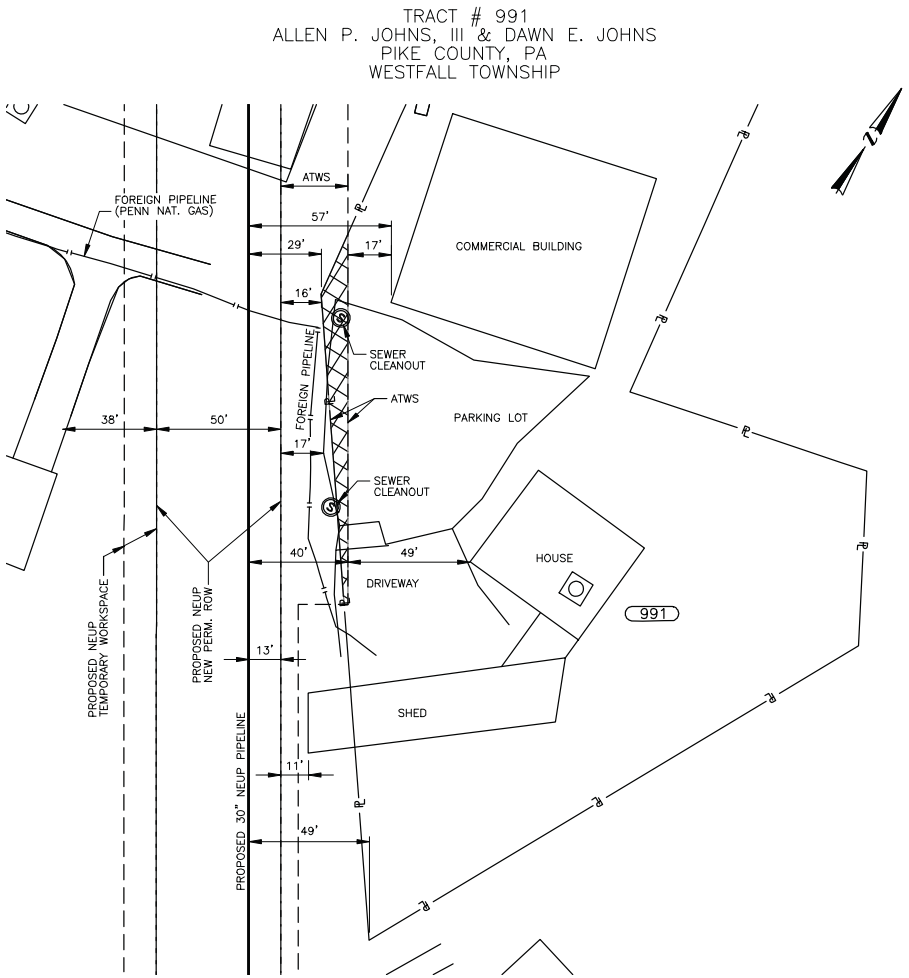
F-6

Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 323
MP 6.1



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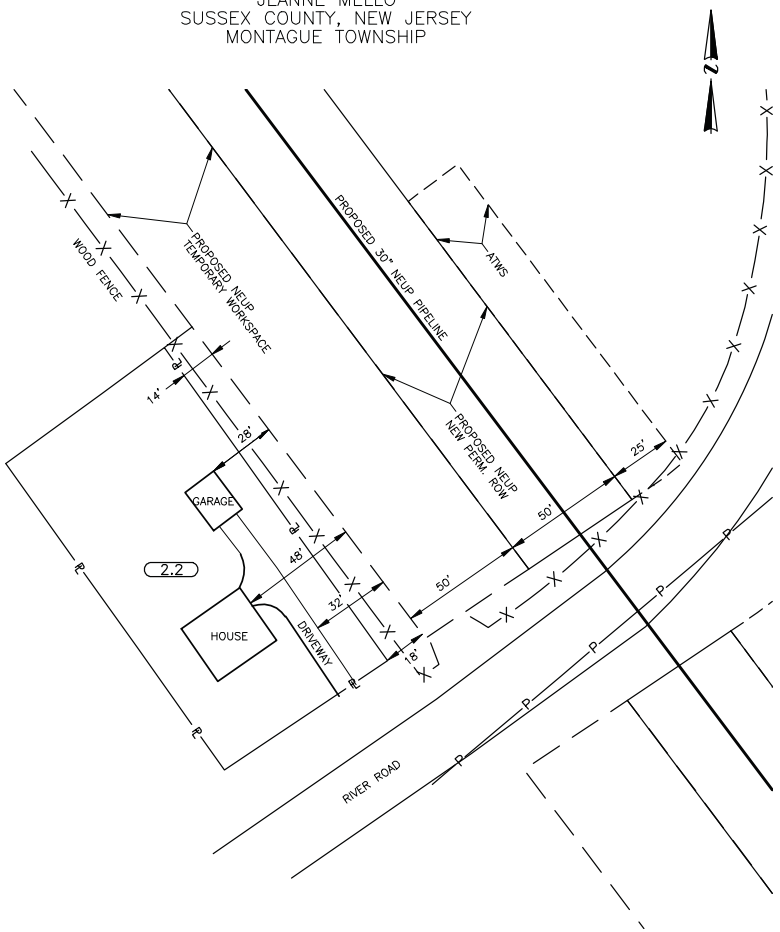
Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 323
MP 6.1

Loop 323 – New Jersey

TRACT # 2.2
JEANNE MELLO
SUSSEX COUNTY, NEW JERSEY
MONTAGUE TOWNSHIP



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- GV — GAS VALVE
- TELEPHONE HAND HOLE

NOTES:
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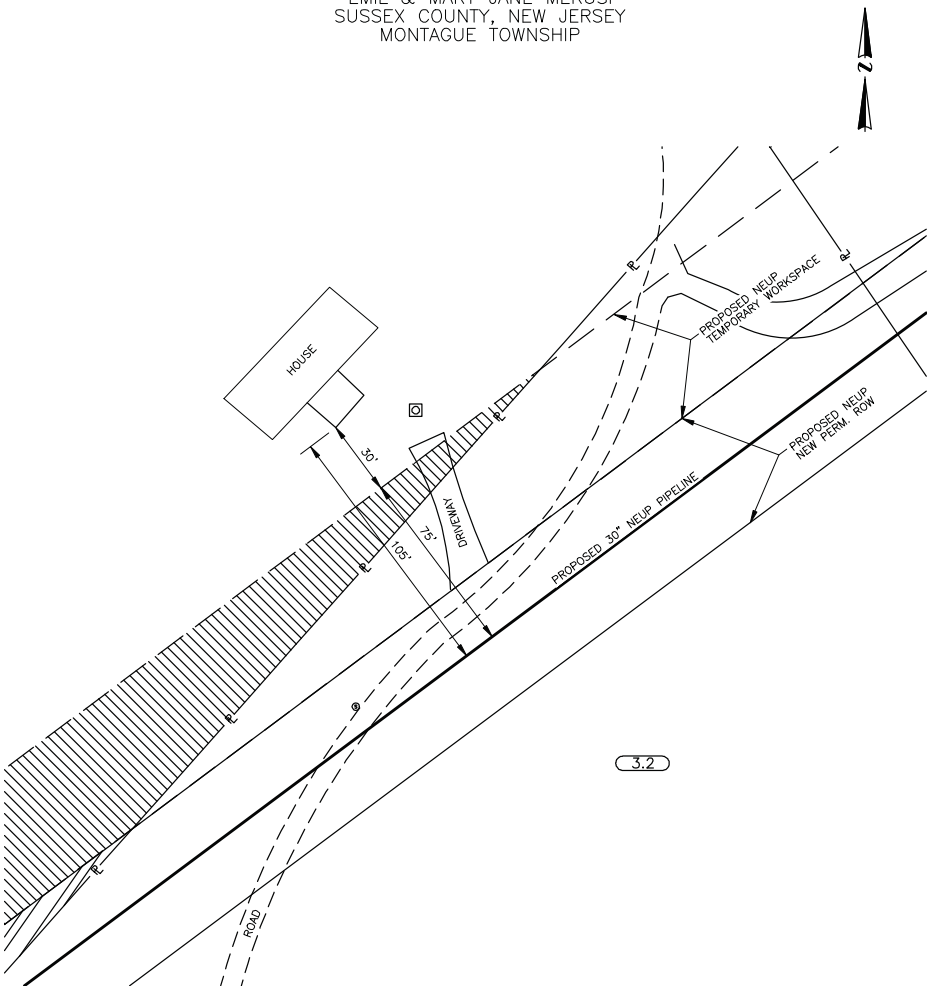
Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 323
MP 7.4

TRACT # 3.2
EMIL & MARY JANE MERUSI
SUSSEX COUNTY, NEW JERSEY
MONTAGUE TOWNSHIP



LEGEND

- ℄ PROPOSED 30" PIPELINE
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- ℄ STREAM
- STONE/ROCK FENCE
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NOTES:
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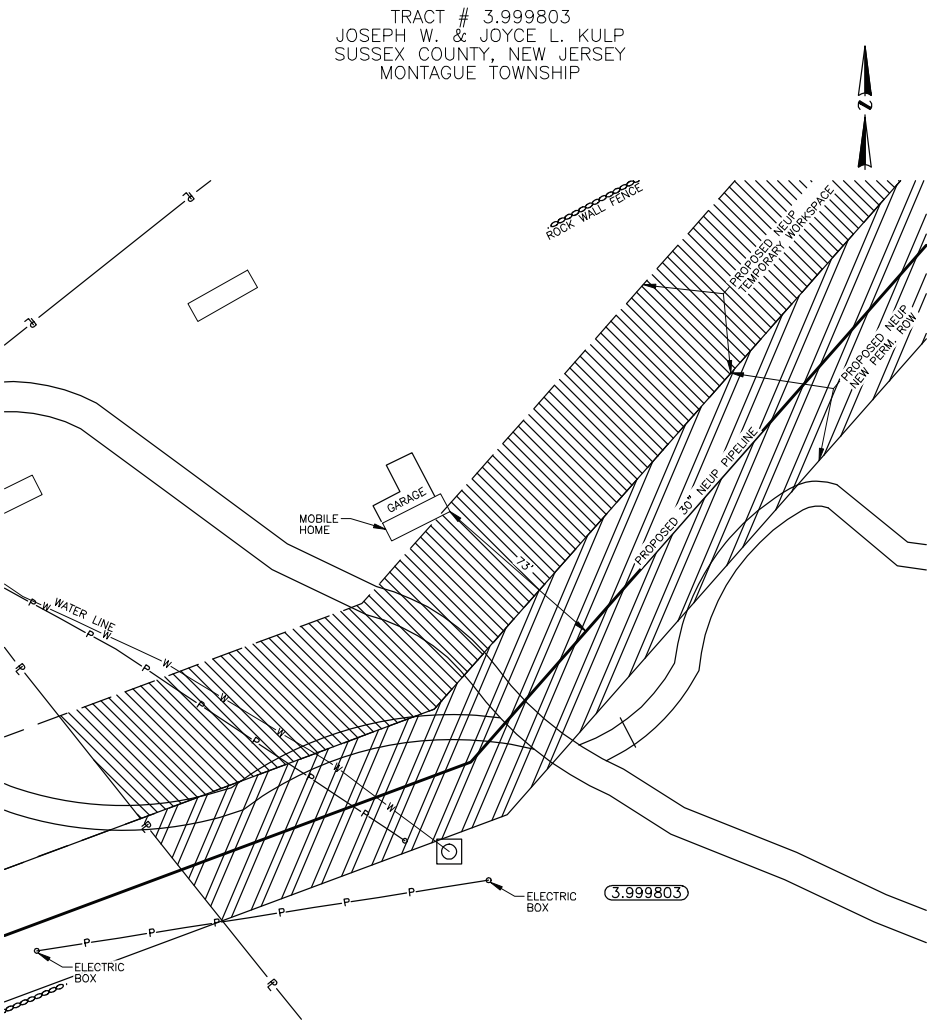
Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 323
MP 7.7



LEGEND

- ℄ PROPOSED 30" PIPELINE
- ℄ EXISTING 24" PIPELINE
- ℄ STREAM
- STONE/ROCK FENCE
- FENCE
- POWER LINE
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- CATCH BASIN
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NOTES:
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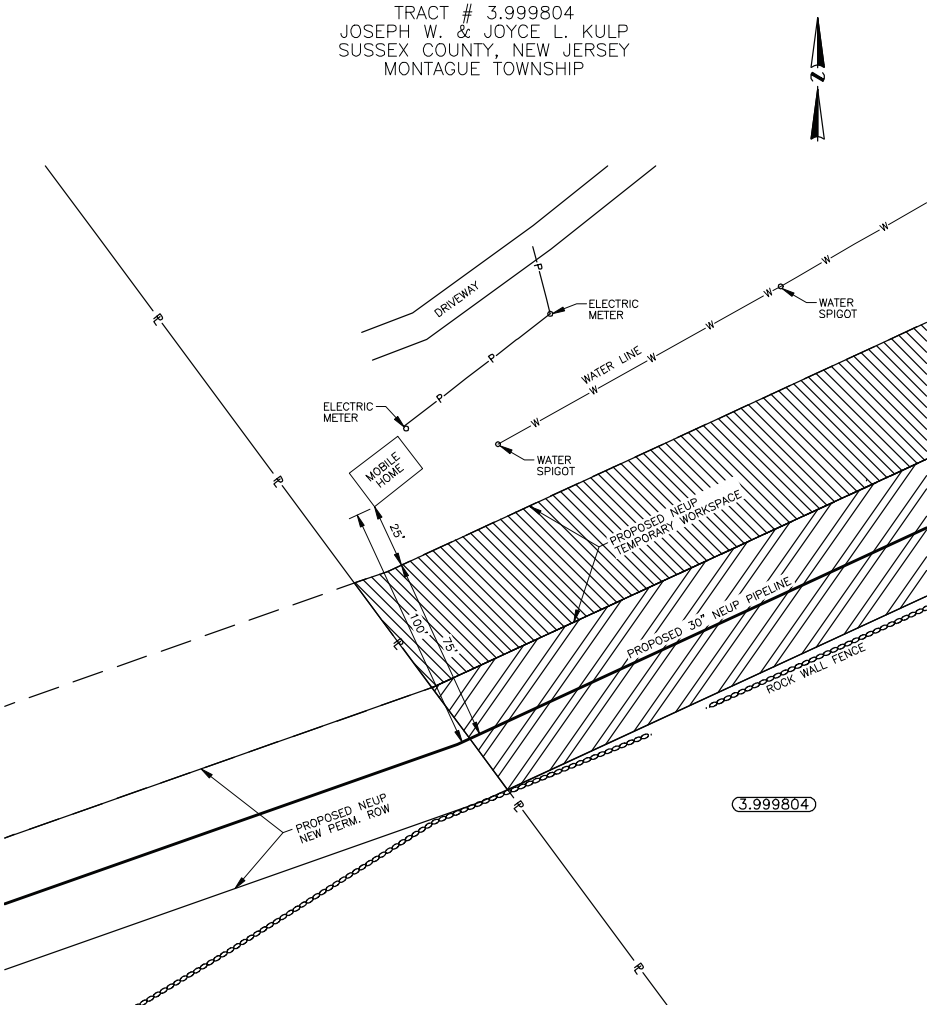
Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 323
MP 8.3



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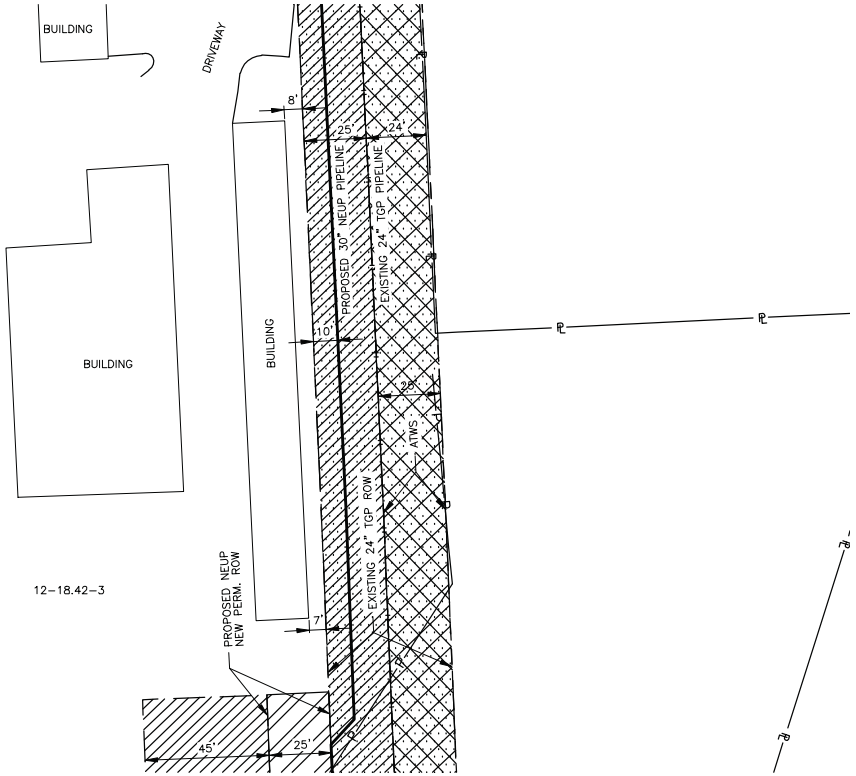
Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 323
MP 8.4

TRACT # 12-18.42-3
DIVERSIFIED PROPERTY GROUP LLC.
SUSSEX COUNTY, NEW JERSEY
MONTAGUE TOWNSHIP



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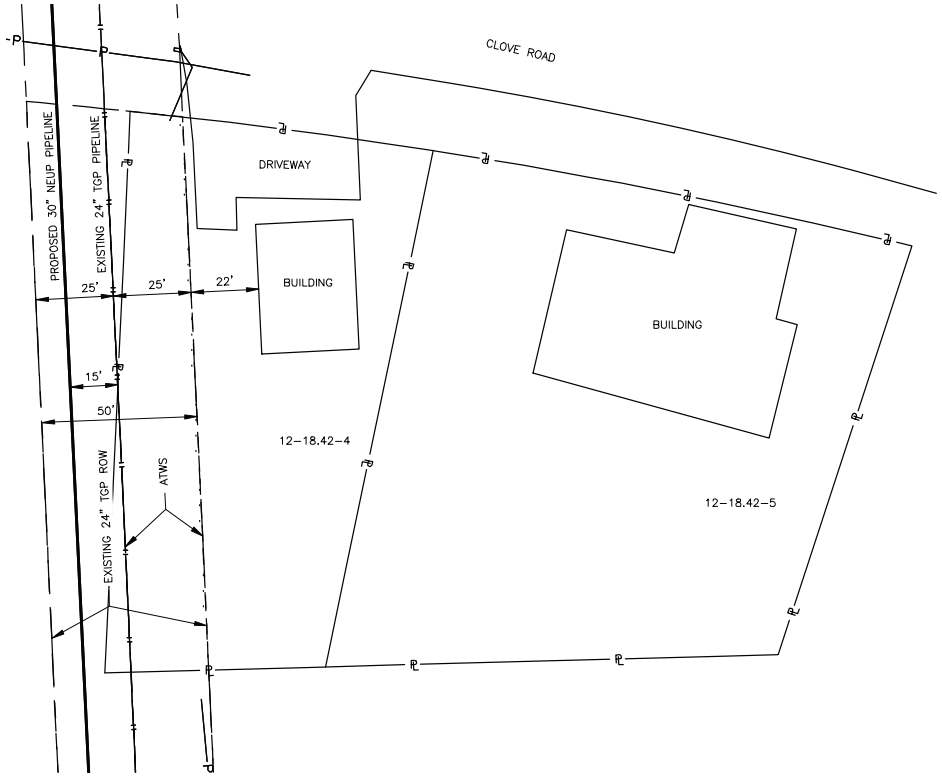
Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 323
MP 9.6

TRACT # 12-18.42-4
EMBARQ CORP/FAC MAR
SUSSEX COUNTY, NEW JERSEY
MONTAGUE TOWNSHIP



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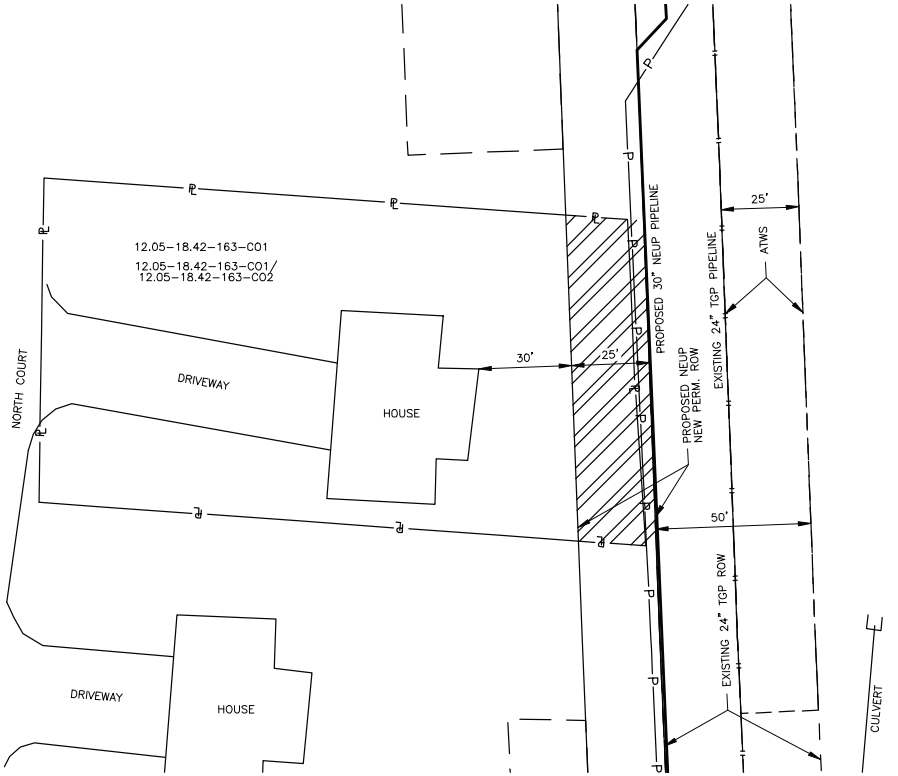
8. TOPSOIL AND SUBSOIL STORAGE PILES WILL BE ON THE SPOIL SIDE OF THE PROPOSED PIPELINE.
9. EQUIPMENT TRAVEL LANES WILL BE ON THE WORKING SIDE OF THE PROPOSED PIPELINE.
10. WORKSPACE WILL NOT INCLUDE BUILDING.
11. TRENCH WILL NOT BE EXCAVATED UNTIL THE PIPE IS READY TO BE INSTALLED AND WILL BE BACKFILLED AS SOON AS POSSIBLE AFTER PIPE INSTALLATION.
12. NO REFUELING OR STORAGE OF HAZARDOUS MATERIALS WILL OCCUR WITHIN 200 FEET OF A PRIVATE WELL.
13. LANDOWNERS SHALL BE NOTIFIED AT LEAST 3 TO 5 DAYS PRIOR TO CONSTRUCTION.

Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 323
MP 9.6

TRACT # 12.05-18.42-163
MICHAEL A SISKO/JAQUES FEYS
SUSSEX COUNTY, NEW JERSEY
MONTAGUE TOWNSHIP



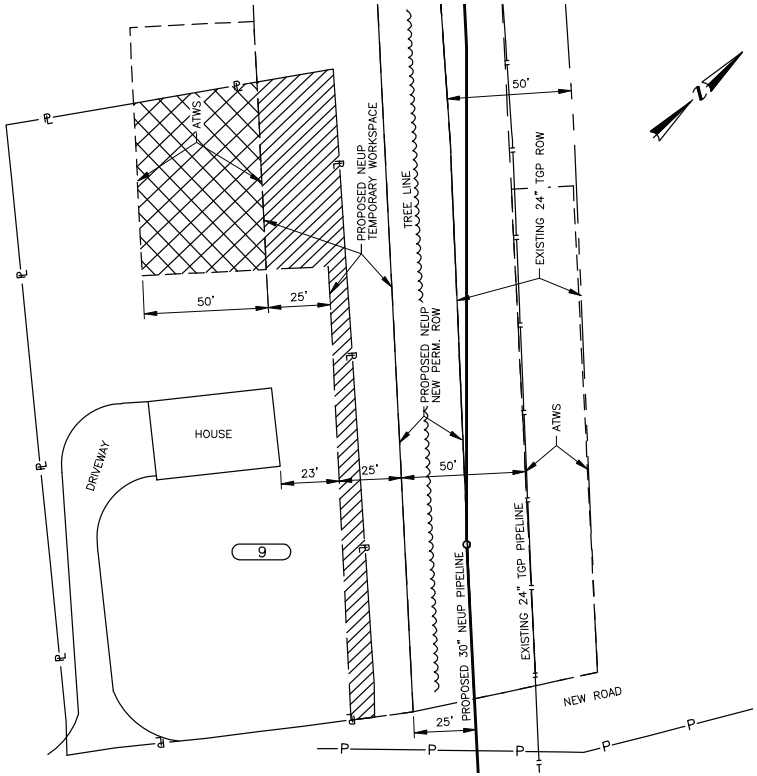
LEGEND

- ℄ PROPOSED 30" PIPELINE
- ℄ EXISTING 24" PIPELINE
- ℄ STREAM
- STONE/ROCK FENCE
- FENCE
- POWER LINE
- EDGE OF WOODS
- GUARD RAIL
- PROPERTY LINE
- GUY WIRE AND ANCHOR
- CATCH BASIN
- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- IRON ROD/PIN
- SINGLE POLE TOWER/POWER POLE
- TREE
- SANITARY SEWER MANHOLE
- STORM SEWER MANHOLE
- WATER WELL
- FIRE HYDRANT
- ELECTRIC HAND HOLE
- WATER VALVE
- GAS VALVE
- TELEPHONE HAND HOLE

NOTES:
1. PROPERTY OUTLINES AND FEATURES ARE BASED ON 2009/2010 CIVIL SURVEY. STRUCTURE (HOUSE) SCALED FROM AERIAL PHOTOGRAPHY.
2. CONTRACTOR SHALL ERECT A TEMPORARY SAFETY FENCE BETWEEN THE WORK AREA AND ADJACENT STRUCTURES BEFORE EQUIPMENT IS USED IN ANY PART OF THE RIGHT-OF-WAY AND SHALL BE REMOVED ONLY AFTER CONSTRUCTION AND RESTORATION IS COMPLETE.
3. CONTRACTOR SHALL MAINTAIN VEHICLE ACCESS TO THE IMPACTED AREA DURING THE CONSTRUCTION PHASE.
4. CONTRACTOR SHALL PROVIDE FUGITIVE DUST ABATEMENT MEASURES.
5. CONTRACTOR SHALL MINIMIZE VEGETATION REMOVAL.
6. CONTRACTOR SHALL LIMIT WORK IN THIS AREA TO DAYLIGHT HOURS.
7. MAINLINE CONSTRUCTION FROM START TO END WILL BE 4 TO 5 MONTHS. ACCESS AND OBSERVATION OF THE CONSTRUCTION AREA WILL CONTINUE THROUGHOUT THE 4 TO 5 MONTH PROJECT SCHEDULE.
8. TOPSOIL AND SUBSOIL STORAGE PILES WILL BE ON THE SPOIL SIDE OF THE PROPOSED PIPELINE.
9. EQUIPMENT TRAVEL LANES WILL BE ON THE WORKING SIDE OF THE PROPOSED PIPELINE.
10. WORKSPACE WILL NOT INCLUDE BUILDING.
11. NO REFUELING OR STORAGE OF HAZARDOUS MATERIALS WILL OCCUR WITHIN 200 FEET OF A PRIVATE WELL.
12. LANDOWNERS SHALL BE NOTIFIED AT LEAST 3 TO 5 DAYS PRIOR TO CONSTRUCTION.
13. UPON CONSTRUCTION COMPLETION R/W WILL BE RESTORED TO OR BETTER THAN ORIGINAL CONDITION.

Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 323
MP 9.7

TRACT # 9
TERRY STAUDENMAIER
SUSSEX COUNTY, NEW JERSEY
MONTAGUE TOWNSHIP



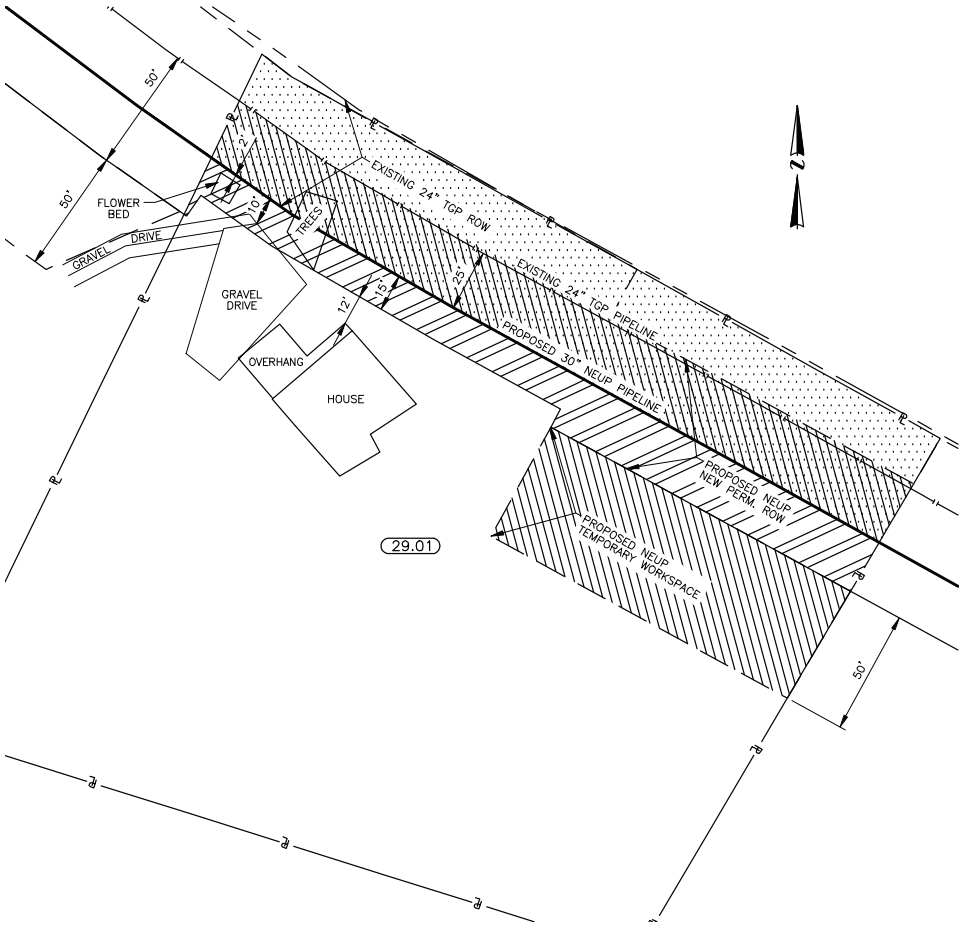
LEGEND

- ℄ PROPOSED 30" PIPELINE
- ℄ EXISTING 24" PIPELINE
- ℄ STREAM
- STONE/ROCK FENCE
- FENCE
- POWER LINE
- EDGE OF WOODS
- GUARD RAIL
- PROPERTY LINE
- GUY WIRE AND ANCHOR
- CATCH BASIN
- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- IRON ROD/PIN
- SINGLE POLE TOWER/POWER POLE
- TREE
- SANITARY SEWER MANHOLE
- STORM SEWER MANHOLE
- WATER WELL
- FIRE HYDRANT
- ELECTRIC HAND HOLE
- WATER VALVE
- GAS VALVE
- TELEPHONE HAND HOLE

NOTES:
1. PROPERTY OUTLINES AND FEATURES ARE BASED ON 2009/2010 CIVIL SURVEY. STRUCTURE (HOUSE) SCALED FROM AERIAL PHOTOGRAPHY.
2. CONTRACTOR SHALL ERECT A TEMPORARY SAFETY FENCE BETWEEN THE WORK AREA AND ADJACENT STRUCTURES BEFORE EQUIPMENT IS USED IN ANY PART OF THE RIGHT-OF-WAY AND SHALL BE REMOVED ONLY AFTER CONSTRUCTION AND RESTORATION IS COMPLETE.
3. CONTRACTOR SHALL MAINTAIN VEHICLE ACCESS TO THE IMPACTED AREA DURING THE CONSTRUCTION PHASE.
4. CONTRACTOR SHALL PROVIDE FUGITIVE DUST ABATEMENT MEASURES.
5. CONTRACTOR SHALL MINIMIZE VEGETATION REMOVAL.
6. CONTRACTOR SHALL LIMIT WORK IN THIS AREA TO DAYLIGHT HOURS.
7. MAINLINE CONSTRUCTION FROM START TO END WILL BE 4 TO 5 MONTHS. ACCESS AND OBSERVATION OF THE CONSTRUCTION AREA WILL CONTINUE THROUGHOUT THE 4 TO 5 MONTH PROJECT SCHEDULE.
8. TOPSOIL AND SUBSOIL STORAGE PILES WILL BE ON THE SPOIL SIDE OF THE PROPOSED PIPELINE.
9. EQUIPMENT TRAVEL LANES WILL BE ON THE WORKING SIDE OF THE PROPOSED PIPELINE.
10. WORKSPACE WILL NOT INCLUDE BUILDING.
11. TRENCH WILL NOT BE EXCAVATED UNTIL THE PIPE IS READY TO BE INSTALLED AND WILL BE BACKFILLED AS SOON AS POSSIBLE AFTER PIPE INSTALLATION.
12. NO REFUELING OR STORAGE OF HAZARDOUS MATERIALS WILL OCCUR WITHIN 200 FEET OF A PRIVATE WELL.
13. LANDOWNERS SHALL BE NOTIFIED AT LEAST 3 TO 5 DAYS PRIOR TO CONSTRUCTION.

Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 323
MP 9.8

TRACT # 29.01
CHRISTOPHER CIRONE
SUSSEX COUNTY, NEW JERSEY
WANTAGE TOWNSHIP



LEGEND

- ℄ PROPOSED 30" PIPELINE
- ℄ EXISTING 24" PIPELINE
- ℄ STREAM
- STONE/ROCK FENCE
- FENCE
- EDGE OF WOODS
- GUARD RAIL
- PROPERTY LINE
- GUY WIRE AND ANCHOR
- CATCH BASIN
- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- IRON ROD/PIN
- SINGLE POLE TOWER/POWER POLE
- TREE
- (S) SANITARY SEWER MANHOLE
- (D) STORM SEWER MANHOLE
- WATER WELL
- FIRE HYDRANT
- (E) ELECTRIC HAND HOLE
- WV WATER VALVE
- GV GAS VALVE
- (T) TELEPHONE HAND HOLE

NOTES:
1. PROPERTY OUTLINES, STRUCTURES AND FEATURES ARE BASED ON 2009/2010 CIVIL SURVEY.
2. CONTRACTOR SHALL ERECT A TEMPORARY SAFETY FENCE BETWEEN THE WORK AREA AND ADJACENT STRUCTURES BEFORE EQUIPMENT IS USED IN ANY PART OF THE RIGHT-OF-WAY AND SHALL BE REMOVED ONLY AFTER CONSTRUCTION AND RESTORATION IS COMPLETE.
3. CONTRACTOR SHALL MAINTAIN VEHICLE ACCESS TO THE IMPACTED AREA DURING THE CONSTRUCTION PHASE.
4. CONTRACTOR SHALL PROVIDE FUGITIVE DUST ABATEMENT MEASURES.
5. CONTRACTOR SHALL MINIMIZE VEGETATION REMOVAL.
6. CONTRACTOR SHALL LIMIT WORK IN THIS AREA TO DAYLIGHT HOURS.
7. MAINLINE CONSTRUCTION FROM START TO END WILL BE 4 TO 5 MONTHS. ACCESS AND OBSERVATION OF THE CONSTRUCTION AREA WILL CONTINUE THROUGHOUT THE 4 TO 5 MONTH PROJECT SCHEDULE.
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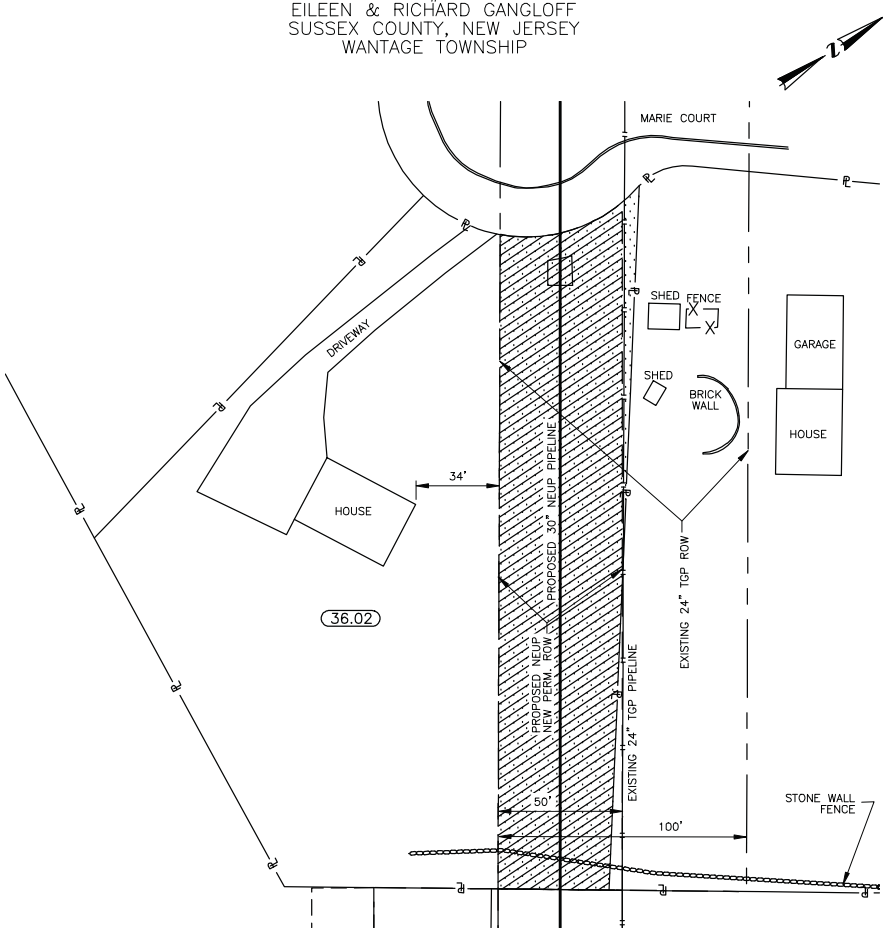
9. EQUIPMENT TRAVEL LANES WILL BE ON THE WORKING SIDE OF THE PROPOSED PIPELINE.
10. WORKSPACE WILL NOT INCLUDE BUILDING.
11. TRENCH WILL NOT BE EXCAVATED UNTIL THE PIPE IS READY TO BE INSTALLED AND WILL BE BACKFILLED AS SOON AS POSSIBLE AFTER PIPE INSTALLATION.
12. NO REFUELING OR STORAGE OF HAZARDOUS MATERIALS WILL OCCUR WITHIN 200 FEET OF A PRIVATE WELL.
13. LANDOWNERS SHALL BE NOTIFIED AT LEAST 3 TO 5 DAYS PRIOR TO CONSTRUCTION.

Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 323
MP 14.3



LEGEND

- ℄ PROPOSED 30" PIPELINE
- ℄ EXISTING 24" PIPELINE
- ℄ STREAM
- STONE/ROCK FENCE
- FENCE
- POWER LINE
- EDGE OF WOODS
- GUARD RAIL
- PROPERTY LINE
- GUY WIRE AND ANCHOR
- CATCH BASIN
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- PROPOSED PERMANENT EASEMENT
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- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
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- TREE
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- FIRE HYDRANT
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- WV WATER VALVE
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NOTES:
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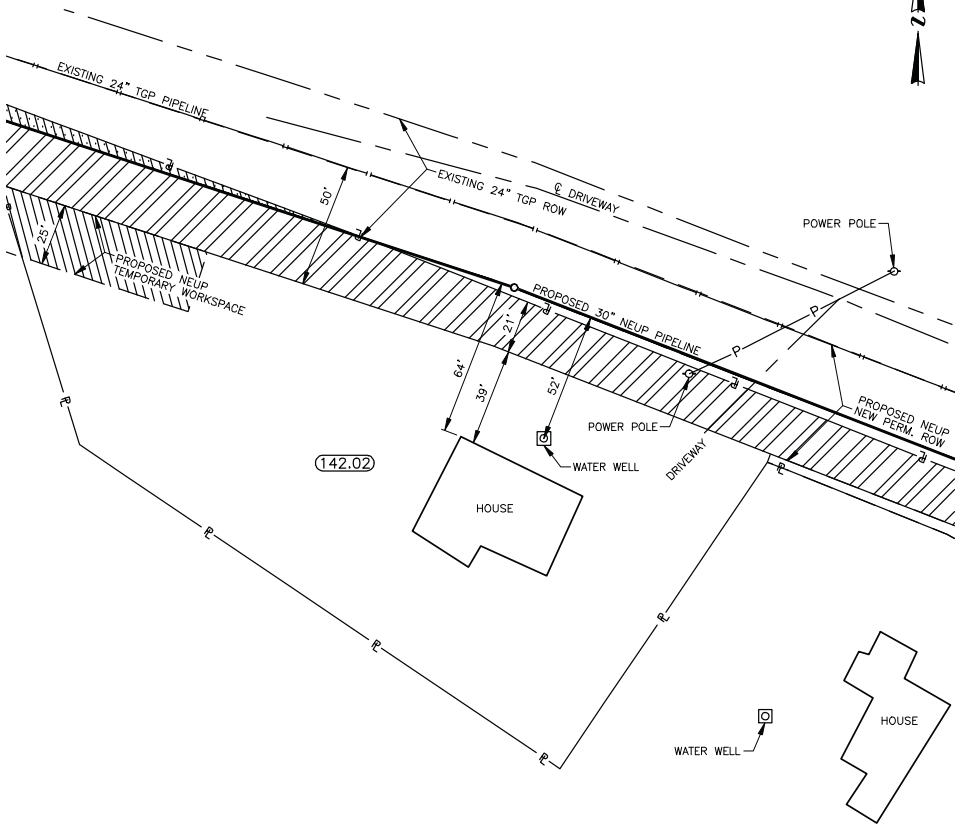
12. LANDOWNERS SHALL BE NOTIFIED AT LEAST 3 TO 5 DAYS PRIOR TO CONSTRUCTION.
13. UPON CONSTRUCTION COMPLETION, R/W WILL BE RESTORED TO OR BETTER THAN ORIGINAL CONDITION.

Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 323
MP 15.2

Loop 325 – New Jersey

TRACT # 142.02
ARTHUR & JOAN RHINESMITH
PASSAIC COUNTY, NEW JERSEY
RINGWOOD, BOROUGH



LEGEND

- ℄ PROPOSED 30" PIPELINE
- ℄ EXISTING 24" PIPELINE
- ℄ STREAM
- STONE/ROCK FENCE
- FENCE
- POWER LINE
- EDGE OF WOODS
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- PROPERTY LINE
- GUY WIRE AND ANCHOR
- CATCH BASIN
- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
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- TREE
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- STORM SEWER MANHOLE
- WATER WELL
- FIRE HYDRANT
- ELECTRIC HAND HOLE
- WV — WATER VALVE
- GV — GAS VALVE
- TELEPHONE HAND HOLE

NOTES:
1. PROPERTY OUTLINES, STRUCTURES AND FEATURES ARE BASED ON 2009/2010 CIVIL SURVEY.
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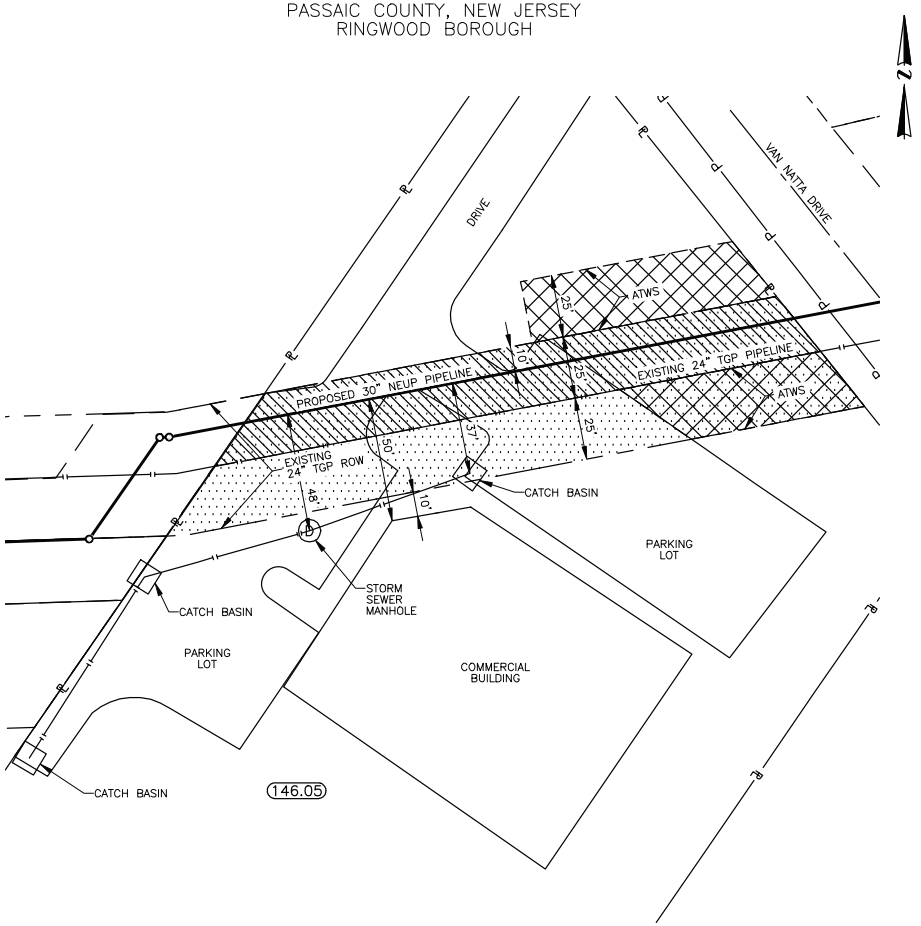
9. EQUIPMENT TRAVEL LANES WILL BE ON THE WORKING SIDE OF THE PROPOSED PIPELINE.
10. WORKSPACE WILL NOT INCLUDE BUILDING.
11. NO REFUELING OR STORAGE OF HAZARDOUS MATERIALS WILL OCCUR WITHIN 200 FEET OF A PRIVATE WELL.
12. LANDOWNERS SHALL BE NOTIFIED AT LEAST 3 TO 5 DAYS PRIOR TO CONSTRUCTION. TGP CONTACT NO. 1-877-366-2650
13. UPON CONSTRUCTION COMPLETION, R/W WILL BE RESTORED TO OR BETTER THAN ORIGINAL CONDITION.

Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 325
MP 1.1

TRACT # 146.05
ARKADIJ HONCZARENKO
PASSAIC COUNTY, NEW JERSEY
RINGWOOD BOROUGH



LEGEND

- ℄ PROPOSED 30" PIPELINE
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- ℄ STREAM
- STONE/ROCK FENCE
- FENCE
- POWER LINE
- EDGE OF WOODS
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- PROPERTY LINE
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- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
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10. WORKSPACE WILL NOT INCLUDE BUILDING.
11. TRENCH WILL NOT BE EXCAVATED UNTIL THE PIPE IS READY TO BE INSTALLED AND WILL BE BACKFILLED AS SOON AS POSSIBLE AFTER PIPE INSTALLATION.
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13. LANDOWNERS SHALL BE NOTIFIED AT LEAST 3 TO 5 DAYS PRIOR TO CONSTRUCTION.

Appendix F
Tennessee Gas Pipeline Company's Northeast Upgrade Project
Site-Specific Residential Construction Plans
Loop 325
MP 2.4