Federal Energy Regulatory Commission

Office of Energy Projects

June 2016

Tennessee Gas Pipeline Company, L.L.C. **Docket No. CP15-520-000**

Triad Expansion Project

Environmental Assessment

Washington, DC 20426

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas 2
Tennessee Gas Pipeline Company, L.L.C.
Docket No. CP15-520-000

TO THE PARTY ADDRESSED:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared this environmental assessment (EA) for the Triad Expansion Project (Project) proposed by Tennessee Gas Pipeline Company, L.L.C. (Tennessee) in the above-referenced docket. Tennessee requests authorization to construct pipeline facilities in Pennsylvania to provide up to 180,000 dekatherms per day of new natural gas delivery capacity.

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. 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.

Tennessee's proposed Project involves construction of approximately 7.0 miles of 36-inch-diameter pipeline; a new pig[1] launcher, crossover, and connecting facilities at the beginning of the proposed pipeline; a new pig receiver; and a new odorant facility and ancillary piping at Tennessee's existing Compressor Station 321.

FERC staff mailed copies of the EA to federal, state, and local government representatives and agencies; elected officials; public interest groups; Native American tribes; potentially affected landowners and other interested individuals and groups; newspapers and libraries in the project area; and parties to this proceeding. In addition, the EA has been placed in the public files of the FERC and is available for 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

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

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 lessen or avoid environmental impacts. The more specific your comments, the more useful they will be. To ensure that the Commission has the opportunity to consider your comments prior to making its decision on this Project, it is important that we receive your comments in Washington, DC on or before **July 15, 2016**.

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 (CP15-520-000) with your submission. The Commission encourages electronic filing of comments and has dedicated eFiling expert staff available to assist you at 202-502-8258 or efiling@ferc.gov.

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

(2) You can file your comments electronically by using the eFiling feature on the Commission's website (www.ferc.gov) under the link to Documents and Filings. With eFiling, you can provide comments in a variety of formats by attaching them as a file with your submission. New eFiling users must first create an account by clicking on "eRegister." You 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 can 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

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 Code of Federal Regulations 385.214).[2] Only intervenors have the right to seek rehearing of the Commission's decision. The Commission grants affected landowners and others with environmental concerns intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding that no other parties can adequately represent. **Simply filing environmental comments will not give you intervenor status, but you do not need intervenor status to have your comments considered.**

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[2] See the previous discussion on the methods for filing comments.

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., CP15-520). 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 notifications of these filings, document summaries, and direct links to the documents. Go to (www.ferc.gov/docs-filing/esubscription.asp).

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TECHNICAL ACRONYMS

300-3 Loop	New 36-inch-diameter looping pipeline in Susquehanna County, Pennsylvania
APE	Area of Potential Effects
AQCR	Air Quality Control Regions
ATW	Approved Trout Waters
ATWS	additional temporary workspaces
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
BCC	birds of conservation concern
CA	Candidate at Risk classification by Pennsylvania Biological Survey
CAA	Clean Air Act of 1970 and its amendments
CEQ	Council on Environmental Quality
Certificate	Certificate of Public Convenience and Necessity
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
Commission	Federal Energy Regulatory Commission
CR	Candidate Rare classification by Pennsylvania Biological Survey
CS	Compressor Station
CWF	Coldwater Fisheries
dB	decibels
dBA	A-weighted decibels
E&SCP	Erosion and Sediment Control Plan
EA	environmental assessment
EI	environmental inspector
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FWS	U.S. Fish and Wildlife Service
GHG	greenhouse gas
HAP	hazardous air pollutants
HCA	high consequence areas
HQ-CWF	High Quality-Coldwater Fisheries
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
MBTA	Migratory Bird Treaty Act
Memorandum	Memorandum of Understanding on Natural Gas Transportation Facilities
MF	Migratory Fisheries/Fishes
MP	milepost
NAAQS	National Ambient Air Quality Standards
NED	Northeast Energy Direct
NEPA	National Environmental Policy Act
NEUP	Tennessee's Northeast Upgrade Project
NGA	Natural Gas Act
NO_x	nitrogen oxides
NOI	*Notice of Intent to Prepare an Environmental Assessment for the Proposed Triad Expansion Project and Request for Comments on Environmental Issues*
NPDES	National Pollution Discharge Elimination System

NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRTW	Naturally Reproducing Trout Waters
OEP	Office of Energy Projects
Order	Commission's Order
OTR	Ozone Transport Region
Pa. Code	Pennsylvania Code
PADCNR	Pennsylvania Department of Conservation and Natural Resources
PADEP	Pennsylvania Department of Environmental Protection
PAFBC	Pennsylvania Fish and Boat Commission
PAGC	Pennsylvania Game Commission
PE	Pennsylvania Endangered by the Pennsylvania Game Commission
PEM	palustrine emergent
PERT	Program Evaluation Review Technique
PFO	palustrine forested
PHMSA	Pipeline and Hazardous Materials Safety Administration
Pig	internal pipeline inspection
PJM	PJM Interconnection
Plan	The Commission's Upland Erosion Control, Revegetation, and Maintenance Plan
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to 10 microns
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than or equal to 2.5 microns
PNDI	Pennsylvania Natural Diversity Index
Procedures	The Commission's Wetland and Waterbody Construction and Mitigation Procedures
PSS	palustrine scrub-shrub
Secretary	Secretary of the Federal Energy Regulatory Commission
SHPO	Pennsylvania State Historic Preservation Office
SIP	State Implementation Plans
SO_2	sulfur dioxide
SPCC Plan	Spill Prevention, Control, and Countermeasures Plan
Tennessee	Tennessee Gas Pipeline Company
TAR	Temporary Access Road
THPO	Tribal Historic Preservation Office
Transco	Transcontinental Gas Pipe Line Company
UGI Penn	UGI Penn Natural Gas, Inc.
UNT	unnamed tributary
USC	U.S. Code
USDOT	U.S. Department of Transportation
USGS	U.S. Geological Survey
VOC	volatile organic compounds

A. PROPOSED ACTION

1. INTRODUCTION

The staff of the Federal Energy Regulatory Commission (Commission or FERC) prepared this environmental assessment (EA) to assess the environmental effects of the natural gas facilities proposed by Tennessee Gas Pipeline Company, L.L.C. (Tennessee). We[1] prepared this EA in compliance with the requirements of the National Environmental Policy Act of 1969 (NEPA), Title 40 of the Code of Federal Regulations (CFR), Parts 1500–1508 (40 CFR 1500–1508), and FERC implementing regulations at 18 CFR Part 380.

On June 19, 2015, Tennessee filed an application for a Certificate of Public Convenience and Necessity (Certificate) in Docket No. CP15-520-000 under Section 7(c) of the Natural Gas Act (NGA) and Part 157 of the Commission's regulations. Tennessee proposes to construct, own, and operate a new natural gas pipeline loop,[2] modify existing aboveground facilities, and add new tie-in facilities in Susquehanna County, Pennsylvania. Tennessee's proposed project is referred to as the Triad Expansion Project (Project).

Our EA is an integral part of the Commission's decision on whether to issue Tennessee a Certificate to construct, own, 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 could result from implementation of the proposed action;
- identify and recommend reasonable alternatives and specific mitigation measures, as necessary, to avoid or minimize project-related environmental impacts; and
- facilitate public involvement in the environmental review process.

2. PURPOSE AND NEED

Tennessee's application and supplementary materials state that the purpose of the Project is to increase transportation capacity of its existing system to provide additional firm transportation service to serve a new natural gas-fired power plant to be constructed in Lackawanna County, Pennsylvania. The proposed action would increase natural gas delivery capacity by approximately 180,000 dekatherms per day, and the project shipper has fully subscribed the additional capacity created by the proposed action.

Under Section 7(c) of the NGA, the Commission determines whether interstate natural gas transportation facilities are in the public convenience and necessity and, if so, grants a Certificate to construct and operate them. The Commission bases its decisions on technical competence, financing, rates, market demand, gas supply, environmental impact, long-term feasibility, and other issues concerning a proposed project.

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1 "We," "us," and "our" refer to environmental staff of the Office of Energy Projects (OEP).

2 A loop is a pipeline that is constructed adjacent to another pipeline, typically in the same right-of-way, for the purpose of increasing capacity in this portion of the system.

3. PROPOSED FACILITIES

The Project consists of the following facilities, all in Susquehanna County, Pennsylvania:

- approximately 7.0 miles of new 36-inch-diameter looping pipeline (300-3 Loop);
- a new internal pipeline inspection (pig)[3] launcher, crossover, and connecting facilities at the beginning of the proposed pipeline loop; and
- a new pig receiver, a new odorant facility, and ancillary piping at the existing Compressor Station (CS) 321.

Maps showing the location of the proposed facilities are included in Appendix A (figures 1 and 2).

Tennessee anticipates construction beginning in November 2016 and continuing through July 2017, with an anticipated in-service date of November 1, 2017.

4. PUBLIC PARTICIPATION AND COMMENT

On August 5, 2015, the Commission issued a *Notice of Intent to Prepare an Environmental Assessment for the Proposed Triad Expansion Project and Request for Comments on Environmental Issues* (NOI). The NOI was mailed to interested parties including federal, state, and local officials; agency representatives; Native American tribes; local libraries and newspapers; and property owners affected by the proposed facilities. This notice opened the scoping period for 30 days. We received six written comments in response to the NOI from the U.S. Army Corps of Engineers; the Pennsylvania Department of Conservation and Natural Resources (PADCNR); the Stockbridge-Munsee Tribal Historic Preservation Office (THPO); the Allegheny Defense Project; UGI Penn Natural Gas, Inc. (UGI Penn); and one affected landowner. The comments primarily concerned the Project's impacts on soils, wetlands, waterbodies, vegetation, wildlife, recreation, and cultural resources; reliability and safety; and a review of project alternatives. Comments received during the scoping period are addressed in the applicable sections of the EA.

During the scoping period, we received comments from UGI Penn regarding an offer to turnback committed natural gas delivery capacity to offset a portion of the demand that the Project is proposed to meet, resulting in lower project costs and fewer environmental impacts. In additional comments filed by UGI Penn, they estimated that the turnback offer, as currently proposed, would potentially eliminate the need for approximately 1.0 mile of the proposed Project. UGI Penn's contention that the Commission should require Tennessee to accept its turnback capacity is outside the scope of this EA. This issue would be considered in any order the Commission may issue for Tennessee's project proposal.

5. LAND REQUIREMENTS

Construction requirements include all temporary workspace areas, existing permanent easement or fee property, new permanent easement, and access roads associated with the Project. The footprint of all project-related disturbances during construction (temporary construction workspace) is estimated at 170.5 acres. Table A.5-1 provides a summary of the acreages of land required for construction (temporary impacts) of the Project.

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

TABLE A.5-1

Land Requirements for Project Construction and Operation

Project Component	Temporary Construction Workspace (acres) [a]	New Permanent Right-of-Way (acres)	Existing Permanent Right-of-Way (acres) [b]
PIPELINE FACILITIES			
300-3 Loop	100.8	6.0	36.1
Additional Temporary Workspace	17.7	0.0	0.0
Pipeline Subtotal	**118.5**	**6.0**	**36.1**
ABOVEGROUND FACILITIES			
Odorant Facility	3.9	0.0	0.5
Upstream Tie-In Site	0.1	0.0	0.1
Downstream Tie-In Site	4.1	0.2	0.6
Aboveground Facility Subtotal	**8.1**	**0.2**	**1.2**
SUPPORT FACILITIES			
Staging Area	1.8	0.0	0.0
Pipe/Contractor Yard	35.4	0.0	0.0
Temporary Access Roads	4.9	0.0	0.0
Permanent Access Roads	0.2	0.1	0.1
Water Withdrawal Locations	1.6	0.0	0.0
Support Subtotal	**43.9**	**0.1**	**0.1**
PROJECT TOTALS	**170.5**	**6.3**	**37.4**

[a] Includes construction right-of-way, and portions of the new and existing permanent right-of-way that would be used to construct the Project.

[b] Portions of Tennessee's existing permanent right-of-way that would be used to operate the Project.

Operation of the Project would require a 50-foot-wide permanent right-of-way centered on the pipeline in most areas. Tennessee proposes to use 25 feet of existing right-of-way associated with the existing permanent easement of Tennessee's 300 Line system and to add 25 feet of new permanent easement, with the exception of approximately 1.4 miles of pipeline loop that would not overlap with the existing 300 Line system right-of-way. The typical width of Tennessee's existing permanent right-of-way for the 300 Line system is 150 feet. As a result of the Project, the proposed total permanent easement would increase to 175 feet in most areas.

5.1 Access Roads, Staging Area/Pipe Yard, and Additional Temporary Workspace

Tennessee proposes to use 10 existing private roads to access the construction right-of-way for pipeline and aboveground facility construction. Tennessee would conduct improvements for some of the existing private roads to be used as access roads, including extending and adding gravel/stone cover to three roads, and adding gravel/stone cover to one road. Six roads do not require improvements. One permanent access road would be utilized during project operation. The acreage of impact from the expansion of these access roads is included in table A.5-1.

Extra workspace, including additional temporary workspaces (ATWS) and staging areas, are typically needed in areas that require special construction techniques such as steep slopes as well as pipeline construction at road, railroad, wetland, and waterbody crossings. Tennessee has identified one staging area and 62 areas of ATWS, which are listed in table 2 of appendix B. Tennessee also proposes to use two temporary contractor/pipe yards totaling approximately 35.4 acres during the construction of the

300-3 Loop. These areas would be used for the storage of pipe, equipment, and materials; temporary field offices; pipe assembly and preparation; hydrostatic test water discharge areas; and soil storage. Upon project completion, these areas would be restored to preconstruction condition or in accordance with landowner agreements and would not be used for pipeline operation. Total acreages for extra workspace, which includes ATWS and the staging area, and the proposed pipe yards are detailed in table A.5-1.

The Commission's *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures) require that extra work areas be located at least 50 feet away from the water's edge and/or wetland boundaries, and that the construction right-of-way be reduced to a width of 75 feet in wetlands, unless conditions warrant modification of these requirements and the applicant provides site-specific justification for why they cannot be met. Tennessee has requested three ATWS areas within 50 feet of the edge of the boundary of a wetland, and one wetland that would require a construction right-of-way width greater than 75 feet to cross. Each of these locations and site-specific justifications for the alternate measures to the Commission's Procedures are provided in table A.5-2.

TABLE A.5-2

Wetland Construction Alternate Measures for Construction Right-of-Way and Temporary Workspace

Location / Pipeline Milepost [a]	Name of Feature or Field ID [b]	Description [c]	Site-Specific Justification for Modification
MP 0.3	Wetland W-1a	ATWS on south, west, and north side of W-1a has a 1-foot-wide buffer from wetland boundary.	Additional workspace is needed to provide staging and access for hydrostatic test water withdrawal location and to accommodate landowner requests.
MP 1.1	Wetland M-1W	Construction right-of-way width greater than 75 feet through wetland.	Construction workspace is needed due to adjacent existing natural gas facility.
MP 3.8	Wetland Q-1W	ATWS on west side of Q-1W has a 29-foot-wide buffer from wetland boundary.	Additional workspace is needed due to limited construction workspace between wetland and nearby wetland and stream crossings.
MP 4.7	Wetland I-1W	ATWS on northwest side of I-1W has a 31-foot-wide buffer from wetland boundary.	Additional workspace is needed due to limited construction workspace and multiple resource crossings in the vicinity.

[a] Milepost references in the pipeline loops correspond to the new 36-inch-diameter pipeline lateral, Line 300-3.
[b] Field ID number corresponds to identification number in the project alignment sheets, issued 2/10/2016.
[c] Data is based on field survey completed for the Project, which is depicted on the alignment sheets.

We have reviewed each of these locations and the site-specific justifications provided by Tennessee and find them to be acceptable. Our Procedures require that Tennessee install sediment barriers along the edge of the workspace to contain spoil within the area of disturbance and to maintain the sediment barrier until restoration and stabilization of the disturbed area is complete. The appropriate implementation of erosion control measures in these locations would provide adequate protection for the adjacent resource.

Although Tennessee has identified areas where additional temporary workspace would be required, additional or alternative areas could be identified in the future due to changes in site-specific construction requirements. Tennessee would be required to file information on each of those areas for our review and approval prior to use.

6. NON-JURISDICTIONAL FACILITIES

Under Section 7 of the NGA, the Commission is required to consider, as part of its decision to approve facilities under Commission jurisdiction, all factors bearing on the public convenience and necessity. Occasionally, proposed projects have associated facilities that do not come under the jurisdiction of the Commission. The following non-jurisdictional facilities are associated with the Project.

The Project would provide natural gas from the project receipt point in Susquehanna County, Pennsylvania to an interconnection in Uniondale, Susquehanna County, Pennsylvania with UGI Corporation. UGI Corporation would deliver the natural gas to a new combined cycle natural gas-fired electric generating plant currently under construction in the Borough of Jessup, Lackawanna County, Pennsylvania that would be constructed, owned, and operated by Lackawanna Energy Center, LLC. The proposed power plant obtained approval from the Borough of Jessup, the Pennsylvania Department of Environmental Protection (PADEP) for air emission and water quality permits, as well as from the Susquehanna River Basin Commission for water consumption. The potential impacts associated with this project were analyzed by these agencies in their decision making process. To provide service to the proposed new plant, UGI Corporation would uprate its existing 16-inch-diameter pipeline from the Uniondale interconnection with Tennessee to the proposed new plant and modify existing aboveground facilities to accommodate the changes. Construction on the UGI Corporation pipeline began in April 2016 and is expected to be completed by October 2017. Section B.9 of this EA, Cumulative Impacts, contains additional discussion regarding the Lackawanna Energy Center.

7. CONSTRUCTION, OPERATION, AND MAINTENANCE PROCEDURES

The proposed facilities would be designed, constructed, tested, operated, and maintained in accordance with the U.S. Department of Transportation (USDOT) Minimum Federal Safety Standards in 49 CFR 192. The USDOT's regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. Part 192 specifies material selection and qualification, minimum design requirements, and protection from internal, external, and atmospheric corrosion.

Tennessee proposes to follow the construction procedures and mitigation measures contained in the Commission's *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and Procedures,[4] with four modifications to the Procedures regarding ATWS wetland and waterbody set-backs (see table A.5-2), as well as slope breakers and wetland seed and mulch requirements, which are discussed in sections B.2.2 and B.2.4. We have reviewed these proposed modifications to the Commission's Procedures and find them acceptable. Therefore, Tennessee would follow its project-specific Plan and Procedures (Tennessee's Plan and Procedures), which include these approved modifications. Tennessee would incorporate these alternate measures into its Erosion and Sediment Control Plan (E&SCP), which would be finalized and submitted to the Commission prior to construction.

Tennessee would use conventional techniques for buried pipeline construction and aboveground facility construction and follow the requirements set forth in its Plan and Procedures to ensure safe, stable, and reliable transmission facilities consistent with Commission and USDOT specifications. Typical construction right-of-way cross sections are provided in appendix A (figure 3).

[4] Copies of the Commission's Plan and Procedures can be accessed on our website (http://www.ferc.gov/industries/gas/enviro/guidelines.asp) or obtained through our Office of External Affairs at 1-866-208-3372.

In addition to its Plan and Procedures, Tennessee has prepared an acceptable *Spill Prevention, Control, and Countermeasures Plan* (SPCC Plan), which contains measures to prevent and respond to any inadvertent releases of hazardous materials as well as notification procedures in the event of a release.

Tennessee would use at least one full-time environmental inspector (EI) during construction of the Project. The EI would be on site during project construction activities to ensure compliance with the construction procedures contained in Tennessee's Plan and Procedures. A full list of the EI's duties is presented in section II.B of Tennessee's Plan. The EI's responsibilities include:

- ensuring compliance with applicable federal, state, and local environmental permits;
- ordering corrective actions for acts that violate the environmental conditions of the Commission's Certificate, or any other authorizing document;
- ensuring compliance with site-specific construction and restoration plans or other mitigation measures and landowner agreements; and
- maintaining construction status reports.

Tennessee would conduct environmental training sessions in advance of construction to ensure that all individuals working on the Project are familiar with the environmental mitigation measures appropriate to their jobs and the EI's authority.

7.1 Pipeline Construction

Tennessee would conduct construction activities during daylight hours for 10 hours per day, 6 days per week; however, 24-hour construction activities may occur on a limited basis due to site conditions, specialized construction techniques, and/or weather-related events. Twenty-four hour activities would be limited to the running of water pumps during hydrostatic testing and trenching activities in areas with open-trench timing restrictions.

To comply with USDOT specifications, Tennessee would hydrostatically test all pipeline facilities prior to placing them in service. Hydrostatic testing is further discussed in section B.2.3.

7.1.1 Construction Schedule and Workforce

Tennessee anticipates construction in late 2016 following the receipt of all regulatory approvals, in order to place the proposed facilities in-service in November 2017. The construction schedule and duration would vary per site, based on the scope of construction activities. Tennessee anticipates using one mainline construction spread for the pipeline loop and several small tie-in crews, with some activities occurring concurrently. Tennessee anticipates a peak construction workforce of approximately 164 individuals. No new permanent employees would be required as a result of the construction, operation, or maintenance of the Project.

7.1.2 Clearing and Grading

Clearing operations include removing brush, trees, roots, and other obstructions such as large rocks and stumps within the construction right-of-way or construction work areas. Tennessee's proposed pipeline loops consist mainly of forest, open land, and agricultural land. Tennessee would clear trees along the pipeline right-of-way between September 1st and March 31st as required by the U.S. Fish and Wildlife Service (FWS) to avoid impacts on migratory birds. In the event that tree clearing is required

outside of this window, Tennessee would implement additional conservation measures approved by the FWS (see section B.3.2.1). Felled trees may be left on the right-of-way (except in wetlands, waterbodies, and other sensitive resources) until grading activities commence in the spring to further minimize ground disturbance.

After clearing is complete, Tennessee would install temporary erosion control devices along the limits of wetland boundaries within the construction right-of-way. Grading of the construction right-of-way would be necessary for the movement of heavy equipment and safe passage for work crews.

7.1.3 Trenching

In accordance with Tennessee's Plan, measures would be employed to minimize soil erosion during trenching. In addition, measures such as trench breakers would be taken to prevent the flow of water through the trench.

To minimize impacts on agricultural and residential lands, topsoil would be segregated from subsoil during trenching and would remain segregated during construction to avoid loss due to mixing with subsoil material. Upon completion of backfilling operations, the topsoil would be replaced over the graded area. Tennessee would utilize either full right-of-way topsoil segregation, which involves removal and segregation of topsoil over the entire construction right-of-way prior to commencing construction, or ditch-plus-spoil-side topsoil segregation, which involves removal and segregation of topsoil from the excavation ditch and spoil storage area prior to commencing construction, as requested by the landowner or as required by the Susquehanna County Conservation District.

The trench would be at least 14 inches wider than the diameter of the pipe. Typically, the trench for a pipeline must be excavated to a depth that allows for a minimum of 36 inches of cover in accordance with USDOT regulations. However, at crossings of foreign pipelines, utilities, or other structures the trench may be buried deeper to allow for a minimum of 12 inches of clearance.

The Project would require a total of 13 roadway crossings involving 12 public roads and 1 private road. Six public roads would be crossed using the conventional bore method (further described in section A.7.1.7), and the remaining seven roads would be crossed using the open-cut construction technique. For all road crossings, Tennessee would ensure that construction activities do not prohibit the passage of vehicles and make provisions for traffic management during construction as necessary.

7.1.4 Pipe Stringing, Preparation, and Lowering In

Pipe stringing involves moving the pipe into position along the construction right-of-way in a continuous line parallel to the excavated trench in preparation for subsequent lineup and welding operations. The pipe is then bent, where necessary, to conform to changes in the direction of the alignment and natural ground contours. After the pipe has been bent, it is lined up, welded, and the welds and pipe coating are inspected. Side-boom tractors are used to lower the pipe into the trench. Trench dewatering would be performed in accordance with Tennessee's Plan and Procedures.

7.1.5 Backfilling and Grade Restoration

After the pipe is lowered into the trench, the trench would be backfilled using the material originally excavated from the trench. Topsoil would not be used for padding the pipeline. In some cases, additional backfill material from other sources may be used. In areas where topsoil has been segregated, the subsoil would be placed in the bottom of the trench, followed by replacing the topsoil over the subsoil layer. The surface of the construction work space would be graded to conform to pre-existing contours of

the adjoining area, except for a slight crown of soil over the trench (in upland areas only) to compensate for natural subsidence of the backfill material.

7.1.6 Cleanup and Restoration

Weather and soil conditions permitting, final cleanup would occur within 20 days after the trench is backfilled (within 10 days in residential areas). After backfilling is complete, all disturbed areas would be graded to the original contours, any remaining debris properly disposed, permanent erosion controls constructed or installed, and the right-of-way seeded with an appropriate seed mix. Examples of typical erosion control devices include slope breakers, sediment barriers (such as silt fence or straw bales), and mulch. All restoration activities would be completed according to Tennessee's Plan and Procedures. Seeding would be completed according to the recommendations of the National Resource Conservation Service, the Susquehanna County Conservation District, and landowner agreements.

7.1.7 Special Pipeline Construction Procedures

Tennessee would use special construction techniques when constructing across waterbodies, wetlands, and roads and railroads, as described below.

Waterbody Crossings

Tennessee has proposed to cross all waterbodies using dry crossing techniques. Tennessee would cross ephemeral waterbodies and ditches where there is no perceptible flow at the time of crossing, using standard upland crossing techniques. Tennessee would maintain adequate equipment on site to conduct a dry-ditch crossing should perceptible flow occur during construction.

The proposed crossing method for each of the waterbodies in the project area is included in section B.2.2.

Dry-Ditch Crossing Method

A dry-ditch waterbody crossing consists of either a flume crossing or a dam-and-pump crossing. A flume crossing involves diverting the flow of water across the construction work area through one or more flume pipes placed in the waterbody. Sandbags or other diversion structures would be placed directly in the waterbody upstream and downstream of the pipeline centerline to divert the water flow through the flume pipes. The trench line would be isolated and pumped dry, allowing construction crews to excavate the trench and install the pipe. Downstream water flow would be maintained until the trench is backfilled, at which time the dams and flume pipe would be removed.

The dam-and-pump crossing method involves using pumps and hoses instead of flumes to move water around 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.

To the extent possible, streambeds would be returned to their preconstruction contours, and stream and river banks restored to their preconstruction condition and allowed to re-vegetate in accordance with Tennessee's Plan and Procedures and applicable permit conditions.

Open-Cut Crossing Method

An open-cut crossing method would likely be used if any stream has no perceptible flow at the time of construction. A backhoe, clam dredge, dragline, or similar equipment would be used for trench excavation. The pipe would be welded together in the staging areas and then carried or floated along the right-of-way into place. If the streambed is composed of unconsolidated material, the pipe would be pulled into place. In rock-bottomed streams, the pipe would be floated or lifted across, and then lowered into place. After the pipe is lowered into the trench, previously excavated material would be returned to the trench line for backfill, streambeds would be restored to their former elevations and grades, and all stream banks would be restored and stabilized with erosion controls. Per Tennessee's Procedures, the completion of all in-stream construction disturbance activities would not exceed 24 hours at minor stream crossings (<10 feet wide) and 48 hours at intermediate stream crossings (10–100 feet wide) unless site-specific conditions make completion within 48 hours infeasible.

Wetland Crossings

Wetland boundaries would be delineated and marked in the field prior to construction activities. The pipeline construction right-of-way in wetlands would be limited to 75 feet (except at wetland M-1W at MP1.1, see table A.5-2). Woody vegetation within the construction right-of-way would be cut off at ground level and removed from the wetlands, leaving the root systems intact. The pulling of tree stumps and grading activities would be limited to the area directly over the trench line unless it is determined that safety-related construction constraints require grading or the removal of stumps from the working side of the right-of-way. Construction equipment operating in wetland areas would be limited to that needed to clear the right-of-way, dig the trench, install the pipeline, backfill the trench, and restore the right-of-way. Topsoil segregation would be utilized in unsaturated wetlands to preserve the existing seed bank and aid in the successful restoration of the disturbed wetland. Trench plugs would be installed as necessary to maintain wetland hydrology.

The specific crossing procedures used to install the pipeline across wetlands would depend on the level of soil stability and saturation encountered during construction. Construction across unsaturated soils that can support the weight of equipment would be conducted in a manner similar to the upland construction procedures. In areas that are proposed for conventional open trench construction, but where soil conditions may not support the weight of equipment, timber mats would be used to minimize disturbance to wetland hydrology and maintain soil structure.

The push-pull method of construction could be used in inundated or saturated conditions where wetland soils and hydrology cannot support conventional pipe laying equipment, or in areas that have significant quantities of water that would allow for the pipe to be floated over the open trench. With this method, construction and excavation equipment would work from temporary work surfaces, and a prefabricated pipeline segment would be pulled or floated into position then sunk with buoyancy control devices and placed in the trench.

Road and Railroad Crossings

Construction across paved roads, highways, and railroads would be conducted in accordance with Tennessee's Plan and Procedures and requirements identified in road and railroad crossing permits or approvals. Roads, highways, and railroads where traffic cannot be detoured would be crossed using the conventional subsurface boring (see section B.4). Typically, there would be little or no disruption to traffic at road, highway, or railroad crossings during boring operations. Roads where traffic can be detoured would be crossed via open cut.

Conventional Bore Method

The conventional bore method allows for trenchless construction across an area by excavating a pit on each side of the feature, placing boring equipment within the pits, boring a hole under the feature, and pulling a section of pipe through the hole. This method is used to avoid direct impacts on sensitive features or areas that otherwise present difficulties for standard pipeline construction.

7.2 Aboveground Facility Construction

The piping and compressor modifications at Tennessee's existing CS 321 to connect the station to the new 300-3 Loop would include the following modifications: the installation of ancillary piping and valves, a receiving trap, and an additional odorant facility. Most of the construction activities would be located within the existing fence line for this facility; however, the existing security fence would be expanded within the existing facility property boundaries to accommodate the installation of a new pig receiver and associated piping. Tennessee also intends to construct a new pig launcher at the beginning of the new 300-3 Loop and crossover and connecting facilities to the existing Tennessee 300 line.

During construction, the sites for the aboveground facilities would be cleared of vegetation and graded. Erosion control devices would be installed as needed to prevent erosion and off-site impacts in accordance with Tennessee's Plan and applicable permit requirements. Access to the aboveground facilities would be provided by existing public or private roads. After construction, all temporary workspaces would be revegetated in accordance with Tennessee's Plan. In addition, fencing would be replaced around compressor station facilities for security purposes.

8. PERMITS, APPROVALS, AND REGULATORY REQUIREMENTS

Tennessee would obtain all necessary federal, state, and local permits, licenses, and clearances related to construction of the proposed facilities. All relevant permits and approvals would be provided to the respective contractors who would be required to be familiar with and adhere to applicable requirements. See table A.8-1 for a list of the permits and approvals required for the Project.

Any non-federal permits or requirements would need to be consistent with the conditions of any Commission Certificate for the Project. The Commission encourages cooperation between interstate pipelines and local authorities. However, if such authorities prohibit or unnecessarily delay Tennessee from meeting its obligations under the Commission's Order (Order), their requirements would be preempted by the Certificate. Tennessee would be required to comply with all reasonable requirements of a state or local approval.

TABLE A.8-1

Federal, State, and Local Permits, Approvals, and Consultations

Permit/Approval	Issuing Agency	Project Status
FEDERAL		
Section 7(c) of the NGA, Certificate of Public Convenience and Necessity	FERC	Application filed on June 19, 2015
Consultations for Section 7 Endangered Species Act (ESA), and Bald and Golden Eagle Protection Act	FWS Pennsylvania Field Office	Consultation completed on June 1, 2015
Migratory Bird Treaty Act consultation	FWS Pennsylvania Field Office	Consultation completed on October 15, 2015
Section 404 of the Clean Water Act (CWA), Dredge and Fill Permit / Authorization	U.S. Army Corps of Engineers, Baltimore District	Application submitted June 19, 2015
STATE – PENNSYLVANIA		
Section 401 of the CWA, Water Quality Certification	PADEP, Regional Bureaus of Watershed Management	Application submitted June 19, 2015
Pennsylvania Code Title 25, Chapter 105 Water Obstruction and Encroachment Permits		
National Pollution Discharge Elimination System (NPDES) – Hydrostatic Test Water Discharge Permit	PADEP, Bureau of Point and Non-Point Source Management	Application approved March 10, 2016
Air Permit (CS 315) – Request for Determination of Changes of Minor Significance and Exception from Plan Approval	PADEP, Bureau of Air Quality	Determination received April 24, 2015
Erosion and Sediment Control General Permit for Earth Disturbance / NPDES-Stormwater authorization	PADEP, Bureau of Waterways	Application yet to be filed
Section 106 of the National Historic Preservation Act consultation	Pennsylvania Historic and Museum Commission, Bureau for Historic Preservation / State Historic Preservation Office	Consultation completed March 23, 2016
State-listed Threatened and Endangered Species Consultation	PADCNR	Consultation completed September 29, 2015
State-listed Threatened and Endangered Species Consultation	Pennsylvania Fish and Boat Commission (PAFBC)	Consultation completed September 18, 2015
State-listed Threatened and Endangered Species Consultation	Pennsylvania Game Commission (PGC)	Consultation completed October 8, 2015
Permit for in-stream blasting (if required)	PAFBC	Application yet to be filed
Highway Occupancy Permit	Pennsylvania Department of Transportation	Application t yet to be filed
LOCAL/COUNTY - PENNSYLVANIA		
Erosion and Sedimentation Control Plan review	Susquehanna County Conservation District	Application yet to be filed
Surface water withdrawal permit for hydrostatic testing and dust control.	Susquehanna River Basin Commission	Application yet to be filed
Township Road Use Permits	Lennox and Clifford Townships	Application yet to be filed

B. ENVIRONMENTAL ANALYSIS

Construction and operation of the Project would have temporary, short-term, long-term, and permanent impacts. As discussed throughout this EA, temporary impacts are defined as occurring only during the construction phase. Short-term impacts are defined as lasting up to three years. Long-term impacts would eventually recover, but require more than three years. Permanent impacts are defined as lasting throughout the life of the Project.

1. GEOLOGY AND SOILS

1.1 Geology

The proposed pipeline route would be located in northeastern Pennsylvania and intersect the Glaciated Low Plateau Section of the Appalachian Plateaus Province (PADCNR, 2015a). The Glaciated Low Plateaus consist of rounded hills and broad to narrow valleys. Much of the surficial geologic material is glacial till that was deposited mainly in the valley bottoms and margins. The Project is located entirely on the Devonian-aged Catskill Formation, which consists primarily of sedimentary strata including sandstone, siltstone, shale, and conglomerate (U.S. Geological Survey [USGS], 2015). Elevations in the project area range from approximately 860 to 1,570 feet above mean sea level. Topography in the project area ranges from nearly level to steep, with average slopes ranging from 0 to 30 percent (Natural Resources Conservation Service [NRCS] Soil Survey Staff, 2015a and 2015b).

1.1.1 Blasting

Based on an analysis of the U.S. Department of Agriculture NRCS Soil Survey Geographic Database, approximately 26 percent (1.8 miles) of the proposed pipeline route would cross areas with bedrock at depths of less than 60 inches (NRCS Soil Survey Staff, 2015a). All of this bedrock is considered lithic (i.e., hard) and may require blasting or other special construction techniques during installation of the proposed pipeline.

Tennessee submitted a blasting plan outlining measures that would be implemented in the event that blasting is required during project installation. These measures include:

- obtaining any required federal, state, and local blasting approvals;
- notifying nearby landowners prior to blasting activities;
- preparing a site-specific blasting plan for each area where blasting would be required;
- using a third-party blasting inspector to monitor blasting operations; and
- implementing other safety measures to ensure the protection of nearby structures, personnel working in proximity to blasting activities, and sensitive species and resources in the vicinity of the blasting area.

We have reviewed Tennessee's Blasting Plan and find it to be acceptable in areas of upland or non-wetland or non-waterbody areas. However, because Tennessee has not specified if blasting would occur in waterbodies or coldwater Fisheries, **we recommend that:**

- **Prior to construction, Tennessee should prepare a schedule identifying when trenching or blasting would occur within each waterbody greater than 10 feet wide, or within any coldwater fishery. Tennessee should file, with at least 14 days advance notice, the schedule with the Secretary of the Commission (Secretary) and revise it as necessary. Changes within this last 14-day period must provide for at least 48 hours advance notice.**

1.1.2 Mineral Resources

Based on a review of USGS topographic maps, recent aerial photography, and available federal and state databases, there are 19 active natural gas wells, 15 inactive natural gas wells or permits, and 3 active surface quarries within 0.5 mile of the project facilities (PADEP, 2015a, 2015b, 2015c).

No impacts on existing natural gas wells are anticipated as a result of project construction or operation. Based on distance from the active surface quarries, construction and operation of the Project would not affect the operations of these facilities.

1.1.3 Geologic Hazards

Geologic hazards are natural, physical conditions that can result in damage to land and structures or injury to people. Such hazards typically include seismicity (e.g., earthquakes, surface faults, and soil liquefaction), landslides, flooding, and land subsidence. Conditions necessary for the development of other geologic hazards, including regional subsidence, avalanches, and volcanism, are not present in the project area. In general, the potential for geologic hazards to significantly affect construction or operation of the project facilities is low.

Historically, seismicity in the project area has been very low. The Project does not cross any active faults (USGS, 2006b). Soil liquefaction is a phenomenon often associated with seismic activity in which saturated, non-cohesive soils temporarily lose their strength and liquefy when subjected to forces such as intense and prolonged ground shaking. Areas susceptible to liquefaction may include soils that are generally sandy or silty and are generally located along rivers, streams, lakes, and shorelines or in areas with shallow groundwater. Soil conditions necessary for liquefaction to occur are likely present in the project area. However, due to the low potential for a seismic event that would cause strong and prolonged ground shaking, the potential for soil liquefaction to occur is very low. In summary, the seismic hazard for the project area is low; therefore, impacts from seismic activity are not expected.

Landslides involve the downslope movement of earth materials under a force of gravity due to natural or man-made causes. The risk of landslides in the project area is "generally low, but includes local areas of high to moderate [risk]" (PADCNR, 2014). The steepest slopes along the project route, which would be the most prone to landslides, are from milepost (MP) 0.2 to 0.5 (10 to 30 percent slope); MP 3.6 to 3.9 (30 to 48 percent slope); and MP 5.3 to 5.5 (20 to 30 percent slope). Landslide hazards would be minimized by siting facilities to avoid loading of slopes to the extent practicable. Where this is not possible, Tennessee would implement measures to reduce the potential for slope failure and minimize impacts associated with erosion. The areas surrounding the remaining project facilities are categorized as having low landslide susceptibility. The potential for slope failure and erosion during construction would be adequately minimized by Tennessee implementing the measures in its Plan and Procedures.

The greatest potential for flash flooding to occur in the project area would be along waterbodies during or after a large storm event with significant precipitation over a short time period. These waterbodies include the Partners Creek (MP 2.3), Nine Partners Creek (MP 3.9), Tunkhannock Creek (MP 4.1), and the unnamed tributary to Nine Partners Creek (MP 5.9). According to the available Federal Emergency Management Agency flood insurance rate maps and the National Flood Hazard Layer data, none of these waterbody crossings are mapped as being in a 100-year flood zone (Federal Emergency Management Agency, 2014). Tennessee would restore all project areas to preconstruction contours. No post-construction impacts related to flooding are anticipated.

Land subsidence is the sinking or downward settling of the earth's surface and may be caused by dissolution of bedrock, subsurface mining, or pumping of oil. Karst terrain features such as sinkholes, caves, and caverns can form as a result of the long-term action of groundwater on soluble carbonate rocks (e.g., limestone and dolostone). None of the formations along the proposed pipeline route contains carbonate rocks; therefore, karst is not found in the project area (Weary and Doctor, 2014). There are no subsurface mining operations within 0.5 mile of the project facilities (PADEP, 2015a). Because the Project would not be located within 100-year flood zones or in areas containing carbonate rocks, we conclude that the risk of landslide and land subsidence hazards on the Project is low.

1.1.4 Paleontology

The project area is underlain by Paleozoic sedimentary rocks that have the potential to contain marine fossils. Although fossil specimens may be encountered during construction activities, no impacts on sensitive paleontological resources are anticipated during construction. If unique or significant fossil specimens are discovered during excavation activities, Tennessee would notify the PADCNR upon discovery.

The overall effect of the Project on topography and geology would be minor, and significant adverse effects on geological resources are not anticipated. Based on the low probability of localized earth movements or geological hazards in the vicinity of the Project, we also do not anticipate impacts attributable to such geological movements or hazards.

1.2 Soils

Construction activities that create soil disturbance, such as clearing, grading, trench excavation, backfilling, and the movement of construction equipment along the right-of-way, could result in temporary, minor impacts on soil resources. Soil characteristics could affect construction performance or increase the potential for adverse construction-related soil impacts. The most significant activities that have the potential to reduce soil quality are inadvertently mixing topsoil with subsoil, bringing excess rocks to the surface, compacting soil by heavy equipment, and disrupting surface and subsurface drainage patterns. Table B.1-1 summarizes the soil characteristics in the project area.

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. Approximately 44 percent of the soils that would be affected by construction are considered highly water erodible. None of the soils are highly susceptible to wind erosion.

TABLE B.1-1

Summary of Soil Characteristics in the Project Area (in acres)

Facility	Total Acres [a]	Prime Farmland [b]	Highly Erodible		Compaction Prone [e]	Revegetation Concerns [f]	Shallow Bedrock [g]	Rocky Soils [h]
			Water [c]	Wind [d]				
PIPELINE FACILITIES								
300-3 Loop	100.8	19.9	61.4	0.0	31.4	69.4	25.4	95.3
ATWS	17.7	6.3	9.4	0.0	4.7	13.0	1.3	16.2
ABOVEGROUND FACILITIES								
Odorant Facility	3.9	0.0	0.0	0.0	3.9	0.0	0.0	3.9
Upstream Tie-In Site	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1
Downstream Tie-In Site	4.1	0.0	1.4	0.0	3.5	0.6	0.0	4.1
ANCILLARY FACILITIES								
Temporary Access Roads	4.9	0.4	2.4	0.0	1.8	3.1	0.0	4.9
Permanent Access Roads	0.2	0.0	0.2	0.0	<0.1	0.2	0.0	0.2
Pipe/Contractor Yard	35.4	7.5	<0.1	0.0	27.7	7.8	0.0	35.4
Staging Area	1.8	1.9	0.0	0.0	0.0	1.9	0.0	1.1
Water Withdrawal Locations	1.6	0.0	0.1	0.0	1.6	0.0	0.0	1.6
PROJECT TOTAL	**170.5**	**36.0**	**75.0**	**0.0**	**74.6**	**96.1**	**26.7**	**162.8**

Sources: NRCS Soil Survey Staff, 2015a and 2015b

[a] Values within rows do not add up to the totals listed for each facility because soils may occur in more than one characteristic class or may not occur in any class listed in the table.

[b] As designated by the NRCS.

[c] Includes land in capability subclasses IVe through VIIe and soils with an average slope greater than or equal to 9 percent.

[d] Includes soils in wind erodibility groups 1 and 2.

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

[f] Includes coarse-textured soils (sandy loams and coarser) that are moderately well to excessively drained.

[g] Soils identified as containing bedrock within 60 inches of the soil surface. All bedrock identified is lithic and could require blasting.

[h] Soils with one or more horizons that have a cobbley, stony, bouldery, channery, flaggy, very gravelly, or extremely gravelly modifier to the textural class and/or contain greater than 5 percent by weight rocks larger than 3 inches.

Approximately 21 percent of the soils in the project area are considered prime farmland. The U.S. Department of Agriculture defines prime farmland as "land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, and oilseed crops" (NRCS Soil Survey Division Staff, 1993). This designation includes cultivated land, pasture, woodland, or other lands that are either used for food or fiber crops. Areas that are not currently used for agriculture can be designated as prime farmland if they are available for these uses in the future. Urbanized land and open water are excluded from prime farmland. Prime farmland typically contains few or no rocks, is permeable to water and air, is not excessively erodible or saturated with water for long periods, and is not subject to frequent, prolonged flooding during the growing season. Soils that do not meet the above criteria may be considered prime farmland if the limiting factor is mitigated (e.g., artificial drainage).

During construction, topsoil and subsoil would be disturbed during grading and trenching activities and the movement of heavy equipment. The potential mixing of topsoil with the subsoil from these activities could result in a loss of soil fertility, which could potentially affect soils, including residential and agricultural soils. To prevent mixing of the soil horizons, topsoil segregation would be performed in croplands, improved pastures, residential areas, non-saturated wetlands, and in areas requested by the landowner. In upland areas, Tennessee would strip topsoil from either the full work area or from the trench and subsoil storage area. In non-saturated wetlands, topsoil would only be segregated within the trench line. The topsoil would be segregated and replaced in the proper order during

backfilling and final grading. Implementation of proper topsoil segregation would help to ensure post-construction revegetation success, thereby minimizing loss of crop productivity and the potential for long-term erosion problems. Topsoil segregation would also minimize the introduction of subsoil rocks into agricultural topsoil, as further discussed below related to shallow bedrock and rocky soils. With the implementation of these measures, we conclude that impacts on prime farmland would be adequately minimized.

There is a potential for construction activities to introduce rock into topsoil during excavation in areas of shallow depth to bedrock. Tennessee would attempt to use mechanical methods such as a pneumatic ram, ripping, or conventional excavation to excavate through the bedrock, where possible. Rock excavated from the trench may be used to backfill the trench only to the top of the existing bedrock profile. Rock not returned to the trench would be considered construction debris and disposed of appropriately. Excess rock would be removed from at least the top 12 inches of soil in all residential areas, as well as other areas at the landowner's request, to ensure the rock in the area disturbed by construction is similar to adjacent undisturbed areas.

Construction equipment traveling over wet soils could disrupt the soil structure, reduce pore space, increase runoff potential, and cause rutting. The degree of compaction depends on the moisture content and soil texture. Fine-textured soils with poor internal drainage that are moist during construction are the most susceptible to compaction. Approximately 44 percent of the soils that would be affected by the Project are considered prone to compaction. Tennessee would minimize compaction and rutting impacts during construction in soft or saturated soils by using measures outlined in its Plan, Procedures, and E&SCP. Measures such as the use of low-ground-weight equipment and/or by temporary installation of timber equipment mats may be used when soil moisture is high. The topsoil and subsoil would be tested for compaction in all agricultural and residential areas disturbed by construction. Severely compacted agricultural areas would be mitigated with deep tillage operations during restoration activities using a paraplow or similar implement. In areas where topsoil segregation occurs, plowing with a paraplow or other deep tillage implement to alleviate subsoil compaction would be conducted before replacement of the topsoil. Soil compaction mitigation would also be performed in severely compacted residential areas.

The clearing and grading of soils with poor revegetation potential could result in a lack of adequate vegetation following construction and restoration of the right-of-way, which could lead to increased erosion, a reduction in wildlife habitat, and adverse visual impacts. Approximately 56 percent of the soils that would be affected by the Project are considered to have revegetation concerns. Tennessee would restore and revegetate according to its Plan, which includes specifications for applying soil amendments, working with local soil conservation authorities or other agencies to obtain seed mixture recommendations, and post-construction monitoring to ensure the effectiveness of revegetation and permanent erosion control devices during facility operation.

To minimize or prevent potential impacts due to soil erosion and sedimentation during construction, Tennessee would utilize the erosion and sedimentation controls outlined in its Plan, Procedures, and E&SCP. Erosion control devices would be maintained until the right-of-way is successfully revegetated. Temporary erosion controls, including slope breakers and sediment barriers (e.g., hay bales and silt fences), would be installed following initial ground disturbance to control runoff and prevent sediment transport off the construction right-of-way. Temporary erosion controls would be maintained until the project area is successfully revegetated. During construction, the effectiveness of these temporary erosion control devices would be monitored by Tennessee's EIs. Following successful revegetation of construction areas, temporary erosion control devices would be removed. Permanent erosion controls would be installed, as necessary, to ensure the successful restoration of the project area. The effectiveness of revegetation and permanent erosion control devices would be monitored by

operating personnel during the long-term operation and maintenance of the project facilities in accordance with the provisions in Tennessee's Plan. With the implementation of these measures, we conclude that impacts would be adequately minimized in areas with poor revegetation potential.

Contamination from spills or leaks of fuels, lubricants, and coolant from construction equipment could adversely affect soils. However, the impacts of such contamination are typically minor because of the low frequency and volumes of spills and leaks. Measures outlined in Tennessee's SPCC Plan would be implemented to reduce potential impacts on soils from spills of the hazardous materials used during construction. These measures include regularly inspecting equipment to ensure it is in good working order, properly training employees regarding the handling of fuels and other hazardous materials, and promptly reporting any spills to the appropriate agencies. We have reviewed Tennessee's SPCC Plan and find it acceptable.

Implementation of the measures outlined in Tennessee's Plan, Procedures, and E&SCP would minimize soil impacts and ensure effective revegetation of disturbed areas. Further, Tennessee would implement its SPCC Plan to reduce the potential impacts on soils from spills of hazardous materials used during construction and manage contaminated soils should they be encountered. Given the impact minimization and mitigation measures described above, we conclude that soils would not be significantly affected by project construction and operation.

2. WATER RESOURCES AND WETLANDS

2.1 Groundwater Resources

The Project would cross the Upper Susquehanna Watershed (USGS, 2014). The project facilities are generally underlain by surficial aquifers consisting of glacial outwash and stream-valley alluvium. Wells in these aquifers are typically shallow and used for residential or limited agricultural uses (USGS, 1997). No U.S. Environmental Protection Agency (EPA) Sole Source Aquifers (aquifers that supply at least 50 percent of the drinking water consumed in an area) were identified within the project area. The nearest sole source aquifers are the Delaware River Streamflow Zone associated with the New Jersey Coastal Plains Sole Source Aquifer, located approximately 18 miles northeast of the project area, and the Clinton Street-Ballpark Valley Sole Source Aquifer, located approximately 19 miles north of the project area (EPA, 2016).

Water supply wells within the vicinity of the Project were identified based on field surveys and a review of data provided by Pennsylvania agencies and databases. A total of 18 wells were identified within 200 feet of the project workspaces and are identified in table B.2-1. Tennessee would offer pre- and post-construction well water testing on all wells within 150 feet of the proposed pipeline construction workspace to document water quality and flow and to establish a baseline for comparison in the event of inadvertent construction impacts. In addition, all wells within 200 feet of any required blasting activities would be monitored by a third-party blasting monitor. If testing were to reveal that impacts on nearby wells occurred as a result of construction, then Tennessee would provide an alternate source of water and/or other appropriate compensation to the landowner.

Construction activities are not likely to result in significant impacts on groundwater resources because the majority of construction would involve shallow, temporary, and localized excavation. Trench excavation could intersect the water table in low-lying areas where groundwater is near the surface (e.g., wetlands), but, in general, the depth to groundwater would be below the excavated trench. Groundwater resources could also be temporarily affected due to changes in overland water flow and recharge caused by clearing and grading of the project right-of-way. In addition, near-surface soil compaction caused by heavy construction vehicles could reduce the soil's ability to absorb water in these isolated areas. During

construction, local water table elevations could be affected by trenching and backfilling, which could temporarily impact wells near the construction area. Tennessee has stated they may use groundwater as a hydrostatic test water source, which would also temporarily impact local groundwater resources. All measures contained in required local and/or state permits would be followed if this is necessary. In these instances where trench dewatering would be required or where groundwater would be used as a hydrostatic test water source, all trench water and/or hydrostatic test water would be discharged into well-vegetated upland areas to allow the water to infiltrate back into the ground, in compliance with all relevant permits, thereby minimizing any long-term impacts on the water table.

TABLE B.2-1

Private Water Supply Wells Within 200 Feet of the Proposed Facilities

Facility	Milepost	Township	Approximate Distance (feet) from Centerline	Approximate Distance (feet) from Construction Work Area	Well Type
PIPELINE FACILITIES					
300-3 Loop	0.2	Lenox	601	167	Domestic
	0.2	Lenox	662	159	Domestic
	0.2	Lenox	15	0	Domestic
	1.1	Lenox	121	7	Domestic
	1.3	Lenox	240	140	Domestic
	2.7	Lenox	73	0	Commercial
	2.8	Lenox	130	96	Commercial
	2.8	Lenox	140	121	Institutional
	2.8	Lenox	75	39	Commercial
	3.0	Lenox	270	0	Commercial
	3.0	Lenox	460	140	Domestic
	4.8	Lenox	172	92	Domestic
	4.8	Lenox	489	140	Domestic
	6.2	Clifford	159	96	Domestic
	6.2	Clifford	117	52	Domestic
ABOVEGROUND FACILITIES					
Odorant Facility	N/A	Clifford	914	70	Tennessee-Private/Industrial
ACCESS ROADS					
TAR 2 [a]	N/A	Lenox	238	166	Commercial
	N/A	Lenox	480	154	Commercial

[a] TAR = temporary access road

The disturbance of soils along the trench line would offer a preferential path for groundwater movement, resulting in changes to permanent flow patterns. However, in accordance with Tennessee's Procedures, permanent trench plugs would be installed at regular intervals within the trench to deter groundwater movement along the trench line.

The direct and indirect impacts described above would be temporary and would not significantly affect groundwater resources. Impacts would be avoided or minimized by the use of construction techniques contained in Tennessee's Plan and Procedures (e.g., temporary and permanent trench plugs), which incorporate the measures in the Commission's Plan. Upon completion of construction, Tennessee would restore the ground surface as closely as practicable to original contours and revegetate the right-of-way to facilitate restoration of preconstruction overland flow and recharge patterns.

Regulatory databases were reviewed to identify known hazardous waste sites that could interfere with the construction of the Project. Disturbance of contaminated soils could release and expose hazardous chemicals bound within the soil that could then reach surface waterbodies and/or groundwater. A database review did not identify any known hazardous waste sites, hazardous waste spills, or petroleum/chemical storage sites within 0.25 mile of the Project. We also reviewed PADEP's Regulated Storage Tank Cleanup Incidents database, which includes leaking petroleum storage tanks. No regulated storage tank cleanup sites were identified within 0.25 mile of the Project (PADEP, 2015d). Therefore, the Project is not likely to disturb contaminated sediments or encounter contaminated groundwater.

Inadvertent surface spills of hazardous materials used during construction could contaminate shallow groundwater. To minimize the potential impacts associated with inadvertent spills, Tennessee has prepared an acceptable SPCC Plan. The plan includes measures designed to prevent hazardous materials from reaching groundwater, such as scheduled equipment and vehicle inspections to identify leaks, storing fuels within secondary containment structures, and refueling at least 100 feet away from waterbodies and wells. In the event that a spill should occur, the plans identify appropriate actions that would be taken to remediate and clean up the spill.

Based on Tennessee's proposed construction techniques and the implementation of minimization and mitigation measures, we conclude that construction and operation of the Project would not significantly impact groundwater resources proximate to the project area.

2.2 Surface Water Resources

The Project would cross a total of 14 waterbodies. Of the 14 waterbodies crossed by the Project, 4 are perennial, 9 are intermittent, and 1 is an open water pond. One additional perennial stream crosses under an access road (temporary access road [TAR] 5) through an existing culvert. Because the stream would not be disturbed by the Project and no modifications to the road are proposed at this crossing, this waterbody is not included as an affected waterbody. No waterbodies would be disturbed for the construction of any aboveground facilities. Table B.2-2 provides details regarding the waterbodies crossed by the Project, water quality designations, and potential project impacts.

Tennessee would cross all waterbodies using a dry crossing method, an open cut (when flow is not perceptible as described in section A.7.1.7), or a temporary road crossing only. Dry waterbody crossing methods are further described in section A.7.1.7. Tennessee would use clean gravel or native cobbles for the upper 1 foot of trench backfill in all waterbodies classified as coldwater fisheries, which are all the streams crossed by the 300-3 Loop. In accordance with Tennessee's Procedures, the streambanks would be reestablished to preconstruction contours and stabilized with an erosion control fabric or similar product. 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, and stream banks would be seeded with an approved seed mixture. A vegetated buffer at least 25 feet wide adjacent to waterbodies would be revegetated to preconstruction conditions over the entire width of the right-of-way, except for a 10-foot-wide strip centered over the pipeline that may be periodically mowed and maintained in an herbaceous state so that shrubs and trees cannot reestablish themselves. In addition, trees would not be allowed to grow within 15 feet of the pipeline.

Tennessee would also monitor the progress of restoration at these crossings for 3 years or until restoration is successful, and would take additional restoration measures if necessary. Riparian cover on affected stream banks would be expected to recover over several months to several years. Erosion controls would be maintained and monitored throughout restoration and removed once restoration is deemed successful.

TABLE B.2-2

Waterbody Crossings

Waterbody ID	Waterbody Name	Location (Milepost/ Access Road)	Waterbody Type	Bank-to-Bank Crossing Width (feet)	Linear Distance of Waterbody Crossing (feet)	Area of Stream Crossing Within Construction Workspace (ft^2)	State Water Quality Classification [a]	Construction Crossing Method [b]
300-3 LOOP								
K-1Sa	Unnamed Tributary (UNT) to Tower Branch	0.69	Intermittent	12	140	1,680	CWF, MF	Temporary Road Crossing Only
K-1Sc	UNT to Tower Branch	0.79	Intermittent	12	94	1,128	CWF, MF	Dry
K-1Sf	UNT to Tower Branch	0.81	Intermittent	12	30	360	CWF, MF	Temporary Road Crossing Only
N-1S	Partners Creek	1.27	Perennial	24	138	3,312	CWF, MF	Dry
X-1S	Sterling Brook	1.75	Intermittent	10	144	1,440	CWF, MF	Dry
V-1S	Nine Partners Creek	2.82	Perennial	53	125	6,625	CWF, MF	Open Cut
U-1S	Tunkhannock Creek	3.01	Perennial	65	146	9,490	CWF, MF	Open Cut
T-1Sb	UNT to Tunkhannock Creek	3.55	Intermittent	5	130	650	CWF, MF	Dry
T-1Sa	UNT to Tunkhannock Creek	3.62	Intermittent	7	132	924	CWF, MF	Dry
S-1S	UNT to Tunkhannock Creek	3.73	Intermittent	3	63	189	CWF, MF	Dry
H-1S	UNT to Tunkhannock Creek	4.75	Perennial	20	83	1,660	CWF, MF	Open Cut
D-OW	Mud Pond	5.62	Open Water	190	45	8,550	CWF, MF	Open Cut
E-1S	UNT to Lake Idlewild	6.44	Intermittent	8	142	1,136	CWF, MF	Dry
C-1S	UNT to Lake Idlewild	6.79	Intermittent	6	99	594	CWF, MF	Dry
Compressor Station 321								
-	-	-	-	-	-	-	-	-
PIPE YARD								
-	-	-	-	-	-	-	-	-
ACCESS ROADS								
TAR 5	UNT to Tunkhannock Creek	NA	Perennial	10	NA	NA	CWF, MF	Existing Culvert

[a] Pennsylvania Code, Chapter 93, Designated Water Uses and Water Quality Criteria. CWF = Coldwater Fishery; MF = Migratory Fishes.

[b] Streams with no perceptible flow at the time of crossing would be crossed using an open cut crossing method. Dry crossings (dam and pump or flume crossings) would be used for streams with perceptible flow at the time of crossing, unless otherwise authorized by applicable regulatory agencies.

Tennessee has indicated that the Pennsylvania Fish and Boat Commission (PAFBC) has requested to restrict instream work in designated trout waters during the following time windows except as required to install or remove equipment bridges:

1. Natural Reproducing Wild Trout Streams – January 1 through September 30; and

2. Trout Stocked Fisheries and Approved Trout Waters (ATW) – June 16 through February 28.

Because these time windows differ from the time windows required section V.B.1 of the Commission's Procedures, we require evidence of the state agency's approval for the proposed time windows conflicts. Section V.B.1 a. in the Commission's Procedures requires that instream work occur in coldwater fisheries between June 1 and September 30. Because we have not yet received the PADEP Chapter 105 Water Obstruction and Encroachment Permit for the Project, and this permit would not be issued until after the EA is issued, we are unable to verify these PAFBC recommended instream work windows. To ensure that these resources are crossed in accordance with appropriate permitting window requirements, **we recommend that:**

- **Prior to construction, Tennessee should file with the Secretary a copy of the final PADEP Chapter 105 Water Obstruction and Encroachment Permit for the Project documenting the instream work windows for the following waterbodies: Partners Creek, Sterling Brook, Nine Partners Creek, Tunkhannock Creek and its tributaries, Mud Pond, unnamed tributaries to Tower Branch, and tributaries to Lake Idlewild, as requested by the PAFBC, and incorporate the appropriate time windows into its final construction plans.**

Impacts on surface water resources from project construction would depend on a number of factors including the size of the waterbody, flow at the time of crossing, duration, and streambed composition. The greatest potential impacts would likely result from an increase in sediment loading and turbidity. Given the dry crossings proposed, these impacts would primarily result from clearing and grading of stream banks, trench dewatering, installation of flume pipes or construction of dams, the loosening of the streambed soil from trenching and subsequent backfilling, as well as silt-laden runoff from the general right-of-way.

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 reestablished. We conclude that if completed in accordance with the construction and restoration methods described above and in Tennessee's Plan, Procedures, and E&SCP, the impacts on waterbodies would be minor and temporary.

We received comments from a landowner within the project right-of-way who expressed concerns regarding existing erosion near the proposed crossing of Partners Creek. Tennessee prepared a site-specific crossing plan for this waterbody as part of its Section 401/404 permit application submitted to the USACE and PADEP. After consulting with the Township of Lenox, Tennessee reports that the existing streambank erosion (downstream of the existing pipeline crossing of Partners Creek) cited by the landowner is not a result of Tennessee's actions. We have reviewed the site-specific plan for this waterbody crossing and find it acceptable. The implementation of this plan, along with the appropriate erosion control devices, would provide adequate protection for Partners Creek.

We also received comments from the Allegheny Defense Project with concerns regarding construction impacts on waterbodies and wetlands associated with Tennessee's 300 Line Project and request that the EA disclose the direct project effects on waterbodies and wetlands. Sections B.2.2 and B.2.4 present the potential temporary and permanent impacts on waterbodies and wetlands associated with project construction and operation. We have further identified permits that would be required for project construction and operation, as well as plans that would be implemented by Tennessee to mitigate potential temporary and permanent impacts.

2.3 Hydrostatic Test Water

Hydrostatic testing is a process in which a pipeline is tested for leaks using a pressurized medium, such as water, which ensures the integrity of facilities and pipeline. The process is generally carried out after backfilling, and after completion of other construction activities. Tennessee would be required to hydrostatically test all pipe in accordance with USDOT pipeline safety regulations. A hydrostatic test involves filling the lowered-in pipeline with water and pressurizing the pipeline above its maximum allowable operating pressure. The pressure in the pipeline is then monitored for several hours. If a drop in pressure is recorded, Tennessee would examine the pipeline to determine if any leaks have occurred. After each test, the hydrostatic test water would be discharged into well-vegetated upland areas using an energy dissipation device to reduce impacts on soil erosion in accordance with Tennessee's Procedures. Tennessee would obtain water for hydrostatic testing from either an offsite surface water location (listed in table B.2-3 below), a municipal water source, or groundwater, and truck the water to the test site location. As indicated in Tennessee's Procedures, prior to water withdrawal, Tennessee would notify appropriate state agencies at least 48 hours prior to testing, inspect all pipeline welds prior to hydrostatic testing, and locate test manifolds outside of wetland and riparian areas where practicable. During testing, Tennessee would screen intake hoses to prevent fish entrainment, maintain adequate flow rates, keep pumps at least 100 feet from any wetland or waterbody, and implement secondary containment and refueling per Tennessee's SPCC plan. Tennessee has identified four locations in upland areas as its discharge locations.

TABLE B.2-3

Hydrostatic Test Water Volumes and Sources

Pipe Test Section	Source [a]	Volume of Water (gallons)	Discharge Location (milepost)
300-3 LOOP			
0.00–1.12	Surface, Municipal, and/or Groundwater	296,000	0.00
1.12–2.37	Surface, Municipal, and/or Groundwater	329,000	3.14
2.37–2.93	Surface, Municipal, and/or Groundwater	148,000	
2.93–4.22	Surface, Municipal, and/or Groundwater	342,000	4.24
4.22–6.95	Surface, Municipal, and/or Groundwater	723,000	6.95
TOTAL		**1,838,000**	

[a] Potential surface water sources include: Southwestern Energy Production Company's Water Retention Basin, Mud Pond, Round Pond, Tunkhannock Creek, municipal sources, groundwater wells, and Water Withdrawal Locations No. 1 (agricultural pond north of MP 0.3) and No. 2 (agricultural pond south of MP 5.7). If it is determined that flow rate in the waterbody is inadequate for water withdrawal, an alternate source location with adequate flow rates or municipal sources would be used.

Table B.2.3 identifies the hydrostatic test segments, volumes of water that would be needed for each hydrostatic test, and discharge locations. As stated earlier, Tennessee would obtain all applicable permits for the withdrawal and discharge of any hydrostatic test water. In addition, necessary approvals would be obtained from the Susquehanna River Basin Commission, which regulates withdrawals of

100,000 gallons per day or more within the Susquehanna River Basin. Tennessee does not anticipate the use of any additives, but should additives be required, Tennessee would submit details to FERC for review and approval of any chemicals proposed for use. Given that Tennessee would discharge to uplands and adhere to all permit requirements, such as the use of erosion control measures, impacts on waterbodies are expected to be temporary and minor.

2.4 Wetlands

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. 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.

Tennessee conducted field delineation surveys to determine the presence of wetlands within project workspaces. The surveys determined that 13 wetlands would be located in the project workspace for the 300-3 Loop Pipeline. Table B.2-4 provides a summary of wetlands crossed by the pipeline. No wetlands would be impacted by ancillary facilities including access roads, the pipe yards, or the odorant facility.

Tennessee plans to reduce the width of the construction right-of-way at all wetland crossings to no greater than 75 feet wide. Construction of the 300-3 Loop would affect a total of 1.30 acres of wetlands (1.07 acres of palustrine emergent wetland [PEM], 0.16 acre of palustrine scrub-shrub wetland [PSS], and 0.07 acre of palustrine forested wetland [PFO]), of which 0.57 acre of impacts (0.37 acre of PEM, 0.14 acre of PSS, and 0.06 acre of PFO) would occur within the temporary workspace proposed during construction. Wetlands within the temporary workspace would be allowed to return to their preconstruction condition following restoration. Approximately 0.02 acre of PSS wetlands and 0.01 acre of PFO wetlands within the new proposed permanent right-of-way would be converted to emergent wetland following construction. An additional 0.70 acre of PEM wetlands fall within the permanent right-of-way; however, these wetlands would return to their original wetland type following restoration. See table B.2-4 for a breakdown of wetland and impact types for wetlands crossed by the pipeline.

Tennessee would construct pipeline segments through wetlands in accordance with its Procedures and state and federal permit requirements. If wetland soils are non-saturated at the time of construction and able to support construction equipment, Tennessee would use standard pipeline construction techniques. If soils are saturated, Tennessee would construct a temporary travel lane to support equipment that would be fully removed following construction. To preserve natural seed stock and increase revegetation potential, Tennessee would segregate up to 12 inches of topsoil during trenching and return it to the trench during backfilling after replacing the subsoil. Erosion controls consisting of silt fence and/or stacked hay bales would be installed at wetland boundaries to prevent sedimentation from adjacent upland areas.

The primary impacts of project construction on wetlands would be the alteration of wetland vegetation due to clearing, and the mixing of topsoil and subsoil from rutting, excavation, and compaction. Construction could also impact water quality within the wetland due to sediment loading or inadvertent spills of fuel or chemicals. In general, Tennessee would minimize wetland impacts by colocating the proposed loop with its existing 300 Line and by implementing the measures outlined in its Procedures and SPCC Plan. Because the construction right-of-way would overlap a portion of the existing permanent right-of-way, the new permanent right-of-way requirements are minimized.

TABLE B.2-4

Wetlands Crossed by the Project

Wetland ID	Beginning Milepost	Ending Milepost	Centerline Crossing Length (feet)	Wetland Type [a]	Temporary Construction Workspace Impact (acres) [b]	Permanent Impact (acres)		Total Construction Workspace Impacts (acres) [e]
						New and Existing Permanent Right-of-Way for Project Operations [c]	10-Foot Mowed and Maintained Area Within Right-of-Way [d]	
300-3 LOOP								
K-1W	0.76	0.81	(22/0)[f]	PEM/ PFO	(0 PEM/0.03 PFO) 0.03	(0.02 PEM/0.01 PFO) 0.03	(<0.01 PEM/0 PFO) <0.01	(0.02 PEM/0.04 PFO) 0.06
M-1W	1.06	1.07	49	PEM	0.14	0.05	0.01	0.19
X-1W	1.74	1.77	0	PEM/ PFO	(0.03 PEM/0.03 PFO) 0.06	(<0.01 PEM/0 PFO) <0.01	(0 PEM/0 PFO) 0	(0.03 PEM/0.03 PFO) 0.06
S-1W	3.72	3.72	0	PEM	0.01	0	0	0.01
Q-1W	3.80	3.82	199	PEM	0.08	0.12	0.02	0.20
R-1W	3.84	3.85	0	PEM	0	0.01	0	0.01
P-1W	4.02	4.03	100	PEM	0.02	0.06	0.01	0.08
O-1W	4.04	4.05	117	PEM	0	0.06	0.01	0.06
I-1W	4.66	4.66	0	PEM	0	0.01	0	0.01
H-1W	4.74	4.77	146	PEM	0.01	0.08	0.02	0.09
E-1W	6.44	6.45	0	PSS	0.02	0	0	0.02
F-1W	6.46	6.47	0	PEM	0.06	0.01	0	0.07
C-1W	6.78	6.83	(261/0)	PEM/ PSS	(0.02 PEM/0.12 PSS) 0.14	(0.28 PEM/0.02 PSS) 0.30	(0.06 PEM/0 PSS) 0.06	(0.30 PEM/0.14 PSS) 0.44
CS 321 (ODORANT FACILITY)								
-	-	-	-	-	-	-	-	-
PIPE YARDS								
-	-	-	-	-	-	-		-
ACCESS ROADS								
-	-	-	-	-	-	-	-	-
TOTAL	**-**	**-**	**894**	**-**	(0.37 PEM/0.14 PSS/ 0.06 PFO) **0.57**	(0.70 PEM/ 0.02 PSS/0.01PFO) **0.73**	(0.13 PEM/0 PSS/ 0 PFO) **0.13**	(1.07 PEM/0.16 PSS/ 0.07 PFO) **1.30**

[a] Cowardin classification wetland types: PEM = Palustrine Emergent; PSS = Palustrine Scrub-Shrub; PFO = Palustrine Forested

[b] Temporary construction workspace consists of a varying width temporary easement (from 0 to 45 feet wide) within the construction right-of-way. No wetlands are located in proposed ATWS areas.

[c] Permanent impacts for *New Operations Right-of-Way* consist of an additional 25-foot-wide new permanent easement for Line 300-3 and the adjacent existing 300 Line permanent easement for Lines 300-1 and 300-2. Construction workspace for the Project would overlap for varying widths with the existing permanent right-of-way easement. Includes conversion impacts associated with maintenance of the right-of-way.

[d] Acreage for "10-Foot Mowed and Maintained Area Within Right-of-Way" is included in the previous column as part of the acreage for "New and Existing Permanent Right-of-Way for Project Operations."

[e] Construction workspace consists of the temporary construction workspace, existing permanent easement, and new permanent easement for Line 300-3.

[f] Wetland type and size are based on field survey determination. Information is broken down by wetland type within parentheses, while numbers outside of parentheses indicate the total of all wetland types for a given wetland.

The Commission's Procedures requires that all ATWS must be set back at least 50 feet from wetlands and that construction right-of-way be reduced to 75 feet in wetlands unless conditions warrant modification of these requirements and the applicant provides site-specific justification for why they cannot be met (see the Commission's Procedures sections VI.A and VI.B). Tennessee has identified three wetland crossings that would require the use of ATWS within 50 feet of the wetland boundary, and one wetland crossing that would require a construction right-of-way width greater than 75 feet. The location of these areas and site-specific justifications are provided in table A.5-2.

In addition to the placement of ATWS within 50 feet of the wetlands Q-1W, I-1W, and W-1a and expanded construction right-of-way width for the wetland M-1W crossing, Tennessee has requested two additional modifications to the Commission's Procedures regarding wetlands (see the Commission's Procedures section VI.C):

1. Permanent slope breakers may not be installed at wetland boundaries if the permanent slope breakers may alter the wetland characteristics. Tennessee would use temporary slope breakers (straw/hay bales) at wetland boundaries until restoration is complete.

2. Tennessee would restore wetlands using seed and mulch as required by Pennsylvania agencies or as recommended by the County Conservation District Offices.

We have reviewed these measures and find that they are consistent with the Commission's Procedures without modification. The alternate measures identified in table A.5-2 are consistent with the intent of the Commission's Procedures. We conclude that the alternate measures would provide an equal level of protection of wetlands during construction and result in a sufficient level of restoration success.

Impacts on wetlands would be greatest during and immediately following construction. Most of these effects would be short term in nature and would diminish as wetland functionality recovers and eventually reaches preconstruction conditions. Wetlands affected within the temporary workspace would be allowed to revert to preconstruction conditions following completion of construction. Vegetation within emergent wetlands would regenerate quickly (typically within 1 to 3 years). Because these areas are naturally open and herbaceous, there would be little to no permanent impacts on emergent wetlands. Impacts on scrub-shrub and forested wetlands would last longer than those on emergent wetlands. Woody vegetation may take several years to regenerate to its original density. Furthermore, annual mowing and maintenance of a 10-foot-wide herbaceous strip centered over the pipeline and removal of trees taller than 15 feet within 15 feet of the pipeline centerline would result in a long-term, permanent impact by converting previously forested wetland areas to emergent wetland areas.

Tennessee is currently working with PADEP and the U.S. Army Corps of Engineers to develop an appropriate mitigation plan to offset the permanent (including long-term restoration) conversion impacts on scrub-shrub and forested wetlands. Tennessee has proposed to offset the permanent conversion impacts on scrub-shrub and forested wetlands with the purchase of wetland mitigation credits at the Seeley Creek Restoration Site, but the final mitigation plan will be determined by the U.S. Army Corps of Engineers.

Although construction would result in permanent conversion of wetland habitats, Tennessee would minimize these impacts by locating the construction right-of-way to overlap a portion of its existing 300 Line permanent right-of-way. Furthermore, the location of the construction right-of-way would limit the temporary impact on forested and scrub-shrub wetlands to 0.23 acre, of which 0.03 acre of forested and scrub-shrub wetlands would be permanently converted to emergent wetlands. Based on the mitigation and restoration measures proposed by Tennessee, we conclude that wetland impacts

associated with the construction and operation of the Project would be sufficiently minimized and do not represent a significant impact on these resources.

3. VEGETATION, WILDLIFE, AND FISHERIES

3.1 Vegetation

The project area consists of upland forests, agricultural lands, open lands, and developed lands. Typical forest communities within the project area include upland forests of deciduous, coniferous, or mixed deciduous and coniferous species; immature hardwood, coniferous, and mixed forests; sapling-shrub communities; and shrub communities. Deciduous forests include hardwoods such as American beech, red maple, sugar maple, and wild black cherry. Conifer species found within the project area typically include eastern hemlock and eastern white pine. Shrubs include rosebay, witch-hazel, moosewood, and viburnums. Herbaceous layers encountered within the project area are typically sparse and can include Canada mayflower, starflower, New York fern, fancy fern, shining clubmoss, teaberry, wild sarsaparilla, and Indian cucumber-root. Agricultural lands include areas used for raising crops, grazing livestock, and tree farms. Open lands are typically previously disturbed lands that have been cleared for farming, utility construction, or other developments and then abandoned, and include grasslands, successional old fields and shrub lands, and maintained utility rights-of-way. Developed areas consist of roads, railroads, parking lots, residential lawns, and commercial lawns. Generally, vegetation associated with these areas consists of mowed and maintained grasses and forbs.

No specific vegetation types of special concern were identified by Tennessee or state and federal agencies that would be affected by the Project. However, the proposed 300-3 Loop would cross Mud Pond, a designated Core Habitat area, and is in the vicinity of four other Core Habitat areas: Tunkhannock Creek Woodland, Robinson Lake, Hartley Pond, and Tea Pond Core Habitat Areas. The proposed Project would cross the supporting landscapes of both Tunkhannock Creek Woodland and Robinson Lake Core Habitat Areas. According to the Pennsylvania Natural Heritage Program, Core Habitats are areas containing plant or animal species of concern at the state or federal levels, exemplary natural communities, or exceptional native diversity. Core Habitats delineate essential habitat that cannot absorb significant levels of activity without substantial impact to the elements of concern. Tennessee consulted with federal and state agencies with jurisdiction over protected plants, animals, and habitats as part of the project-specific Pennsylvania Natural Diversity Index (PNDI) review. State and federal agencies provided specific comments for protection of species, as described in section B.3.3. We determine that in reviewing Tennessee's Plans, Procedures, Migratory Bird Impact Assessment and Conservation Plan, and E&SCP, and additional FWS Pennsylvania Field Office recommendations outlined in section B.3.2.1, no significant effect on the Core Habitat areas would be anticipated.

Noxious weeds are a concern along the proposed 300-3 Loop due to the potential for spreading as a result of soil disturbances associated with construction activities. In addition, noxious weeds can out-compete native vegetation and change the composition of native vegetation communities. Tennessee would implement its *Noxious and Invasive Weed Control Plan* to minimize the potential for the establishment and spread of noxious weeds during and after construction. Per Tennessee's *Noxious and Invasive Weed Control Plan*, Tennessee's EI would identify and flag areas of concern while in the field to alert construction personnel and prevent access into areas until noxious and/or invasive weed management control measures have been implemented. Measures required by the *Noxious and Invasive Weed Control Plan* include contractors ensuring that work vehicles arrive at the site clean and weed-free, and using compressed air or other means to remove soil and propagules from machinery and vehicles to prevent their transport to other sections of the right-of-way. We have reviewed this plan and find it acceptable.

After construction is complete, the rights-of-way for the 300-3 Loop and all temporary work areas would be revegetated according to Tennessee's Plan and E&SCP. Land disturbance associated with the 300-3 Loop would occur primarily in open land. Land disturbance associated with aboveground facilities for the Project would primarily occur within existing industrial areas. After construction, Tennessee would revegetate all temporary work areas in accordance with its Plan, and all other areas would be maintained in permanent operational use. Land outside the permanent easement would be permitted to revegetate naturally, which would be a short-term impact on open land (3 to 12 months to reach preconstruction densities) and a long-term impact on forested areas (30 to 50 years to reach preconstruction densities).

As outlined in section B.4, the total acreage affected by the proposed pipeline, ATWS, staging areas, pipe yards, aboveground ancillary facilities, and access roads is 170.5 acres, with 126.8 acres of temporary disturbance and 43.7 acres associated with the new and existing permanent right-of-way. The project footprint is expected to result in 65.7 acres of impact (39 percent of the total footprint) to agricultural lands, 44.2 acres of impact (26 percent of the total project footprint) to open lands, and 42.2 acres of impact (25 percent of the total project footprint) to forested lands. The remaining areas affected by project construction would be to developed areas (industrial, commercial, residential lands, and roadways) and open water.

Of the 65.7 acres of impacts on agricultural land, approximately 57.3 acres would be associated with temporary construction workspace. However, once restoration is complete, these acres would be available for continued use as agricultural lands (see section B.1.2 for further information regarding soil restoration in agricultural areas). With the implementation of measures outlined in Tennessee's Procedures, and given that the agricultural land in the temporary and permanent right-of-way would be available for agricultural use following project restoration, we conclude that impacts on agricultural vegetation would be sufficiently minimized.

Of the 42.2 acres of impacts on forested lands, 31.2 acres would be temporary impacts during construction, and the remaining 11.0 acres of impacts on forest lands would be associated with the permanent right-of-way. Forest impacts would be considered long term, as the clearing of mature, woody vegetation would result in the greatest degree of change in terms of vegetation strata, appearance, and habitat. The reestablishment of native woody vegetation within forested areas would be encouraged in the temporary impact areas to limit the amount of long-term impacts; however, natural restoration of preconstruction forest densities is expected to take 30 to 50 years. To mitigate impacts on forests, the Project is colocated within the existing maintained right-of-way of Tennessee's 300 Line, shifting the edge effect of the new maintained right-of-way associated with the Project, avoiding additional habitat fragmentation.

The staging areas and temporary workspaces would eventually revegetate to their preconstruction condition. Given that much of the proposed project route for the 300-3 Loop is collocated within Tennessee's existing right-of-way, impacts on forested vegetation would be minimized to the extent possible. In addition, the majority of the proposed aboveground facilities are located adjacent to existing aboveground facilities, primarily in developed areas, with minimal impacts (less than 1.0 acre) on agricultural, open land, and forest areas. For this reason and the reasons listed above, we conclude that the proposed Project would not have a significant impact on vegetation.

3.2 Wildlife

The project area consists of upland forests, open lands, agricultural lands, developed lands, and wetlands. Common wildlife and habitat types found in the project area are presented in table 1 of appendix B. Potential impacts on wildlife include habitat removal and construction-related ground

disturbance and noise. Some individual animals may be inadvertently injured or killed by construction equipment. However, more mobile species such as birds and mammals would likely relocate to other nearby suitable habitat to avoid the project area once construction activities commence. The temporary disturbance of local habitat is not expected to have population-level effects on wildlife because the amount of habitat crossed represents only a small portion of the habitat available to wildlife throughout the project area, much of which would return to preconstruction use. The widening of cleared areas within forested habitat could affect species that are intolerant of edge habitat, such as interior-dwelling bird species. However, long-term impacts from habitat alteration would be further minimized by the implementation of the mitigation measures contained in Tennessee's Plan, which would ensure revegetation of most areas disturbed by construction. After construction, wildlife is expected to return and colonize post-construction habitats. Therefore, we conclude that the Project would not have a significant impact on wildlife or their habitat in the project area.

3.2.1 Migratory Birds

Migratory birds are species that nest in the United States and Canada during the summer and then migrate to and from the tropical regions of Mexico, Central and South America, and the Caribbean for the non-breeding season. Migratory birds are protected under the Migratory Bird Treaty Act (MBTA) (16 U.S. Code [USC] 703–711), and bald and golden eagles are additionally protected under the Bald and Golden Eagle Act (16 USC 668–668d). The MBTA, as amended, prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests. Executive Order 13186 (66 Federal Register 3853) was enacted in 2001 to, among other things, ensure that environmental analyses of federal actions evaluate the impacts of actions on migratory birds. Executive Order 13186 directs federal agencies to identify where unintentional take is likely to have a measurable negative effect on migratory bird populations; avoid or minimize adverse impacts on migratory birds through enhanced collaboration with the FWS; emphasize species of concern, priority habitats, and key risk factors; and give particular focus to population-level impacts.

On March 30, 2011, the FWS and the Commission entered into a Memorandum of Understanding between FERC and the FWS Regarding Implementation of Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds," which focuses on avoiding or minimizing adverse impacts on migratory birds and strengthening migratory bird conservation through enhanced collaboration between the two agencies. This voluntary Memorandum of Understanding does not waive legal requirements under the MBTA, Bald and Golden Eagle Protection Act, Endangered Species Act (ESA), Federal Power Act, NGA, or any other statutes, and does not authorize the take of migratory birds.

The FWS Pennsylvania Field Office Information for Planning and Conservation report indicated that there are 14 migratory birds protected under the MBTA within the project area, all of which are also listed as birds of conservation concern (BCC), along with two additional BCC species, the red-headed woodpecker and rusty blackbird. Construction activities would occur during the nesting season for migratory birds (generally considered April 1 to August 31). Therefore, direct and indirect impacts on migratory birds could result from construction. Examples of potential impacts include habitat loss, disruption of foraging adults, and abandonment or destruction of active nests. Tennessee would avoid or minimize direct impacts on migratory birds by conducting clearing activities of natural or semi-natural habitats (e.g., forests, woodlots, reverting fields, fencerows, and shrubby areas) outside of the nesting season for migratory birds within the project area (April 1 to August 31), as further described below.

This EA also discusses several plans (i.e., Tennessee's Plan, Procedures, E&SCP, and SPCC Plan) that contain project-specific mitigation measures that would reduce the extent and duration of impacts on migratory bird habitat, actively and naturally allow a great majority of the construction right-

of-way to return to preconstruction condition, and limit the potential effects from spills or environmental contamination.

Executive Order 13186 also requires federal agencies to identify where unintentional "take" (i.e., the unintended death, harm, or harassment) is likely to have a measurable negative effect on migratory bird populations. We conclude that adult birds relocating to avoid construction is an impact of limited duration that would not result in a substantial or long-term change in migration patterns through the area nor constitute a population-level impact.

Due to the potential for impacts on tree-nesting birds in forested areas within the proposed project area, Tennessee intends to implement bird conservation measures and best management practices (BMPs), including conducting tree felling activities outside of the nesting season (April 1 to August 31) to preclude avian species from nesting within the site. In the event that unforeseeable issues arise that result in Tennessee being unable to conduct tree-felling activities outside of the nesting season, Tennessee would coordinate with the FWS regarding appropriate conservation measures that could be implemented between April 1 and August 31. Habitat loss would be minimized to the extent practicable by colocating the 300-3 Loop adjacent to the existing Tennessee right-of-way.

Tennessee submitted a Migratory Bird Impact Assessment and Conservation Plan to the FWS for review on August 6, 2015. In a letter dated October 15, 2015, the FWS stated that it supports the proposed MBTA conservation measures and provided additional recommendations for vegetation species, including the use of native, non-persistent grasses that will not outcompete tree and shrub species, which is the targeted plant community outside of the permanent right-of-way. For woody vegetation, the FWS also recommended the use of a diverse mix of native plant species that is comparable to what currently exists within the project area that will serve as food and habitat for a variety of wildlife. Tennessee has committed to taking measures to quickly restore native cover types and the wildlife habitat that they sustain along the right-of-way. Tennessee, in conjunction with recommendations from the Susquehanna County Conservation District, would use a seed mix that supports species associated with pollinator habitat, consisting of red and white clover. Tennessee would initially replace woodland vegetation removed from workspaces with non-woody vegetation that may provide food and shelter for wildlife adapted to open habitats. Trees would be allowed to grow back on cleared workspaces beyond the permanent pipeline right-of-way.

Bald Eagle

The bald eagle is no longer a federally listed endangered or threatened species but is still protected under the Bald and Golden Eagle Protection Act and the MBTA. Tennessee has not performed a formal survey for bald eagles within the project area; however, bald eagle nests were not observed during Tennessee's habitat assessments. Tennessee has stated it would notify the FWS in the event that an eagle nest is encountered in the project area.

During operation of the Project, vegetative maintenance clearing would occur outside of the nesting season in accordance with Tennessee's plans.

For the reasons listed above, we determine that the proposed Project would not significantly affect migratory bird species within or in close proximity to the project area.

3.3 Fisheries

The Project would cross 14 waterbodies. One additional waterbody crosses under an access road (TAR 5) through an existing culvert and would not be affected by the Project. Twelve of the

14 waterbodies that would be crossed by the Project drain into coldwater fisheries (CWF) and Migratory Fisheries (MF) designated streams. Seven of the waterbodies that would be crossed by the Project drain into streams designated as ATW. Eight of the waterbodies that would be crossed by the Project, and an unnamed tributary to Lake Idlewild, drain into streams designated as Naturally Reproducing Trout Waters (NRTW). Two waterbodies that would be crossed drain into High Quality-CWF (HQ-CWF). One waterbody, Tunkhannock Creek, that would be crossed by the Project, is designated as a CWF, MF, ATW, and NRTW. No waterbodies would be affected by the proposed aboveground facilities. Table B.3-1 outlines waterbodies identified as potential fisheries resources of special concern.

TABLE B.3-1

Fisheries Resources of Special Concern within the Project Area

Milepost	Waterbody Name	Width of Crossing (feet)	Crossing Method	Instream Work Timing Restrictions	Comments [a]
300-3 LOOP					
0.69	Unnamed Tributary (UNT) to Tower Branch	12	Temporary Road Crossing Only	January 1 to September 30	Drains to CWF and MF; Drains to NRTW
0.79	UNT to Tower Branch	12	Dry	January 1 to September 30	Drains to CWF and MF; Drains to NRTW
0.81	UNT to Tower Branch	12	Temporary Road Crossing Only	January 1 to September 30	Drains to CWF and MF; Drains to NRTW
1.27	Partners Creek	24	Dry	June 16 to February 28	Drains to CWF and MF; Drains to ATW
1.75	Sterling Brook	10	Dry	June 16 to February 28	Drains to CWF and MF; Drains to ATW
2.82	Nine Partners Creek	53	Open Cut	June 16 to February 28	Drains to CWF and MF; Drains to ATW and NRTW
3.01	Tunkhannock Creek	65	Open Cut	June 16 to February 28	CWF and MF; NRTW, ATW
3.55	UNT to Tunkhannock Creek	5	Dry	June 16 to February 28	Drains to CWF and MF; Drains to ATW and NRTW
3.62	UNT to Tunkhannock Creek	7	Dry	June 16 to February 28	Drains to CWF and MF; Drains to ATW and NRTW
3.73	UNT to Tunkhannock Creek	3	Dry	June 16 to February 28	Drains to CWF and MF; Drains to ATW and NRTW
4.75	UNT to Tunkhannock Creek	20	Open Cut	June 16 to February 28	Drains to CWF and MF; Drains to ATW and NRTW
5.62	Mud Pond	190	Open Cut	N/A	N/A
6.44	UNT to Lake Idlewild	8	Dry	January 1 to September 30	Drains to CWF and MF; NRTW; Drains to HQ-CWF
6.79	UNT to Lake Idlewild	6	Dry	January 1 to September 30	Drains to NRTW; Drains to NRTW; Drains to HQ-CWF
ACCESS ROADS					
TAR 5	UNT to Tunkhannock Creek	10	Existing Culvert	June 16 to February 28	Drains to CWF and MF; Drains to ATW

[a] CWF and MF are designated by Pennsylvania Code 93, Designated Water Uses and Water Quality Criteria; ATW and NRTW are designated by the PAFBC; HQ-CWF waters are designated by the PADEP.

The Project would not cross any waterbodies designated as wild and scenic rivers at the federal or state level. The Project does not cross any Exceptional Value streams as defined by 25 Pennsylvania (Pa.) Code 93.4b(b). In addition, the Project would not cross or be in close proximity to any warm water fisheries. The Project would not cross any streams that are designated as Trout Stocked Fisheries; however, the 14 waterbodies that would be affected by project crossings drain to streams that are either ATW or NRTW. Approved Trout Waters (ATW) contain significant portions that are open to public fishing and are stocked with trout by the PAFBC, and NRTW are stream sections that support naturally reproducing populations of trout.

Construction impacts on fishery resources may include direct contact by construction equipment with food resources in the form of relatively immobile prey, increased sedimentation and water turbidity immediately downstream of the construction work area, alteration or removal of aquatic habitat cover, introduction of pollutants, impingement or entrainment of fish and other biota associated with the use of water pumps at dam and pump crossings, and downstream scour associated with use of those same pumps. Fish passage would only be temporarily interrupted during the dam and pump process, and would be restored immediately after the restoration of the stream bed and banks. The short term and localized interruption of fish passage is not anticipated to dramatically affect the migration of fish within the stream systems.

Based on our analysis, we have determined that there are no threatened or endangered species present in any of the waterbodies crossed by the Project, as further discussed in section B.3.4. Tennessee would adhere to the timing restrictions and implementation of water quality protection standards for construction in accordance with regulations and procedures set by FERC and state regulatory agencies. Per Tennessee's Procedures, construction in Naturally Reproducing Wild Trout Streams would occur from January 1 through September 30. We have included a condition in section B.2.2 requesting a copy of the Chapter 105 Water Obstruction and Encroachment Permit from the PADEP documenting approval of the proposed in-stream construction windows for this Project. For the reasons described above, we conclude that the Project would not significantly affect fisheries within the project area.

3.4 Special Status Species

Special status species are those species for which state or federal agencies provide an additional level of protection by law, regulation, or policy. Included in this category are federally listed species that are protected under the ESA or are considered candidates for such listing by the FWS, those species that are state-listed as threatened or endangered, and state species of special concern. Information on species potentially occurring in the project area is presented in table B.3-2. No special status species were noted to occur in the vicinity of CS 321 or the proposed pipe yards.

As outlined in sections B.3.4.1 and B.3.4.2 below, special status species may be present in the project area. However, through the completion of field surveys, correspondence with agencies, implementation of BMPs, and incorporation of regulatory guidelines in project activities and our consultation, the Project is not likely to adversely affect special status species.

3.4.1 Federally Listed Species

Tennessee, acting as the Project's non-federal representative to FERC, initiated informal consultation with the FWS, PADCNR, PAFBC, and Pennsylvania Game Commission (PAGC) in October 2014 and reviewed the PNDI for the project area. Review of the PNDI and correspondence with the FWS Pennsylvania Field Office indicated that the northern long-eared bat, a federally listed species,

may occur in the project area. No other federally listed species would potentially occur in the project area.

TABLE B.3-2

Federally and State-Listed Species Potentially Occurring in the Project Area

Species	Scientific Name	Status	300-3 Loop	Access Roads
Timber rattlesnake	*Crotalus horridus*	CS	X	
Eastern hellbender	*Cryptobranchus alleganiensis*	None	X	
Bald eagle	*Haliaeetus leucocephalus*	BEGPA, BCC	X	
Northern long-eared bat	*Myotic sodalist*	FE	X	
Worm-eating warbler	*Helmitheros vermivorum*	BCC	X	
Wood thrush	*Hylocichla mustelina*	BCC	X	
Least bittern	*Ixobrychus exilis*	BCC	X	
Short-eared owl	*Asio flammeus*	BCC	X	X
Rusty blackbird	*Euphagus carolinus*	BCC	X	
Red-headed woodpecker	*Melanerpes erythrocephalus*	BCC	X	
Pied-billed grebe	*Podilymbus podiceps*	BCC	X	X
Louisiana waterthrush	*Parkesia motacilla*	BCC	X	
Golden-winged warbler	*Vermivora chrysoptera*	BCC	X	X
Prairie warbler	*Dendroica discolor*	BCC	X	X
Kentucky warbler	*Oporomis formosus*	BCC	X	
Blue-winged warbler	*Dendroica cerulea*	BCC	X	
Canada warbler	*Wilsonia canadensis*	BCC	X	
Black-billed cuckoo	*Coccyzus erythropthalmus*	BCC	X	
American bittern	*Botaurus lengtiginosus*	BCC	X	
Prothonotary warbler	*Protonotaria citrea*	CR	X	
Yellow-bellied flycatcher	*Empidonax flavescens*	PE	X	
Swainson's thrush	*Catharus ustulatus*	CR	X	
Cerulean warbler	*Dendroica caerulea*	None	X	
Northern goshawk	*Accipiter gentilis*	CA	X	

CS = Candidate Species under review for further listing by the PAFBC
BGEPA = Bald and Golden Eagle Protection Act
FE = Federally Endangered
BCC = Birds of Conservation Concern
CR = Candidate Rare classification by Pennsylvania Biological Survey
PE = Pennsylvania Endangered by the PAGC
CA = Candidate at Risk classification by Pennsylvania Biological Survey

Northern Long-Eared Bat

The northern long-eared bat was formally listed as a federally threatened species in April 2015. Northern long-eared bats occur in widespread, but uncommon, patterns in forest habitats. During the winter, the bat hibernates in caves and underground mines. Individuals may travel up to 35 miles from their summer habitat to their winter hibernacula. Summer roosting habitat, including maternity roosts, includes tree cavities, exfoliating bark, snags of dead or dying trees, and man-made structures (e.g., barns). As noted above, the FWS Pennsylvania Field Office had previously indicated that the Project is within the range of the federally threatened northern long-eared bat. Tennessee initiated follow-up

consultation with the FWS Pennsylvania Field Office in May 2015, which identified that the Project is not within any known northern long-eared bat hibernacula or maternity area. The FWS Pennsylvania Field Office concurred with the determination that the Project was *not likely to adversely affect* the northern long-eared bat in a response dated June 1, 2015. As such, consultation for this species is complete under the ESA.

3.4.2 State-Listed Species

State-listed threatened and endangered species in Pennsylvania are protected under Title 58, Part II of the Pennsylvania Code (Pa. Code). The PAGC, the PAFBC, and the PADCNR are the three agencies responsible for administering this law. Mammals and birds are under the jurisdiction of the PAGC. Fish, reptiles, amphibians, and aquatic organisms are under the jurisdiction of the PAFBC. Plants, natural communities, terrestrial invertebrates, and geological features are under the jurisdiction of the PADCNR.

A review of the PNDI was conducted for the project area, which indicated no known impacts on species under the jurisdiction of the PAFBC and PADCNR. Based on the PNDI results, Tennessee initiated correspondence with the PAGC. The PAGC indicated in correspondence dated February 5 and October 8, 2015 that no impacts are anticipated to state-listed species from the Project. No other recommendations were identified.

For the reasons listed above, we determine that the Project would not significantly affect state-listed species within the project area.

4. LAND USE, RECREATION, AND VISUAL RESOURCES

4.1 Land Use

The Project involves the construction and operation of pipeline facilities, referred to as the 300-3 Loop, and two temporary pipe yards. The Project also involves the installation of new ancillary pipeline facilities at the beginning of the proposed 300-3 Loop and modifications to an existing compressor station. The following section discusses land use impacts associated with the construction and operation of the Project. Existing land uses in the project area are listed as follows:

- Agricultural land: cultivated cropland, pastureland, hay fields, nurseries, orchards, commercial tree stands, such as those used for maple sugar production or Christmas trees, and associated facilities and features, including farm buildings;
- Forest: wooded lands not being used for other specific purposes, consisting of deciduous and coniferous types, including forested wetland areas and state forest lands;
- Roadway: paved or gravel surfaced federal, state, and local roads; private drives; and railways crossed by the right-of-way;
- Open Land: non-forested lands and scrub-shrub wetlands used for open space, pasture, or existing utility rights-of-way, and open space lands not specifically designated for outdoor recreation or agriculture;
- Residential land: properties used primarily for dwellings, including associated outbuildings such as garages, and planned new residential developments;

- Industrial/Commercial: properties used primarily for industrial activities such as gas or electric power utility stations, manufacturing or industrial plants, landfills, surface mining (including associated structures), and commercial or retail facilities;

- Open Water: water crossings greater than 100 feet; and

- Other: miscellaneous special uses, including land associated with schools, parks, places of worship, cemeteries, sports facilities, campgrounds, and other recreational areas.

Potential land use impacts associated with project pipeline facilities, ATWS, access roads, and aboveground facilities are discussed below.

4.1.1 Pipeline Facilities

Construction of the pipeline facilities, which includes ATWS, access roads, and two pipe yards, would disturb approximately 170.5 acres of land, of which approximately 43.7 acres would be permanent right-of-way or a permanent access road. The remaining 126.8 acres would consist of temporary workspace, ATWS, temporary access roads, pipe yard and staging areas, water withdrawal locations, or portions of the existing 300 Line right-of-way, all of which would revert back to the previous land use following construction. Table B.4-1 summarizes the land use types that would be crossed by the pipeline facilities.

Operation of the Project would require a 50-foot-wide permanent right-of-way centered on the pipeline in most areas. Tennessee proposes to use 25 feet of existing right-of-way associated with the existing permanent easement of the 300 Line system and to add 25 feet of new permanent easement, with the exception of approximately 1.4 miles of pipeline loop, which would not overlap with the existing 300 Line system right-of-way. The typical width of Tennessee's existing permanent right-of-way for the 300 Line system is 150 feet. As a result of the Project, the proposed total permanent easement would increase to 175 feet in most areas.

The major land use types that would be traversed by the pipeline facilities include forested land, agricultural land, open land, commercial/industrial areas, roadways, and residential land. These land uses are described below.

Forested Lands

Construction of the pipeline would affect approximately 42.2 acres of forested lands, which include approximately 4.3 acres of ATWS and staging areas. Approximately 11.0 acres of forested lands would be permanently affected during operation of the pipeline facilities.

All of the trees within the right-of-way would be removed during clearing and preparation of the right-of-way. A 50-foot-wide permanent easement would be maintained in an herbaceous state over the centerline, which would prohibit the growth of woody species. Land outside the permanent easement would be permitted to revegetate naturally, a process that is expected to take 30 to 50 years to reach preconstruction forest densities. The clearing of forested lands, for the usable life of the pipeline, would be a long-term impact. Because the pipeline is proposed to be located adjacent to and within existing pipeline rights-of-way, tree clearing would be minimized to the greatest extent practicable.

Table B.4-1

Project Acreage Affected by Construction and Operation of the Pipeline Facilities

Land Use Category	Temporary Construction Workspace (acres) [a]	Permanent Right-of-Way (acres) [b]	Total
300-3 LOOP			
Open land	17.8	20.5	38.3
Forest	26.9	11.0	37.9
Agriculture	11.6	8.2	19.8
Roadways	1.0	1.4	2.4
Residential	0.3	0.4	0.7
Industrial/Commercial	0.7	0.3	1.0
Open water	0.4	0.3	0.7
300-3 Loop Total	**58.7**	**42.1**	**100.8**
ATWS, STAGING AREA, AND WATER WITHDRAWAL LOCATIONS			
Open land	5.5	0	5.5
Forest	4.3	0	4.3
Agriculture	8.8	0	8.8
Roadways	0.3	0	0.3
Residential	0.3	0	0.3
Industrial/Commercial	1.9	0	1.9
ATWS and Staging Area Total	**21.1**	**0**	**21.1**
PIPE YARD			
Agriculture	35.4	0	35.4
Pipe Yard Total	**35.4**	**0**	**35.4**
ACCESS ROADS			
Open land	0.3	0	0.3
Agriculture	1.5	0.2	1.7
Roadways	2.2	0	2.2
Industrial/Commercial	0.9	0	0.9
Access Roads Total	**4.9**	**0.2**	**5.1**
PIPELINE FACILITIES TOTAL	**120.1**	**42.3**	**162.4**

[a] Includes land affected only during the construction phase.

[b] Includes land that would only be affected by operations, including new permanent right-of-way, as well as permanent right-of-way associated with the existing 300 Line that is within the overall 50-foot operational right-of-way for the proposed 300-3 Loop.

Agricultural Lands

Construction of the pipeline would affect approximately 30.3 acres of agricultural lands, which include approximately 10.5 acres of ATWS, staging areas, and access roads. Approximately 8.4 acres of agricultural land would be permanently affected during operation of the pipeline facilities, which includes approximately 0.2 acre associated with a permanent access road, and would not be allowed to revert to agricultural use following construction. A 50-foot-wide permanent easement would be maintained in an herbaceous state over the centerline, which would prohibit the growth of woody species. In addition, 35.4 acres of agricultural lands would be used as temporary construction workspace for a pipe yard. All of the trees within the right-of-way would be removed during clearing and preparation of the right-of-way. Land outside the permanent easement would be permitted to revert to agricultural use following construction. The loss of agricultural lands, for the usable life of the pipeline, would be a long-term impact. Because the pipelines are proposed to be located adjacent to and within existing pipeline rights-

of-way, the loss of arable lands would be minimized to the greatest extent practicable. To minimize impacts on the soil profile on agricultural lands, up to 12 inches of topsoil would be segregated from subsoil during trenching and would remain segregated during construction to avoid loss due to mixing with subsoil material. Tennessee would utilize either full right-of-way topsoil segregation or ditch plus spoil side topsoil segregation as requested by the landowner, as required by the Susquehanna County Conservation District, or as appropriate based upon site-specific conditions.

Industrial/ Commercial Lands

Construction of the pipeline would affect approximately 3.8 acres of industrial/ commercial land, which includes approximately 2.8 acres of ATWS, staging areas, and access roads. Approximately 0.3 acre of industrial/ commercial land would be permanently affected during operation of the pipeline facilities. Construction of aboveground facilities would affect approximately 8.1 acres (8.0 acres of industrial land and 0.1 acre of open land), of which 1.2 acres is existing permanent right-of-way, and 0.2 acres would be new right-of-way. All of the trees within the right-of-way would be removed during clearing and preparation of the right-of-way. Where construction of the pipeline would disturb industrial/commercial land with structures within 25 feet of construction, Tennessee would use site-specific construction plans (appendix C) to ensure protection of the nearby structures. Land outside the permanent easement would be permitted to revert to preconstruction conditions. The restricted use of industrial/commercial land inside the permanent easement, for the usable life of the pipeline, would be a long-term impact. Because the pipelines are proposed to be located adjacent to and within existing pipeline rights-of-way, the use of industrial/commercial lands would be minimized to the greatest extent practicable.

Open Land

Construction of the pipeline would affect approximately 44.1 acres of open land, which includes approximately 5.8 acres of ATWS, staging area, and access roads. Approximately 11.0 acres of open land would be permanent right-of-way affected during the operation of pipeline facilities. Open land comprises the majority of the existing 300 Line right-of-way. Impacts on open land would be short term and occur primarily during construction. Open land vegetation would return to its pre-existing condition in approximately 3 to 12 months. Vegetation in the operational right-of-way would be permanently maintained in an herbaceous state. Given the current use by the existing pipeline right-of-way, open land would not be significantly affected by pipeline facilities.

Residential

Construction of the pipeline would affect approximately 1.0 acre of developed residential land, of which approximately 0.4 acre would be affected during the operation of pipeline facilities. These areas would be restored to preconstruction conditions, except that trees and certain other residential activities, such as digging for foundations, would not be permitted within the permanent right-of-way.

There are three residences and one additional structure located within 50 feet of the pipeline workspace, as identified in table B.4-2. In order to minimize the impact on these residents, Tennessee would implement the following measures:

- narrowing or shifting the construction work area, where feasible, to maintain at least 25 feet between the residence, or other structure, and the edge of the work area;
- retaining landscaping and mature trees outside of the permanent right-of-way (but within the work area) where feasible;

- restoring all lawn areas and landscaping in accordance with Tennessee's Plan and individual landowner agreements immediately after backfilling; and

- fencing the construction work area adjacent to the residence for 100 feet in both directions to ensure that construction crews, materials, and equipment do not encroach on the residence throughout the open trench phases of pipe installation.

For residences and occupied structures located within 25 feet of construction workspace, Tennessee prepared site-specific residential construction plans, which are attached in appendix C. These plans include additional measures to minimize impacts on residents, such as erecting lighted barricades around excavations that must remain open after work hours and watering the right-of-way periodically to reduce fugitive dust emissions. We reviewed the site-specific residential construction plans and find them to be acceptable.

One of the residences listed in table B.4-2, while not within the construction workspace, would be within 10 feet of the workspace due to construction constraints along those portions of the Project route. To ensure that property owners have adequate input to a construction activity occurring so close to their homes, **we recommend that**:

- **Prior to construction, Tennessee should file with the Secretary, for the review and written approval of the Director of the Office of Energy Projects (OEP), evidence of landowner concurrence with the site-specific residential construction plan for the residence at MP 1.1 where Project construction work areas would be within 10 feet of a residence.**

Table B.4-2

Residences/Structures Within 50 Feet of Project Construction Workspace

Nearest Pipeline Milepost	Structure Type	Distance to Edge of Workspace (feet)	Distance to Pipeline Centerline (feet)
0.8	Poolhouse	24	99
1.0	Residence	41	120
1.1	Residence	6	31
1.1	Residence	27	77

We received comments from a landowner within the project right-of-way who expressed concerns with project impacts on his property including right-of-way maintenance and mowing, rocks in the right-of-way, right-of-way restoration, potential recreational impacts associated with tree clearing, noxious weeds, and landowner notification for maintenance activities. Tennessee has stated that it has met with the landowner and his representatives and intends to continue doing so to resolve these issues. To address the timing conflict between proposed tree felling and the hunting season, Tennessee has proposed to delay tree felling on his property until after December 2016, or provide compensation to this landowner for loss of hunting income. The landowner is concerned that Tennessee does not mow its right-of-way frequently enough or provide sufficient notification prior to accessing the right-of-way for mowing. Although mowing—and notification of entering the right-of-way for the purpose of mowing—are not required by terms of Tennessee's lease agreement, Tennessee attempts to notify all landowners prior to accessing its right-of-way for mowing activities and adheres to permitting requirements related to notifications. The landowner has expressed concerns about the width of the right-of-way. The proposed 300-3 pipeline loop would reside completely within the currently defined right-of-way on the landowner's property.

Roadways

The pipelines would cross public roadways or private driveways 14 times. These roads range from dirt or gravel tracks to an interstate highway. At the locations where Tennessee would install the pipeline via conventional bore, as identified in table B.4-3, traffic would not be affected. On all other roadway crossings, where Tennessee would use an open-cut method, there would be impacts on traffic. Tennessee would maintain an open traffic lane during construction except for a temporary period of time during the lowering-in of the pipeline segment. Tennessee would employ police detail as necessary to ensure the orderly passage of vehicles and pedestrians during periods when only a single travel lane is maintained. Table B.4-3 details the roads that would be crossed by the pipeline facilities.

Table B.4-3

Public and Private Roads Crossed by the Pipeline Facilities

County	Township	Milepost	Road Name	Crossing Method
Susquehanna	Lenox	0.3	Bennett Road	Open cut
Susquehanna	Lenox	1.1	West Lenox Church Road (Route 2043)	Bore
Susquehanna	Lenox	1.3	Franklin Road	Open cut
Susquehanna	Lenox	2.3	Route 2022 (Owego Road)	Open cut
Susquehanna	Lenox	2.7	State Route 106	Bore
Susquehanna	Lenox	2.7	Route 2063 (Creek Road)	Bore
Susquehanna	Lenox	2.7	State Route 92	Bore
Susquehanna	Lenox	2.9	Interstate 81 (southbound)	Bore
Susquehanna	Lenox	2.9	Interstate 81 (northbound)	Bore
Susquehanna	Lenox	4.2	Route 2065	Open cut
Susquehanna	Lenox	4.4	Private access road	Open cut
Susquehanna	Lenox	4.8	Round Pond Road	Open cut
Susquehanna	Clifford	6.2	Route 2067	Bore
Susquehanna	Clifford	6.6	Route 2069/Tennessee Gas Road	Open cut

4.1.2 Additional Temporary Work Space

Tennessee identified certain areas where site-specific conditions would require the use of ATWS outside of the proposed 125-foot-wide pipeline construction right-of-way. ATWS would be required at pipeline interconnections and in areas where the proposed pipeline route crosses wetlands, waterbodies, existing utilities, and roads. Impacts associated with ATWS are included with the pipeline construction impacts in table B.4-1 above. A list of ATWS associated with the Project is included in table 2 of appendix B. We have reviewed these workspaces and their justification, and find them acceptable.

In addition to ATWS at various locations along the proposed pipeline route, Tennessee proposes to use one staging area and two pipe yards within Susquehanna County to support construction activities. Impacts associated with the staging area and pipe yards are included with the pipeline construction impacts in table B.4-1, and the staging area and two pipe yards are included in table 2 of appendix B. Upon completion of construction, the staging area and pipe yards would be restored in accordance with Tennessee's Plan, and prior use of the sites would resume. The staging area would not result in any permanent impacts on land use, although the clearing of forested lands for the usable life of the pipeline would be a long-term impact. As discussed above for temporary pipeline right-of-way, natural restoration of preconstruction forest densities is expected to take at least 30 to 50 years.

4.1.3 Access Roads

Existing public roads and the construction right-of-way would be used for primary access to the pipelines during construction. Tennessee proposes to construct one new permanent non-public access road and use ten public and non-public temporary access roads. Tennessee would modify four of these existing roads and use the other six roads without alteration for access during construction and operations, as presented in table B.4.4. The existing roads have dirt, asphalt, or gravel surfaces. The modifications to the four existing roads would be limited to grading, addition of stone, and extension of one road. The surface type of existing roads used for temporary access would not be permanently changed.

Modifications to existing roads used for construction access would affect 5.1 acres of land. Of this total, operation of the permanent access road would require 0.2 acre.

Table B.4-4

Access Roads to be Used During Construction of the Pipeline Facilities

County	Township	Access Road No.	Milepost	Access Road Type	Existing Road Surface Type	Project Modifications	Length of Road (feet)	Area Affected	
								Construction (acres)	Operation (acres)
Susquehanna	Lenox	PAR-1	0.0	Permanent	None	New gravel access road	948	1.4	0.2
Susquehanna	Lenox	TAR-8	0.3	Temporary	Dirt	Grading, addition of stone, existing road would be extended	315	0.1	0
Susquehanna	Lenox	TAR-10	0.3	Temporary	Gravel	None	768	0.4	0
Susquehanna	Lenox	TAR-1	2.7	Temporary	Asphalt	None	361	0.2	0
Susquehanna	Lenox	TAR-2	2.9	Temporary	Gravel	None	248	0.1	0
Susquehanna	Lenox	TAR-3	3.0	Temporary	None	Grading, addition of stone, existing road would be extended	436	0.2	0
Susquehanna	Lenox	TAR-4	3.0	Temporary	Gravel	Existing road would be extended	1,727	0.8	0
Susquehanna	Lenox	TAR-5	4.6	Temporary	Gravel	None	1,424	0.7	0
Susquehanna	Clifford	TAR-9	5.5	Temporary	None	Addition of stone	101	0.1	0
Susquehanna	Clifford	TAR-6	7.0	Temporary	Asphalt	None	1,110	0.6	0
Susquehanna	Clifford	TAR-7	7.0	Temporary	Asphalt	None	1,150	0.5	0
Access Roads Totals								**5.1**	**0.2**

4.1.4 Aboveground Facilities

The aboveground facilities for the Project would affect existing industrial lands at one existing compressor station, as well as open land within the existing 300 Line right-of-way. Impacts from construction and operation of the aboveground facilities are presented in table B.4-5.

All of the aboveground facilities would be located at existing natural gas pipeline facilities or within the existing 300 Line right-of-way; therefore, the majority of the impacts would be on lands used for industrial or pipeline purposes. Impacts on the industrial facilities are expected to be minor and temporary given that these facilities are owned by Tennesee. The impacts on day-to-day operations would not be significant. The construction activities associated with the aboveground facilities would affect 8.0 acres of industrial land and 0.1 acre of open land. Approximately 1.4 acres of land would be required to operate the aboveground facilities, of which approximately 1.2 acres is associated with existing property associated with CS 321 or existing pipeline right-of-way.

Because the aboveground facilities are not on lands already owned or maintained by Tennessee, we conclude that the aboveground facilities would pose a significant impact on land use.

Table B.4-5

Acreage Affected by Construction and Operation of the Aboveground Facilities

Facility	County, State	Approximate Milepost	Land Requirements		Present Land Use
			Construction (acres) [a]	Operations (acres) [b]	
Upstream Tie-in Site	Susquehanna, PA	0.0	0.1	0.1	Open
CS 321 - Odorant Facility	Susquehanna, PA	7.0	3.9	0.5	Industrial
CS 321 - Downstream Tie-in Site	Susquehanna, PA	7.0	4.1	0.8	Industrial
Totals			**8.1**	**1.4**	

[a] Includes all land affected by construction of the Project (including land listed under Operations).
[b] Includes only new land (in addition to construction acreage) affected by operation of the Project.

4.2 Recreation and Special Use Areas

Tennessee consulted with state and federal land managing agencies to determine if recreational lands would be crossed by the proposed facilities. The Project would not cross any publicly owned or recreational lands. The Project would cross two parcels that have private conservation easements—the Stalter property and the Cecil-Wagner property—as listed in table B.4-6. The Project would not cross the portions of the Stalter property covered by easements. Approximately 0.5 mile of the Cecil-Wagner property covered by a conservation easement (from MP 0.3 to 0.8) would be crossed by the Project. The North Branch Land Trust holds an approximately 73-acre conservation easement on the Cecil-Wagner property for the purpose of conserving open space; preserving the area's rare, threatened, or exemplary natural communities; and improving water quality. Discussions are ongoing with the landowner and holder of the conservation easement regarding the Project crossing the portion of the Cecil-Wagner property covered by a conservation easement, and potential mitigation measures.

Table B.4-6

Public Land and Designated Recreation, Scenic, or Other Areas in the Vicinity of the Project

Facility	County, State	Approximate Mileposts	Approximate Length of Crossing (feet) (Pipelines Only)
Stalter Property	Susquehanna, PA	1.3 – 1.8	2,640
Cecil-Wagner Property	Susquehanna, PA	0.3 – 0.8	2,640

The pipeline would cross 26 properties associated with the Pennsylvania Department of Agriculture's Clean and Green Program, as shown in table B.4-7. The Pennsylvania Department of Agriculture's Clean and Green Program was created under the Pennsylvania Farmland and Forest Land Assessment Act with the goal of preserving agricultural and forested lands. The program provides a tax

incentive to individuals participating in the program by taxing the property on the "use value" of the land rather than its market value. Property owners would be able to realize a modest tax savings by preserving forest or agricultural land.

Table B.4-7

Pennsylvania Department of Agriculture Clean and Green Properties Crossed by the Project

Township	County	Approximate Mileposts
Lenox	Susquehanna	Pipe Yard
Lenox	Susquehanna	0.0
Lenox	Susquehanna	0.0 – 0.1
Lenox	Susquehanna	0.3 – 0.8
Lenox	Susquehanna	1.2 – 1.3 [a]
Lenox	Susquehanna	1.2 – 1.3 [a]
Lenox	Susquehanna	1.3 – 1.5
Lenox	Susquehanna	1.5 – 1.8
Lenox	Susquehanna	1.8 – 2.0
Lenox	Susquehanna	2.0 – 2.1
Lenox	Susquehanna	2.1 – 2.3
Lenox	Susquehanna	2.6 – 2.7
Lenox	Susquehanna	3.0 – 3.5
Lenox	Susquehanna	3.5 – 3.6
Lenox	Susquehanna	3.6 – 3.9
Lenox	Susquehanna	3.9 – 4.1
Lenox	Susquehanna	4.1 – 4.3
Lenox	Susquehanna	4.3 – 4.8
Lenox	Susquehanna	4.8 – 5.1
Clifford	Susquehanna	5.1 – 5.4
Clifford	Susquehanna	5.4 – 5.8
Clifford	Susquehanna	5.8 – 6.2
Clifford	Susquehanna	6.2 – 6.3
Clifford	Susquehanna	6.3 – 6.5
Clifford	Susquehanna	6.5
Clifford	Susquehanna	6.8

[a] Due to rounding, the mileposts appear the same as the above, but are separate parcels.

In order to qualify for the program, landowners must have a minimum of 10 acres of contiguous agricultural, open, or forested lands. While lands devoted to "subsurface transmission and gathering" of natural gas may still receive the state's preferential tax rates (Pa. Code § 137b.73a), if clearing were to reduce the amount of contiguous forested lands to less than 10 acres, the Project could result in disqualification of some properties from future participation in the Clean and Green Program. This would result in a long-term financial impact on the affected property owner. In such a case, Tennessee proposes to compensate Clean and Green Program property landowners for such impacts.

To ensure that construction does not affect the eligibility of parcels for the Clean and Green Program, **we recommend that**:

- **Prior to construction, Tennessee should file with the Secretary, for the review and written approval of the Director of the OEP, a plan to reduce tree clearing on each parcel of land enrolled in the Clean and Green Program that would be crossed by the Project as necessary to ensure the property remains eligible for the program. In the event Tennessee is not able to avoid disqualifying a property from the program, Tennessee should describe how it would compensate the affected landowner.**

The Project would not cross any Natural Resource Conservation Service easements. No other recreational areas, scenic vistas, national trails, or other federally administered lands were identified within the project area. We conclude that recreational opportunities and special interest areas would not be significantly affected by the Project.

4.3 Visual Resources

4.3.1 Pipeline Facilities

The primary impacts of the pipeline facilities on visual resources would occur during active construction and affect forest, open lands, and wetlands. No visually sensitive areas were identified during review of the Project's pipeline facilities. The impacts would include the presence of construction equipment, materials, and personnel, and disturbance of vegetation and soils. These construction impacts would be temporary, as construction would take approximately 12 months, culminating in November 2017. During restoration of the disturbed areas, the rights-of-way would be characterized by mixed areas of new vegetation and bare soils. Revegetation of the rights-of-way would be expected to begin shortly after construction and restoration activities in the fall of 2017 and early in the spring of 2018.

Following construction, Tennessee would fully restore all disturbed areas. The visual appearance of these areas would return to their preconstruction conditions within 2 to 3 years in open lands and emergent wetlands. Construction would have a permanent impact on some forested lands. Forested lands cleared within the temporary construction corridor, ATWS, and the staging area could take 30 to 50 years to return to their preconstruction conditions. Furthermore, clearing of forested lands for the permanent easement would result in a permanent visual change, as these areas would be maintained in an herbaceous state.

Tennessee proposes to use 25 feet of existing right-of-way associated with the existing permanent easement of the 300 Line system and to add 25 feet of new permanent easement, with the exception of approximately 1.4 miles of pipeline loop that would not overlap with the existing 300 Line system right-of-way. These areas are already subject to the visual impact of a utility corridor. Clearing of forested lands adjacent to the existing 300 Line would widen the corridor by approximately 25 feet. We conclude that locating the proposed pipelines adjacent to the 300 Line would not result in significant adverse effects on visual resources.

4.3.2 Aboveground Facilities

The aboveground facilities associated with the Project would represent minimal change in visual conditions. All of the aboveground facilities associated with the Project would be located within the property boundaries of CS 321, an existing industrial facility owned by Tennessee, or within the proposed pipeline's permanent right-of-way.

Proposed construction at existing CS 321 includes additional piping and valves, a pig receiving trap, and an odorant facility contained in a building. These activities would disturb approximately 4.0 acres of land, all of which would be within the existing property boundary. This facility currently has an existing visual impact on the surrounding areas depending on the direction and viewpoint from which it is seen. By locating the proposed facilities next to existing structures, the visual impact would generally be minimized. Furthermore, no new areas would be subject to visual impacts.

Proposed construction of a pig launcher and upstream tie-in facility near MP 0.0 would occur within the permanent right-of-way and would disturb approximately 4.1 acres of land. This facility and its associated aboveground piping would occupy approximately 0.1 acre. By locating the proposed facilities within the permanent right-of-way, the visual impact would generally be minimized. While the proposed facilities may constitute a visual change to the immediate surrounding area, their construction is generally consistent with the existing land use and would not significantly modify the character of this area.

Tennessee has not proposed any new visual screening for its aboveground facilities; however, it would leave existing trees and vegetation in place along roadways to buffer the view of the new buildings and pig receiver from motorists. To a casual observer or passerby, no significant visual changes would be expected once these facilities are complete.

5. SOCIOECONOMICS

The potential socioeconomic impacts on the affected areas would be short term due to the relatively short construction period. Population influx into the affected areas would occur due to the temporary construction workers required for the Project. This temporary population increase could have minor impacts on local services (fire, medical, and police).

Construction of the Project would result in some beneficial impacts on the affected areas. The hiring of local and non-local workers during the construction period would provide some economic benefit due to purchases of temporary housing, food, and other services during construction. In addition, some construction materials may be purchased locally. The Project would contribute tax revenues to the local areas during operation. Tennessee anticipates that no permanent positions would be generated for continued operation of the project facilities.

Due to the scope of the Project, it is not expected to have a significant economic impact on the project area.

6. CULTURAL RESOURCES

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

Tennessee completed a cultural resource survey of the project area, including pipeline right-of-way, ATWS, pipe yards, access roads, and aboveground facilities. Survey methods included background research, shovel testing, pedestrian survey, and architectural survey.

Archaeological testing of the pipeline right-of-way was conducted in a 400-foot-wide corridor. A total of 470 acres was surveyed. Five archaeological sites were identified, including three pre-contact

sites (36SQ292, 36SQ293, and 36SQ25), one historic site (36SQ194), and one multi-component pre-contact and contact site (36SQ195). Two of the sites were recommended as not eligible for listing on the NRHP. One site was recommended for avoidance (36SQ195). The other two sites needed additional evaluation. The results of the surveys are documented in the *Phase I Archaeological Investigations Report* (Padamonsky and Peltier, 2015) and the *Addendum Phase I Archaeological Investigations Report* (Padamonsky and Stuck, 2016). These documents have been submitted to FERC and the Pennsylvania Historical and Museum Commission, which acts as Pennsylvania's State Historic Preservation Office (SHPO), for review. The Pennsylvania SHPO concurred with the initial report and its recommendations on October 28, 2015, and the addendum report on March 23, 2016. We concur also.

In April and May 2015, Tennessee conducted a Phase II archaeological evaluation of sites 36SQ192 and 36SQ103. The report recommends one of the sites as eligible and the other site as not eligible for listing in the NRHP. Tennessee developed an avoidance plan for the eligible site, which is included in the *Phase II Archaeological Investigations Report* (Stuck and Johnston, 2015). The avoidance plan includes adjusting the project workspace to avoid the site and keeping a 50-foot fenced buffer zone around the site during construction to avoid intrusion. The report recommends no additional investigation of these sites and concludes that, with the implementation of Tennessee's avoidance plan, the Project would have no adverse effects on the eligible site. The Phase II Report was submitted to FERC and the SHPO for review. The SHPO concurred with the report and Tennessee's avoidance plan on November 19, 2015. We concur also.

In October and November 2014, Tennessee completed a historic architecture survey of the project area of potential effect (APE) for aboveground historic resources, which includes all areas from which there exists a view to or from the proposed project right-of-way for the pipeline corridor, access roads, staging areas, and pipe yards. The survey identified a historic church and two historic barns within the APE and one historic residence adjacent to the APE. The *Phase I Historic Architecture Survey Report* (Peltier, 2015) was submitted to FERC and the SHPO for review. The report recommends that project construction would have minor temporary indirect impacts on the four identified historic structures and recommends measures to mitigate these impacts, including fencing, limiting the use of blasting, and limiting construction hours to lessen noise impacts. With the implementation of these mitigation measures, the report recommends no adverse effects on historic properties from the Project. The SHPO concurred with the report's finding of no adverse effects on May 8, 2015. We concur also.

In letters dated December 4, 2014, Tennessee provided information on the Project to the following 15 American Indian tribes with historic ties to the region: Absentee-Shawnee Tribe of Oklahoma, Cayuga Nation of Indians, Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, Oneida Indian Nation, Oneida Nation of Wisconsin, Onondaga Indian Nation, Seneca-Cayuga Tribe of Oklahoma, Seneca Nation of Indians, Shawnee Tribe, Stockbridge-Munsee Community Band of Mohican Indians, St. Regis Mohawk Tribe, Tonawanda Seneca Nation, and Tuscarora Nation.

In a letter dated January 20, 2015, the Oneida Indian Nation requested to be included in the development of the planned scope of work for and review of the archaeological surveys for the Project. The Stockbridge-Munsee THPO responded on December 9, 2014, indicating that the Project is within their historic territory, but that they are not aware of any known cultural sites within the project area. The Stockbridge-Munsee THPO also sent a letter dated August 3, 2015, requesting to continue consultation on the proposed Project. On December 22, 2015, the Stockbridge-Munsee THPO requested confirmation that there would be a 50-foot buffer around the NRHP eligible site during construction, per the recommendation of the SHPO. Tennessee provided the Stockbridge-Munsee THPO with their avoidance plan for the site on January 18, 2016, which specifies that a 50-foot buffer would be used to avoid intrusion of the site during construction.

Tennessee contacted the Oneida Indian Nation on January 30, 2015 regarding archaeological site 36SQ195, which was identified during the Phase I archaeological survey. The Oneida Indian Nation requested avoidance of the site. Additionally, they requested to be provided with copies of the archaeological survey reports for the Project. Tennessee provided copies of the Phase I and Phase II archaeological survey reports to the Oneida Indian Nation, as well as a plan detailing avoidance measures for the site during construction. FERC staff followed up with a phone call to the Oneida Indian Nation. The tribe agreed that the Avoidance Plan was sufficient.

The Seneca Nation of Indians stated that they have no concerns regarding the proposed Project, but requested to be copied on SHPO correspondence regarding the Phase II archaeological investigations.

We sent our notice of application, NOI, and follow-up letters to the same 15 tribes. The Stockbridge-Munsee THPO confirmed that the Project is within their cultural area of interest and requested to continue consultation on the Project.

Tennessee provided FERC and the SHPO with an acceptable Unanticipated Discovery Plan to address the unexpected discovery of archaeological resources and human remains during construction. To date, the SHPO has not provided comments on this plan.

Based on the results of the cultural resource surveys, consultation with the SHPO and American Indian tribes, and implementation of avoidance and mitigation measures proposed by Tennessee, we conclude that construction and operation of Tennessee's proposed facilities would not have a significant effect on cultural resources.

7. AIR QUALITY AND NOISE

7.1 Air Quality

Air quality can be affected by both construction and operation of the proposed facilities. The EPA has established National Ambient Air Quality Standards (NAAQS) for criteria pollutants for the purpose of protecting human health (primary standards) and public welfare (secondary standards). The EPA set NAAQS for the following air contaminants designated as "criteria pollutants:" nitrogen dioxide, carbon monoxide (CO), ozone, sulfur dioxide (SO_2), lead, 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 ($PM_{2.5}$). These NAAQS reflect the relationship between pollutant concentrations and health and welfare effects, and are supported by sound scientific evidence. The states implement and enforce the NAAQS through State Implementation Plans (SIP), which must be approved by the EPA. The State of Pennsylvania implements its SIP through the PADEP.

Air quality control regions (AQCR) are areas established for air quality planning purposes in which SIPs 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 Clean Air Act of 1970 and its amendments (CAA), as a means to implement the CAA and comply with the NAAQS through SIPs. The CAA is the basic federal statute governing air pollution. 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/unclassifiable" (areas in compliance with the NAAQS or not able to be classified on the basis of available information as meeting or not meeting the NAAQS), "nonattainment" (areas not in compliance with the NAAQS), or "maintenance" (areas that are currently in attainment but were previously classified as nonattainment and are afforded additional protection to ensure that they remain in

attainment). Areas in nonattainment with the NAAQS for any criteria pollutant are held to more restrictive air emissions limits when determining whether a facility is a "major source" under federal programs.

An Ozone Transport Region (OTR) is a region where the transfer of air pollutants from one or more states contributes significantly to a violation of the NAAQS in one or more other states.[5] The Northeast OTR is comprised of eleven northeastern states, including Pennsylvania. Ozone forms when there is a reaction between nitrogen oxides (NO_x) and volatile organic compounds (VOC); as a result, ozone formation cannot be directly controlled. Limiting NO_x and VOC emissions would result in a lower potential for ozone formation.

Susquehanna County, where the Project is located, is in the Northeast Pennsylvania – Upper Delaware Valley Interstate AQCR.[6] This county is in attainment with the NAAQS; however, because the Project would be constructed in the Northeast OTR, Susquehanna County is considered to be in moderate nonattainment with the NAAQS for ozone for air permitting purposes. Pipeline facilities in nonattainment areas are held to more restrictive air permitting standards.

7.1.1 Air Quality Construction Impacts and Mitigation

Emissions associated with construction activities generally include exhaust from construction non-road equipment and commuting and on-road construction vehicles; fugitive dust associated with vehicle movement at the project sites; fugitive dust associated with trenching, backfilling, and other earth-moving activities; and venting of natural gas to the atmosphere. Exhaust emissions would depend on the equipment used and the horsepower-hours of operation. The quantity of fugitive dust emissions would depend on the moisture content and texture of the soils that would be disturbed.

Construction of Tennessee's pipeline, which includes one mainline spread and various smaller tie-in crews, would last approximately 8 months depending upon site-specific conditions. A summary of the Project's potential construction emissions is presented in table B.7-1.

In order to minimize fugitive dust emissions, Tennessee has committed to implementing mitigation measures such as:

- requiring contractors to meet all federal, state, and local air quality regulations and emission standards applicable to their equipment;
- limiting the area of earth to be disturbed;
- applying water or dust suppressants to disturbed areas, as necessary;
- covering open hauling trucks with tarps, as necessary, and using paved roads for construction and vehicle traffic, wherever practical;
- limiting vehicle speeds as required;
- responding promptly to any significant particulate emission concerns that occur during construction by evaluating the source of emissions; and
- stabilizing disturbed areas upon completion of construction activity.

[5] 42 USC 85, part D, subpart 1, section 7506(a).

[6] This data is provided in 40 CFR 81, subpart C, section 107 – Attainment Status Designations.

Table B.7-1

Construction Emissions Summary (tons per year)

Source	CO	NO_x	SO_2	VOC	PM/PM_{10}	$PM_{2.5}$	HAPs [a]	CO_2e [b]
2016								
Fugitive dust	-	-	-	-	9.2	1.1	-	-
Non-road engines	1.1	2.6	<0.1	0.2	0.2	0.2	<0.1	713
On-road engines	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	202
Venting	-	-	-	-	-	-	-	-
Total 2016	**1.6**	**2.7**	**<0.1**	**0.2**	**9.4**	**1.3**	**<0.1**	**915**
2017								
Fugitive dust	-	-	-	-	31.3	4.2	-	-
Non-road engines	16.6	8.6	<0.1	1.2	0.6	0.6	0.3	2,530
On-road engines	1.3	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	700
Venting	-	-	-	<0.1	-	-	-	346
Total 2017	**17.9**	**8.9**	**<0.1**	**1.2**	**32.0**	**4.8**	**0.3**	**3,576**

[a] HAPs = hazardous air pollutants
[b] CO_2e = carbon dioxide equivalents

Tennessee would also be required to comply with 25 Pa. Code 123.1, which regulates fugitive dust emissions. Additionally, Tennessee would ensure compliance with Title 35 of Pennsylvania Statutes, Chapter 23 B, commonly referred to as Act 124 or the Diesel-Powered Motor Vehicle Idling Act, which restricts most diesel-powered motor vehicles over 10,000 pounds from idling more than 5 minutes in any continuous 60-minute period, with a number of exemptions.

Emissions from construction equipment exhaust would be temporary in nature. Once construction activities in the project area are completed, ambient air quality would return to preconstruction levels. Therefore, we conclude that emissions associated with the construction phase of the Project would not result in a significant impact on air quality.

7.1.2 Air Quality Operations Impacts and Mitigation

The proposed Project would not generate any significant air emissions during operations. No new facilities containing stationary emission sources would be constructed, no new emission generating units would be added to existing facilities, and no existing emission generating units would be modified as part of the Project.

The Project would generate a minor amount of new fugitive emissions associated with new piping, the pig launcher and receiver, and the proposed odorant facility. During operations, fugitive emissions associated with minor new piping and the pig launcher and receiver would be a result of natural gas leaks from the sealed surfaces of the components (e.g., valves and flanges), and from venting of the gas in the launcher/receiver during pigging operations. Additionally, the emissions associated with the

odorant system would be the vented natural gas used for driving the pneumatic injection pumps. Tennessee would ensure that the odorant facility to be installed at CS 321 would be completely enclosed and designed to be leak-free to prevent any potential fugitive emissions of the odorant.

In conclusion, the Project's operation would result in a minimal impact on local and regional air quality.

Federal Air Quality Regulations

As indicated above, the primary air quality impacts associated with the Project would be associated with the construction activities. Federal air quality regulations (permitting) apply only to stationary sources. Because the air emissions associated with project construction are solely from mobile construction activities, the sources associated with the construction phase of the Project would not be subject to federal air quality requirements. None of the minor emissions associated with operation of the Project would be subject to air permitting requirements. The provisions of the CAA that are potentially relevant to this Project are discussed below.

Greenhouse Gases

On September 22, 2009, the EPA issued the final Mandatory Reporting of Greenhouse Gases Rule. It requires reporting of greenhouse gas (GHG) emissions from suppliers of fossil fuels and facilities that emit greater than or equal to 25,000 metric tons[7] of GHG per year. On June 3, 2010, the EPA tailored the applicability criteria for stationary sources and modification projects.[8]

GHGs occur in the atmosphere both naturally and as a result of human activities, such as the burning of fossil fuels. These gases are the integral components of the atmosphere's greenhouse effect that warms the earth's surface and moderates day/night temperature variation. The primary GHGs produced by fossil fuel combustion are water, carbon dioxide (CO_2), methane, and nitrous oxide. During construction of the Project, GHGs would be emitted from non-electrical construction equipment. During operation of the Project, GHGs would be emitted from minor fugitive sources. Emissions of GHGs are typically expressed in terms of CO_2 equivalents (CO_2e), where the potential of each gas to increase heating in the atmosphere is expressed as a multiple of the heating potential of CO_2 or its global warming potential.[9] Table B.7-1 summarizes the estimated project GHG emissions from construction activities. The fugitive CO_2e emissions associated with the operation of the Project are summarized in table B.7-2. The GHG reporting rule does not apply to construction emissions. The estimated annual GHG emissions associated with the operation of the Project are a very small fraction of the EPA reporting threshold of 25,000 metric tons per year. However, Tennessee may be required to submit a GHG report based on the aggregate CO_2e emissions associated with pipeline fugitive emissions from their entire pipeline system, in which case the fugitive GHG emissions associated with the Project would be included in the GHG report.

Table B.7-2

Estimated Operational Emissions Summary (tons per year)

Source	VOC	CO_2e
Project Operation Fugitives	0.3	2,594

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

[8] 75 Federal Register 31-514

[9] The EPA uses the 100-year global warming potential in its analyses for greenhouse gases, as listed in the Intergovernmental Panel on Climate Change's Second Assessment Report.

General Conformity

A General Conformity applicability analysis is required for any part of the Project occurring in nonattainment or maintenance areas for criteria pollutants. Section 176(c) of the CAA requires federal agencies to ensure that federally approved or funded projects conform to the applicable approved SIP. Such activities must not:

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

General conformity does not apply to federal actions in attainment areas or unclassifiable/ attainment areas, including attainment areas located within an OTR. As detailed in section 7.1, all project activities would occur within unclassifiable/attainment areas; therefore, general conformity rules do not apply to the Project.

State Air Quality Regulations

Pennsylvania has adopted the NAAQS but maintains additional air quality standards under Title 25 of the Pennsylvania Code. Fugitive emissions regulations are outlined in 25 Pa. Code 123.1. For accepted fugitive emissions activities/sources, which include construction of buildings, clearing of land, and stockpiling of material, this section states that the following requirements must be met: 1) the emissions are of minor significance with respect to causing air pollution, and 2) the emissions are not preventing or interfering with the attainment or maintenance of an ambient air quality standard.

The fugitive emissions associated with the project modifications (new piping, pig launcher and receiver, and odorant facility) are estimated to be 0.26 ton per year of VOCs. This increase in emissions does not exceed the de minimis threshold of 1.0 ton per year of VOCs; therefore, these minor modifications are exempt from PADEP's Plan Approval requirement per 25 Pa. Code 127.14(b) and 127.449. Because the emissions associated with the project modifications are considered to be *de minimis* and exempt from permitting requirements, a quantitative impact assessment of air quality impacts is not required. On April 24, 2015, PADEP granted Tennessee's request for exemption and determined that a Plan Approval was not required.

7.2 Noise

Construction and operation of the proposed Project would affect the local noise environment. Two measurements used by 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 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. An additional 10 decibels (dB) are added to late night through early morning (10:00 p.m. to 7:00 a.m.) noise exposures to account for people's greater sensitivity to sound during nighttime hours. An L_{dn} of 55 dB on the A-weighted scale (dBA) is equivalent to a continuous L_{eq} noise level of 48.6 dBA.

The noticeable noise increase threshold for humans is about 3 dBA. A 5 dBA increase is clearly audible for humans, while an increase of 10 dBA is perceived to be a doubling of noise levels.

The EPA has indicated that an L_{dn} of 55 dBA protects the public from indoor and outdoor activity interference. We have adopted this criterion and use it to evaluate the potential noise impact from operation of compressor facilities. We have adopted this criterion for evaluating potential noise impacts from operation of compressor facilities. The State of Pennsylvania and Lenox Township do not have any noise requirements directly applicable to the proposed Project; however, Susquehanna County and Clifford Township have noise regulations that may apply. Susquehanna County Subdivision and Land Development Ordinance, Article VII – Commercial and Industrial, Section 707.4 restricts noise from industrial developments to 50 dBA at the neighboring landowners' property, measured at an occupied structure. Clifford Township Subdivision and Land Development Ordinance, Article XI - Commercial and Industrial, Section 1107.4 requires that audible noise from operation of a commercial or industrial development not exceed 55 dBA at the exterior of any occupied structure. The proposed Project does not include new compression or other support facilities that would result in operational noise levels; therefore, a baseline sound survey and acoustic modeling analysis were not requisite to demonstrate compliance with the applicable noise requirements.

7.2.1 Construction Activities

Construction activities associated with the Project would be performed with standard heavy equipment such as track-excavators, backhoes, bulldozers, dump trucks, and cement trucks. The most prevalent sound source during construction would be internal combustion engines used to power the construction equipment. Construction activities would temporarily increase ambient sound levels in the immediate vicinity of the aboveground facility construction sites, while noise associated with pipeline construction for the Project would be transitory in nature. Most construction activities would be limited to daytime hours, with the exception of the running of water pumps during hydrostatic testing, which would occur continuously until hydrostatic testing is complete. Noise from construction activities proceeding along the proposed 300-3 Line's right-of-way would not impact any location for an extended period of time, including construction within 50 feet of residences as described in section B.4.1.1.

Blasting may be needed due to the presence of lithic bedrock along the proposed route. The need for blasting would be determined by the construction contractors on a site-specific basis at the time of construction. If blasting becomes necessary, Tennessee has submitted an acceptable project-specific blasting plan that establishes procedures and safety measures that Tennessee's contractor would be required to follow while implementing blasting activities. In addition, Tennessee would follow the measures listed in section B.1.1.1, including preparing site-specific blasting plans for each area where blasting would be required and notifying nearby landowners prior to blasting activities.

As indicated above, the majority of Project construction activities would not affect nighttime noise levels as they would be limited to daylight hours. Those activities that would occur during nighttime hours (e.g., hydrostatic testing) are not major noise sources and would generally occur away from noise-sensitive areas (NSAs).

Additionally, in the event that a blowdown is required during construction, the noise generated is expected to be consistent with the noise from blowdowns that occur as part of operations at CS 321 and that are mitigated using the existing blowdown silencer.

Based on estimated sound levels and adherence to noise regulations, we conclude that the noise attributable to construction of the proposed facility would not cause a significant impact on the noise environment in the project area.

7.2.2 Operational Activities

The operation of the Project is anticipated to result in minimal changes to the existing operational noise associated with Tennessee's pipeline system. The installation of the additional odorant facility at CS 321 is expected to produce negligible sound levels relative to other on-site equipment. The sound generated by the existing on-site equipment would be considered dominant and the installation of the odorant facility would cause no appreciable increase in sound level. The odorant facility would be installed with the building, which would further mitigate any noise generated from the new equipment.

Based on the noise assessment presented above, we conclude that the noise attributable to the operation of the new facilities on the project area, including nearby noise-sensitive areas, would be minimal.

8. RELIABILITY AND SAFETY

The transportation of natural gas by pipeline involves some incremental risk to the public due to the potential for 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. The natural gas treated by the new odorant facility at CS 321, and downstream from CS 321 within the existing 300 Line and new 300-3 Loop, would contain a chemical odorant that produces the familiar "natural gas smell."

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 and burn if there is an ignition source. A flammable concentration within an enclosed space in the presence of an ignition source can explode. Methane is buoyant at atmospheric temperatures and disperses rapidly in air.

8.1 Safety Standards

The USDOT is mandated to prescribe minimum safety standards to protect against risks posed by pipeline facilities under 49 USC 601. The USDOT's Pipeline and Hazardous Materials Safety Administration (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 that set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety. PHMSA's safety mission is to ensure 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.

Title 49 USC 601 provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing the federal standards. A state may also act as USDOT's agent to inspect interstate facilities within its boundaries; however, the USDOT is responsible for enforcement actions.

For the Project, the state of Pennsylvania does not have delegated authority to inspect interstate pipeline facilities.

The USDOT pipeline standards are published in 49 CFR Parts 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 USDOT and FERC, the USDOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of FERC's regulations require that an applicant certify that it will 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. Alternatively, an applicant must certify that it has been granted a waiver of the requirements of the safety standards by the USDOT in accordance with section 3(e) of the Natural Gas Pipeline Safety Act. FERC accepts this certification and does not impose additional safety standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum to promptly alert the USDOT. 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.

FERC also participates as a member of the USDOT'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 USDOT 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 USDOT specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion.

The USDOT 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. For instance, pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil and 18 inches in consolidated rock. Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 36 inches in normal soil and 24 inches in consolidated rock.

Class locations also specify the maximum distance to a sectionalizing block valve (e.g., 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). Pipe wall thickness and pipeline design pressures, hydrostatic test pressures, maximum allowable operating

pressure, 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 determined based on the proximity of the pipeline centerlines to other nearby structures and manmade features. Class locations along the pipeline route include approximately 5.3 miles in Class 1 locations, 1.4 miles in Class 2 locations, and 0.3 mile in Class 3 locations. If a subsequent increase in population density adjacent to the right-of-way results in a change in that portion of the pipeline's class location, Tennessee would reduce the maximum allowable operating pressure or replace the segment with pipeline of sufficient grade and wall thickness, if required to comply with the USDOT regulations for the new class location.

The USDOT Pipeline Safety Regulations require operators to develop and follow a written integrity management program that contain all the elements described in 49 CFR 192.911 and address the risks on each transmission pipeline segment. The rule establishes an integrity management program which applies to all high consequence areas (HCAs). Tennessee's proposed pipeline route would not cross any HCAs.

The USDOT 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 (described in 49 CFR 192.903) satisfies, in part, the Congressional mandate for USDOT 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 [10] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle; [11] 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 for at least 50 days in any 12-month period; a building that is occupied by 20 or more persons on at least 5 days a week for any 10 weeks in any 12-month period; or a facility that is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate.

In the second method, an HCA includes any area within a potential impact circle that contains

- 20 or more buildings intended for human occupancy; or
- an identified site.

Once a pipeline operator has determined the HCAs along its pipeline, it must apply the elements of its integrity management program to those segments of the pipeline within HCAs. The USDOT regulations specify the requirements for the integrity management plan at 49 CFR 192.911. The pipeline

[10] The potential impact radius is calculated as the product of 0.69 and the square root of the maximum allowable operating pressure of the pipeline in pounds per square inch gauge multiplied by the square of the pipeline diameter in inches.

[11] The potential impact circle is a circle of radius equal to the potential impact radius.

integrity management rule for HCAs requires inspection of the pipeline HCAs every 7 years. Tennessee's proposed pipeline route would not cross any HCAs.

The USDOT 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 of a natural gas pipeline emergency. Key elements of the plan include procedures for:

- receiving, identifying, and classifying emergency events, gas leakage, fires, explosions, and natural disasters;
- establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;
- emergency system shutdown and safe restoration of service;
- making personnel, equipment, tools, and materials available at the scene of an emergency; and
- protecting people first and then property, and making them safe from actual or potential hazards.

The USDOT requires that each operator establish and maintain liaison with appropriate fire, police, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency, and to coordinate mutual assistance. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. Tennessee would provide the appropriate training to local emergency service personnel before the pipeline is placed in service.

8.2 Pipeline Accident Data

The USDOT requires all operators of natural gas transmission pipelines to notify the USDOT of any significant incident and to submit a report within 30 days. Significant incidents are defined as any leaks that:

- caused a death or personal injury requiring hospitalization; or
- involved property damage of more than $50,000 (1984 dollars).[12]

During the 20-year period from 1996 through 2015, a total of 1,310 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 B.8-1 provides a distribution of the causal factors as well as the number of each incident by cause.

The dominant causes of pipeline incidents are corrosion and pipeline material, weld or equipment failure, and excavation, constituting 66.7 percent of all significant incidents. The pipelines included in the data set in table B.8-1 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.

[12] $50,000 in 1984 dollars is approximately $115,000 as of March, 2014 (Consumer Price Index, Bureau of Labor Statistics, February 2014).

The frequency of significant incidents is strongly dependent on pipeline age. Older pipelines have a higher frequency of corrosion incidents and material failure, since corrosion and pipeline stress/strain is a time-dependent process.

The use of both an external protective coating and a cathodic protection system,[13] required on all pipelines installed after July 1971, significantly reduces the corrosion rate compared to unprotected or partially protected pipe.

TABLE B.8-1

Natural Gas Transmission Pipeline Significant Incidents by Cause (1996–2015) [a]

Cause	Number of Incidents	Percentage
Pipeline material, weld, or equipment failure	354	27.0
Corrosion	311	23.7
Excavation	210	16.0
All other causes [b]	165	12.6
Natural forces [c]	146	11.1
Outside force [d]	84	6.4
Incorrect operation	40	3.1
Total	**1,310**	**100**

[a] All data gathered from PHMSA's Oracle BI Interactive Dashboard website for Significant Transmission Pipeline Incidents, (USDOT, 2016a).

[b] All other causes include miscellaneous, unspecified, or unknown causes.

[c] Natural force damage includes earth movement, heavy rain, floods, landslides, mudslides, lightning, temperature, high winds, and other natural force damage.

[d] Outside force damage includes previous mechanical damage, electrical arcing, static electricity, fire/explosion, fishing/maritime activity, intentional damage, and vehicle damage (not associated with excavation).

Outside force, excavation, and natural forces are the cause in 33.5 percent of significant pipeline incidents nationwide from 1996 to 2015. 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 winds, storms, and thermal strains; and willful damage. Table B.8-2 provides a breakdown of outside force incidents by cause.

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 movement.

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.

[13] Cathodic protection is a technique to reduce corrosion (rust) of the natural gas pipeline through the use of an induced current or a sacrificial anode (like zinc) that corrodes at faster rate to reduce corrosion.

TABLE B.8-2

Excavation, Natural Forces, and Outside Force Incidents by Cause (1996–2015) [a]

Cause	Number of Excavation, Natural Forces, and Outside Force Incidents	Percentage of All Incidents [b,c]
Third party excavation damage	172	13.1
Heavy rain, floods, mudslides, landslides	74	5.7
Vehicle (not engaged with excavation)	49	3.7
Earth movement, earthquakes, subsidence	32	2.4
Lightning, temperature, high winds	27	2.1
Operator/contractor excavation damage	25	1.9
Unspecified excavation damage/previous damage	13	1.0
Other or unspecified natural forces	13	1.0
Fire/explosion	9	0.7
Fishing or maritime activity	9	0.7
Other outside force	9	0.7
Previous mechanical damage	6	0.5
Electrical arcing from other equipment/facility	1	0.1
Intentional damage	1	0.1
Total	440	33.5

[a] All data gathered from PHMSA's Oracle BI Interactive Dashboard website for Significant Transmission Pipeline Incidents (USDOT, 2016).

[b] Percentage of all incidents was calculated as a percentage of the total number of incidents natural gas transmission pipeline significant incidents (i.e., all causes) presented in table B.8-1.

[c] Due to rounding, column does not equal 33.6 percent.

8.3 Impact on Public Safety

The service incidents data summarized in table B.8-1 include pipeline failures of all magnitudes with widely varying consequences.

Table B.8-3 presents the average annual injuries and fatalities that occurred on natural gas transmission lines for the 5-year period between 2011 and 2015. These data have been separated into employees and nonemployees to better identify a fatality rate experienced by the general public. Fatalities among the public averaged 1.2 per year over the 5-year period from 2011 to 2015.

The majority of fatalities from pipelines are due to local distribution pipelines not regulated by FERC. These are natural gas pipelines that distribute natural gas to homes and businesses after transportation through interstate natural gas transmission pipelines. In general, these distribution lines are smaller diameter pipes and/or plastic pipes which are more susceptible to damage. Local distribution systems typically do not have large rights-of-way and pipeline markers common to the FERC regulated natural gas transmission pipelines.

TABLE B.8-3

Injuries and Fatalities—Natural Gas Transmission Pipelines [a]

	Injuries		Fatalities	
Year	Employees	Public	Employees	Public
2011	1	0	0	0
2012	3	4	0	0
2013	0	2	0	0
2014	1	0	1	0
2015	12	2	6	0

[a] Data gathered from PHMSA Pipeline Incident Flagged Files website (USDOT PHMSA, 2015).

The nationwide totals of accidental fatalities from various anthropogenic and natural hazards are listed in table B.8-4 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. The data nonetheless indicate a low risk of death due to incidents involving natural gas transmission pipelines compared to the other categories. Furthermore, the fatality rate is much lower than the fatalities from natural hazards such as lightning, tornados, or floods.

The available data show that natural gas transmission pipelines continue to be a safe, reliable means of energy transportation. From 1996 to 2015, there were national averages of 65.4 significant incidents, 9.1 injuries, and 2.3 fatalities per year. The number of significant incidents over the more than 300,000 miles of natural gas transmission lines indicates the risk is low for an incident at any given location. The operation of the Project would represent a slight increase in risk to the nearby public, and we are confident that with implementation of the required design criteria, the new pipeline facilities would be constructed and operated safely.

TABLE B.8-4

Nationwide Accidental Fatalities by Cause

Type of Accident	Annual Number of Deaths
Poisoning [a]	38,851
Motor vehicle [a]	35,369
Falls [a]	30,208
Drowning [a]	3,391
Fire, smoke inhalation, burns [a]	2,760
Floods [b]	81
Tornado [b]	72
Lightning [b]	49
Hurricane [b]	47
Natural gas distribution lines [c]	13
Natural gas transmission pipelines [c]	2

[a] Accident data presented for motor vehicle, poisoning, falls, drowning, fire, smoke inhalation, and burns represent the annual accidental deaths recorded in 2013 (Centers for Disease Control and Prevention, 2013).

[b] Accident data presented for floods, tornados, lightning, and hurricanes represent the 30-year average of accidental deaths between 1985 and 2014 (National Oceanic and Atmospheric Administration, 2016).

[c] Accident data presented for natural gas distribution lines and transmission pipelines represent the 20-year average between 1996 and 2015 (USDOT PHMSA, 2016).

9. CUMULATIVE IMPACTS

The first European settlements in Pennsylvania date back to the mid-seventeenth century. However, indigenous peoples who lived in large settlements and associated satellite villages occupied the state more than 15,000 years ago. Currently, the state is the sixth most populated state in America. Consequently, the natural environment has been modified numerous times over a very long period of occupation.

In accordance with NEPA, we identified other actions located in the vicinity of the proposed project facilities and evaluated the potential for a cumulative impact on the environment. As defined by the Council on Environmental Quality (CEQ), a cumulative effect is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. The CEQ guidance states that an adequate cumulative effects analysis may be conducted by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions. In this analysis, we consider the impacts of past projects within defined areas of influence as part of the affected environment (environmental baseline) which was described and evaluated in the preceding environmental analysis. However, present effects of past actions that are relevant and useful are also considered.

As described in section B of this is EA, constructing and operating the Project would temporarily and permanently impact the environment. The Project would impact geology, soils, water resources, wetlands, vegetation, fish, wildlife, cultural resources, some land uses, recreation, visual resources, air quality, and noise. However, throughout section B of this EA, we determined that the proposed Project would have only minimal or temporary impacts on these resources, with the exception of the long-term impacts on forested land and forested and scrub-shrub wetlands (further discussed below). We also concluded that nearly all of the project-related impacts would be contained within or adjacent to the temporary construction right-of-way and ATWS. For example, erosion control measures included in Tennessee's construction and restoration plans would keep disturbed soils within work areas. For other resources, the contribution to regional cumulative impacts is lessened by the expected recovery of ecosystem function. For example, vegetative communities would be cleared, but restoration would proceed immediately following construction. Additionally, we determined that air quality and noise impacts during construction would be temporary and that operation of the Project would not result in significant air emissions or changes to operational noise associated with Tennessee's pipeline system.

As noted above, the proposed Project is expected to have longer-term or permanent impacts on certain resources, including forested and scrub-shrub wetlands. Project impacts on wetlands range from short-term to permanent. Impacts on forested and scrub-shrub wetlands include long-term construction impacts and permanent operational impacts from clearing and maintenance activities. However, project impacts on these resources would be minimal, including 0.2 acre of long-term impact on both forested and scrub-shrub wetlands associated with construction, as well as 0.03 acre of permanent impacts on forested and scrub-shrub wetlands from operation of the Project. These impacts would be limited to the conversion of the vegetative cover, and these areas would retain their hydrologic function as wetlands. The proposed Project would also impact emergent wetlands, but following revegetation, these wetlands transition relatively quickly back into a community with functionality similar to that of the preconstruction state (typically within 1 to 3 years, but closer to 1 year or less in the project area). As a result, although project impacts would include long-term and permanent impact on wetlands, the extent of these impacts would be minimal and would not be significant; therefore, we conclude that the Project would not contribute to cumulative impacts on wetland resources.

Based on the colocation of the project pipeline with existing rights-of-way, Tennessee's implementation of impact avoidance, minimization, and mitigation measures as described in its construction and restoration plans, and adherence to our recommendations, we find that most of the project impacts would be largely limited to the 7-mile-long corridor followed by the pipeline.[14] Furthermore, we find that the impacts of the Project discussed above would generally be localized and minimal. Therefore, we conclude that project impacts would not be significant and would not contribute to cumulative impacts, with the possible exception of impacts on forested lands. As a result, we have related the scope of our analysis to the magnitude of environmental impacts on forested lands. Impacts on forested lands would be largely contained within or adjacent to proposed project workspaces. Due to the localized nature of potential project impacts on these resources, cumulative impacts were assessed for other projects occurring within a 0.5 mile radius of the proposed Project.

Consistent with the CEQ guidance and to determine cumulative impacts, we expanded the geographic boundary of our review into the region of influence. Table B.9-1 below summarizes the resource-specific regions of influence that were considered in this analysis. Actions located outside the region of influence are generally not evaluated because their potential to contribute to a cumulative impact diminishes with increasing distance from the Project.

Table 3 of appendix B identifies present and reasonably foreseeable projects or actions that occur within the region of influence of forested lands (i.e., 0.5 mile). These projects were identified by a review of publicly available information; aerial and satellite imagery; consultations with federal, state, and local agencies/officials and development authorities; and information provided by Tennessee, affected landowners, and concerned citizens.

TABLE B.9-1

Resource-Specific Regions of Influence

Resource	Cumulative Impact Region of Influence
Geology and Soils	Area of disturbance of the Project and other projects within 0.5 mile for geology and within 1 mile for soils
Water Resources, Wetlands, and Fisheries	Hydrologic Unit Code (HUC)-12 watershed boundary
Vegetation and Wildlife	0.5 mile from pipeline or aboveground facilities
Land Use and Recreation	5-mile radius
Visual	Distance that the tallest feature at the planned facility would be visible from neighboring communities
Socioeconomics (including Environmental Justice)	Affected counties and cities
Cultural Resources	Project area of disturbance and other projects in the vicinity of the Project, and the distance that the tallest feature at the planned facility would be visible from cultural or historic resource areas
Air Quality - Operations	Air emission sources within a 50-kilometer radius
Air Quality – Construction	0.25 mile from pipeline or aboveground facilities
Noise	Overlapping noise-sensitive areas during construction and operation (distance from facility at which there would no longer be a noticeable noise impact).

The actions considered in our cumulative impact analysis may vary from the proposed Project in

[14] Please note this narrow corridor is not the expanded area of our cumulative impacts review, it is only the area directly affected by the Project.

nature, magnitude, and duration. These actions are included based on the likelihood of completion near the proposed construction time span, and only projects with either ongoing impacts or that are "reasonably foreseeable" future actions were evaluated. Existing or reasonably foreseeable future actions that would be expected to affect similar resources during similar periods as the proposed Project were considered further. The anticipated cumulative impacts of the proposed Project and these other actions are discussed below, as well as any pertinent mitigation actions.

The Allegheny Defense Project provided comments requesting consideration of direct, indirect, and cumulative effects of the proposed Project (including shale natural gas extraction); consideration of connected, cumulative, and similar actions; and the preparation of a programmatic environmental impact statement (EIS). We discuss potential cumulative effects below, including identification of projects considered in this assessment. Resource-specific direct and indirect project impacts are addressed throughout section B of this EA. Consistent with previous Commission Determinations and as further discussed below, while this cumulative impact analysis considers natural gas production well and associated gathering line development, it is unknown when, or even if, these wells would be drilled. An in-depth analysis of Marcellus Shale wells, besides those identified in table 3 of appendix B and further analyzed in this section, is outside the scope of the analysis in this EA because the exact location, scale, and timing of these facilities are unknown. Regarding preparation of a programmatic EIS, the proposed Project represents regional development by private industry and is not part of a comprehensive federal program. Therefore, a programmatic EIS is not required.

As previously noted, the Project is being proposed to increase capacity to serve a natural gas-fired power plant, the Lackawanna Energy Center, under construction in Lackawanna County, Pennsylvania. The Lackawanna Energy Center was required to obtain approvals from the Borough of Jessup, PADEP for air emission and water quality permits, as well as from the Susquehanna River Basin Commission for water consumption. The Lackawanna Energy Center is located approximately 16.5 miles from the project area and is currently under construction. Construction of the Lackawanna Energy Center would overlap with the construction of the Triad Project. Although the Lackawanna Energy Center is not located within the cumulative impact areas of influence identified for the Triad Project, there is the potential that cumulative impact would result from the Project since it would occur at the same time as the Lackawanna Energy Center. The geographic extent and duration of disturbances caused by construction of the Triad Project would be minimal and further minimized by the implementation of the protective measures contained in Tennessee's Plan and Procedures. As a result, the cumulative effect on resources in the vicinity of the Project area expected to be minor.

9.1 Identified Projects

Based on the areas of influence described above for forested land cumulative impacts, we identified four other projects and multiple natural gas wells that were considered in the cumulative impact assessment.

The following projects listed in table 3 of appendix B are further considered in the analysis of forested land cumulative impacts:

- Tennessee's 300-Line Project;
- Tennessee's Northeast Upgrade Project (NEUP);
- Tennessee's Uniondale Expansion Project;
- Transcontinental Gas Pipe Line Company's (Transco's) Atlantic Sunrise Project;
- Williams Partners, LP (Williams) natural gas gathering pipelines; and
- natural gas wells.

Overall descriptions of these projects are provided in table 3 of appendix B, and more detailed descriptions are provided below.

Tennessee's 300-Line Project included construction of eight pipeline loops, construction of two compressor stations, and modification of seven compressor stations. Activities in Susquehanna County, Pennsylvania included construction of 4.5 miles of looping pipeline (a portion of Loop 321) and modifications to CS 321. The CS 321 modifications included replacement of three compressor drivers and compressor unit restaging, as well as replacement of existing gas turbine engines with three new gas turbine engines. Approximately 0.5 mile of Loop 321, extending east from CS 321 is located within the Project's region of influence.

Tennessee's NEUP Project included construction of 40 miles of pipeline in five loops and modification to existing compressor stations in Pennsylvania and New Jersey. Within Susquehanna County, Pennsylvania, Tennessee's NEUP Project included installation of a new compressor unit at CS 321, which is the only portion of the NEUP Project located within the Triad Project's cumulative impact region of influence.

Tennessee's Uniondale Expansion Project involved modifications at CS 321 and the existing Uniondale Meter Station. Modifications included addition of inlet air cooling systems to two CS 321engine units and addition of measurement equipment capable of delivering increased capacity at the meter station. The modifications to CS 321 are the only portions of the Uniondale Expansion Project located within the Triad Project's cumulative impact region of influence.

Transco's Atlantic Sunrise Project includes 197.7 miles of pipeline, of which 183.7 miles would be new greenfield pipeline. Aboveground facilities consist of two new compressor stations; modifications to three existing compressor stations; two new meter stations; three new regulator stations; and minor modifications at existing aboveground facilities to allow for bidirectional flow and the installation of supplemental odorization, odor detection, and/or odor masking/deodorization equipment. In Susquehanna County, Pennsylvania, the Atlantic Sunrise Project includes 6.7 miles of new 30-inch-diameter pipeline and construction of a new meter station with a pig launcher and receiver (Zick Meter Station). The Zick Meter Station and approximately 1 mile of pipeline would be located within the Project's cumulative impact region of influence west of Lenox, Pennsylvania.

Williams operates a variety of natural gas gathering pipelines in Pennsylvania, including within Susquehanna County. Approximately 3.1 miles of existing Williams natural gas gathering pipelines were identified within the Project's cumulative impact region of influence for impacts to forested lands.

While natural gas well development activities are outside of the Commission's jurisdiction and are under the jurisdiction of the PADEP and other resource agencies, clearing and construction activities associated with natural gas well development could result in impacts on forested lands. Thirty-nine permitted natural gas wells were identified in PADEP's online database (PADEP, 2015e) within 0.5 mile of the proposed project area. These wells are included in table 3 of appendix B and were assessed related to forested land cumulative impacts.

In addition to the Tennessee projects described above, there are two other Tennessee projects currently under review by the Commission associated with the 300 Line: the Susquehanna West and Orion Projects. We received comments requesting that these projects be included in our analysis of the Triad Project.

The Susquehanna West Project includes construction of approximately 8.1 miles of new pipeline along Tennessee's existing 300 Line in Tioga and Bradford Counties, Pennsylvania. Two existing

compressor stations, CS 317 and CS 319, would be modified to increase compression capacity. Additional piping modifications and minor equipment modifications would occur at both CS 317 and CS 319. In addition, there would be conducting piping modifications at CS 315 in Tioga County, Pennsylvania. The Orion Project includes the construction of approximately 12.9 miles of new looping pipeline and associated facilities. Modifications would also be made to the existing CS 323. The Susquehanna West and Orion Projects are located more than 20 miles away from the proposed Project. These projects are not located within the region of influence for cumulative impacts identified in table B.9-1; and are, therefore, not anticipated to contribute to cumulative impacts on resources in the vicinity of the Triad Project.

Additionally, the EA for the Susquehanna West Project issued on March 17, 2016 considered the following projects in the evaluation of cumulative impacts that are not included in the cumulative impact analysis for the Triad Project:

- Tennessee's Rose Lake Expansion Project;
- Tennessee's Northeast Supply Diversification Project;
- Tennessee's Northeast Energy Direct (NED) Project;
- Tennessee's and National Fuel Gas Supply Corporation's Northeast ConneXion – NY/NJ Project;
- Panda Power Funds' Liberty Power Project (Liberty Power Project); and
- natural gas wells within 0.5 mile of the Susquehanna West Project.

These projects are located outside of the proposed Project's region of influence and would not contribute to cumulative impacts when considered with the Project, with the exception of sources of air quality impacts within the 50-kilometer operational air quality region of influence. The proposed Project would not result in significant air emissions during operation given that no new facilities containing stationary emission sources would be constructed, no new emission generating units would be added to existing facilities, and no existing emission generating units would be modified as part of the Project. Therefore, the proposed Project would not contribute to cumulative operational air quality impacts. As further described below, we are including a summary of additive impacts associated with the Tennessee 300 Line projects within Susquehanna County in this analysis, which includes the ConneXion – NY/NJ Projects along with other 300 Line Projects. Tennessee's NED Project application to FERC was withdrawn on May 23, 2016; therefore, this project is no longer being proposed by Tennessee and has not been included in the cumulative impact analysis for the Triad Expansion Project.

We also received comments requesting that we consider Dominion Transmission's Leidy South Project, the Lackawanna Energy Center, and the Panda Power Stonewall Power Plant in our cumulative impact analysis for the Triad Project. Potential cumulative impacts associated with the Lackawanna Energy Center are discussed above. The nearest portion of the Leidy South Project is located greater 110 miles from the Project, and the Stonewall Power Plan is located greater than 205 miles from the Project. These two projects are located outside of the cumulative impact area of influence associated with the Project and would not result in cumulative impacts to resources in the project vicinity.

9.2 Potential Cumulative Impacts of the Proposed Action on Forested Lands

Impacts on forested lands include long-term construction impacts and permanent operational impacts from clearing and maintenance activities. This analysis considers cumulative impacts on forested areas from the proposed Project and other existing and planned projects within 0.5 mile. The other projects considered in this analysis include Tennessee's 300-Line Project, Tennessee's NEUP Project, Tennessee's Uniondale Expansion Project, Transco's Atlantic Sunrise Project, and natural gas wells.

Construction activities within the proposed project area of influence associated with Tennessee's NEUP and Uniondale Expansion Projects were completed entirely within Tennessee's existing fenced-in sites. As a result, there were no forested impacts associated with these projects within the area of influence. In addition, based on a review of the Atlantic Sunrise Project Draft EIS issued May 5, 2016, Transco is proposing 6.7 miles of pipeline and the Zick Meter Station in Susquehanna County; however, only approximately 1.0 mile of this pipeline is located within the area of influence of the proposed Project. Approximately 29.2 acres of forested land in Susquehanna County would be impacted by construction of the Atlantic Sunrise Project, and approximately 14.3 acres would be impacted by operation. Detailed quantification of impacts on forested lands is not available specifically for the 1.0 mile of pipeline located within the area of influence of the proposed Project; however, for the purpose of this assessment, we assumed that forested lands were evenly distributed along the 6.7 miles of pipeline within Susquehanna County. Therefore, about 15 percent of the total forested impacts, or 4.4 acres of construction impacts and 2.1 acres of operational impacts, were assumed to have occurred within the area of influence (FERC et al., 2016).

Based on information in the Atlantic Sunrise Project Draft EIS, we also identified several Williams natural gas gathering pipeline systems in the vicinity of the proposed Project. Based on a review of available information filed along with the Atlantic Sunrise Project, we identified approximately 3.1 miles of Williams gathering pipelines within the cumulative impact region of influence of the Project. We reviewed recent aerial photography (Google Earth, 2016) and estimated that approximately 17.8 acres of forested land were impacted by the construction of these gathering pipelines. Information regarding operational right-of-way needs for these pipelines was not available; therefore, we conservatively estimated that all of the forested lands impacted by construction of these pipelines would be impacted by the ongoing operation of these pipeline systems.

A portion of the 321 Loop associated with the 300-Line Project was constructed within the region of influence of the proposed Project. Overall, the 22.3-mile 321 Loop located in Susquehanna and Wayne Counties impacted 148.4 acres of forested land for construction and 25.1 acres of forested land for operation; however, only approximately 0.5 mile of this loop was located within the area of influence of the proposed Project. Detailed quantification of impacts on forested lands is not available specifically for this 0.5-mile section of the 321 Loop. This area is comprised of agricultural land and existing pipeline right-of-way through forested areas. Accordingly, only minimal impacts to forested areas would have occurred in the area of influence. However, for the purpose of this assessment, we assumed that forested land impacts were evenly distributed along the 22.3-mile loop. Therefore, about 2 percent of the total 321 Loop impacts, or 3 acres and 0.5 acre of construction and operational impacts, respectively, were assumed to have occurred within the area of influence.

Due to the limited forested impacts associated with the 300-Line Project in the area of influence, the 300-Line Project would not significantly contribute to cumulative impacts when considered with the proposed Project. Furthermore, the 300-Line Project and the proposed Project are looping projects, and previous Commission analyses have concluded that forest fragmentation is reduced with the colocation of looping projects (as compared to new, greenfield pipelines) because most of the forested lands impacted are already bisected by an existing right-of-way (FERC, 2015). We acknowledge, however, that these types of impacts widen the right-of-way corridor and move the edge effects into new areas of forest. Restoration of areas cleared for construction would proceed immediately following project completion. Because the 300-Line Project has already been placed in service, some of the construction impacts associated with the 300-Line Project have had time to begin regeneration, which further lessens the potential for regional cumulative impacts with the proposed future construction of the proposed Project.

Of the 39 natural gas wells listed in table 3 of appendix B, the status of 19 wells was noted as "operator reported not drilled" or "proposed but never materialized." In addition, only three of the

identified wells are listed as vertical wells. The remainder is horizontal wells, and single well pads frequently support multiple horizontal wells, which limits the surface disturbance associated with these wells. Based on a review of 2014 aerial photography (Google Earth, 2015) we estimate that seven well pads within the proposed project area of influence may have impacted forest resources. We estimate the long-term forested impacts associated with the development of these well pads to be approximately 65 acres, based on a review of recent aerial photography.

Forested impacts associated with the proposed Project include 37.9 acres of construction impacts and 11.0 acres of operational impacts. Based on the above analysis, potential cumulative impacts on forested areas in the area of influence could occur from construction and operation of the proposed Project in combination with natural gas well development activities. The cumulative forested impacts associated with the proposed Project and other projects within the area of influence for forested impacts are summarized in table B.9-2.

TABLE B.9-2

Summary of Cumulative Upland Forest Impacts for the Proposed Project

	Upland Forest (acres) [a]	
Project	Construction	Operation
Triad Expansion Project	37.9	11.0
Atlantic Sunrise Project [b]	4.4	2.1
Williams Natural Gas Gathering Pipelines [b]	17.8	17.8
300-Line (portion of 321 Loop) [c]	3.0	0.5
Natural Gas Production Wells [d]	65.0	65.0
Total	**128.1**	**96.4**

[a] Upland forested impacts identified within 0.5 mile of the Project.

[b] Impacts estimated based upon the Atlantic Sunrise Project Draft EIS issued May 5, 2016 and information included in the Atlantic Sunrise Project FERC docket (CP15-138).

[c] Impacts estimated based on total forested impacts of the 321 Loop, scaled for the portion of the 321 Loop within the 0.5 mile area of influence.

[d] Impacts estimated based on a review of 2014 aerial photography.

Tennessee would be required to restore vegetation in temporarily disturbed areas, and the other FERC jurisdictional projects in the region of influence would be held to the same restoration standards as the proposed Project. In addition, non-jurisdictional facilities would likely be held to similar standards by state permitting agencies. Furthermore, siting of the proposed Project within and adjacent to existing rights-of-way, where possible, along with implementation of BMPs and Tennessee's Plan and Procedures, minimizes and mitigates impacts to forested lands to the extent possible, such that the overall impact of these projects is not considered cumulatively significant.

In addition to the assessment of cumulative impacts, we are including a summary of additive impacts associated with the Tennessee 300 Line projects within Susquehanna County. Although the majority of the impacts described below are not within the area of influence for cumulative impacts for the Project, this information is provided to disclose total regional impacts associated with Tennessee's 300-Line system.

The additive forested land impacts from the existing and planned 300-Line projects in proximity to the proposed Project in Susquehanna County are summarized in table B.9-3.

The impacts on forested lands summarized in table B.9-3 are not continuous. Forested tracts are interspersed with various agricultural areas and other cleared, non-forested areas throughout the project

areas, and the projects generally include loops immediately adjacent to an existing maintained right-of-way. Consequently, forest fragmentation is already an existing condition of the environment. In addition, the impacts did not occur simultaneously in time, but were scattered over a multi-year period. This analysis concludes that the additive 300 Line impacts on forested lands are not significant when considered in the context of existing forest resources in Susquehanna County Pennsylvania, and the colocation of the projects with Tennessee's existing 300 Line.

TABLE B.9-3

Summary of Cumulative Upland Forest Impacts for the Proposed Project and Tennessee 300-Line Projects within Susquehanna County

	Upland Forest (acres) [a]	
Project	Construction	Operation
300-Line Project [b]	29.7	5.0
NEUP Project [c]	0	0
Uniondale Project [d]	0	0
ConneXion NY/NJ Project [e]	20.0	6.5
Triad Expansion Project	37.9	11.0
Total	**87.6**	**22.5**

[a] Impact acreages are associated with 300 Line activities in Susquehanna County, Pennsylvania

[b] 300-Line Project EA, table 2.4.1-1 (February 2010). Loop 321 impacts prorated for 4.5-mile loop in Susquehanna County.

[c] The NEUP EA, section 1.7.3.1 Modified Compressor Stations (November 2011).

[d] The Uniondale Expansion Project Environmental Assessment Report (July 24, 2013).

[e] Northeast ConneXion – NY/NJ Project EA, table 6 (October 2005). Additional information is available in the FERC's eLibrary under docket number CP05-355.

9.3 Conclusion

We identified recently completed, ongoing, and planned projects in the proposed project area that met the criteria for inclusion in the cumulative impacts study in table 3 in appendix B. We identified other projects in a 0.5-mile radius of the proposed Project, including Tennessee's 300-Line, NEUP, and Uniondale Expansion Projects, Transco's Atlantic Sunrise Project, and natural gas wells.

Based on our analysis, we concluded that the potential exists for cumulative impacts on upland forested areas as a result of construction and operation of the proposed Project. However, our analysis concluded that the Project effects on forest resources, when combined with other impacts on forested areas within the Project's region of influence, would not result in a significant impact on forest resources in the project area. Therefore, we conclude that the construction and operation of the Project, when combined with other past, present, and foreseeable future projects, would not result in significant cumulative impacts.

C. ALTERNATIVES

As required by NEPA and Commission policy, we identified and evaluated alternatives to the specific natural gas transmission facilities (and locations) comprising the Project as proposed by the Applicant in their application and associated supplements. Specifically, we evaluated the no action or postponed action alternative, and system alternatives. Aboveground facility site alternatives (including compressor station equipment alternatives) and alternative pipeline routes were not identified.

The purpose of this evaluation is to determine whether an alternative would be preferable to the proposed action. We generally consider an alternative to be preferable to a proposed action using three evaluation criteria, as discussed in greater detail below. These criteria include the alternative meets the stated purpose of the project, it is technically and economically feasible and practical, and it offers a significant environmental advantage over a proposed action.

Our evaluation of the identified alternatives is based on project-specific information provided by the Applicant, affected landowners, and other concerned parties; publicly available information; our consultations with federal and state resource agencies; and our expertise and experience regarding the siting, construction, and operation of natural gas transmission facilities and their potential impact on the environment. In evaluating alternatives, we considered and addressed, as appropriate, the comments provided to the Commission about possible alternatives.

1. PUBLIC COMMENTS

As described in section A.4, the Commission received several comments expressing concern about the Project. The comments primarily concerned impacts on waterbodies, land-use issues, and connected actions/cumulative impacts. Comments received during the scoping period are addressed in the applicable sections of the EA. One comment discussed a potential system change, which is further discussed in section A.4. None of the environmental comments received suggested that we evaluate specific alternatives.

2. EVALUATION PROCESS

Through environmental comparison and application of our professional judgement, each alternative is considered to a point where it becomes clear if the alternative could or could not meet the three evaluation criteria. To ensure a consistent environmental comparison and to normalize the comparison factors, we generally use desktop sources of information (e.g., publicly available data, GIS data, aerial imagery) and assume the same right-of-way widths and general workspace requirements. Where appropriate, we also use site-specific information (e.g., field surveys or detailed designs). As described previously, our environmental analysis and this evaluation only considers quantitative data (e.g., acreage or mileage) and uses common comparative factors such as total length, amount of collocation, and land requirements. Our evaluation also considers impacts on both the natural and human environments. Impacts on the natural environment include wetlands, forested lands, geology, and other common environmental resources. Impacts on the human environment include residences, roads, utilities, and industrial and commercial development near construction workspaces. In recognition of the competing interests and the different nature of impacts resulting from an alternative that sometimes exist (i.e., impacts on the natural environment versus impacts on the human environment), we also consider other factors that are relevant to a particular alternative or discount or eliminate factors that are not relevant or may have less weight or significance.

The purpose of the Project, which is described in greater detail in section A.2, is to provide additional firm transportation service to serve a new natural gas-fired power plant to be constructed in

Lackawanna County, Pennsylvania. Therefore, a preferable alternative must create similar transportation capabilities as those of the proposed action. An alternative that would significantly reduce or eliminate the price competitiveness of the transported natural gas would not satisfy the purpose for the project and is not a preferable alternative to the proposed action.

Many alternatives are technically and economically feasible. Technically practical alternatives, with exceptions, would generally require the use of common construction methods. An alternative that would require the use of a new, unique, or experimental construction method may not be technically practical because the required technology is not available or unproven. Economically practical alternatives would result in an action that generally maintains the price competitive nature of the proposed action. Generally, we do not consider the cost of an alternative as a critical factor unless the added cost to design, permit, and construct the alternative would render the project economically impractical.

Determining if an alternative provides a significant environmental advantage requires a comparison of the impacts on each resource as well as an analysis of impacts on resources that are not common to the alternatives being considered. The determination must then balance the overall impacts and all other relevant considerations. In comparing the impact between resources (factors), we also considered the degree of impact anticipated on each resource. Ultimately, an alternative that results in equal or minor advantages in terms of environmental impact would not compel us to shift the impacts from the current set of landowners to a new set of landowners.

One of the goals of an alternatives analysis is to identify alternatives that avoid significant impacts. In section B, we evaluated each environmental resource potentially affected by the Project and concluded that constructing and operating the Project would not significantly impact these resources. Consistent with our conclusions, the value gained by further reducing the (not significant) impacts of the Project when considered against the cost of relocating the route/facility to a new set of landowners was also factored into our evaluation.

3. NO-ACTION OR POSTPONED ACTION ALTERNATIVE

Under the No-Action Alternative, Tennessee would not implement the proposed action. The No-Action Alternative would avoid the potential environmental impacts associated with construction of the Project; however, the Project's objective would not be met, of Tennessee to provide firm transportation service to a new natural gas-fired power plant.

Other natural gas transmission companies would be required to increase their capacity and construct new facilities to meet the known demand for additional capacity at the power plant. Such actions would likely transfer impacts from one location to another, but would not eliminate or necessarily reduce impacts and may have larger environmental impacts than the Project. The No-Action Alternative would result in a lost or delayed opportunity to provide firm transportation service to the power plant with limited environmental impact.

4. SYSTEM ALTERNATIVES

System alternatives are alternatives to the proposed actions that would meet the project objectives, but would use existing or modified pipeline systems or a different configuration of pipeline facilities that would render all or part of the proposed facilities unnecessary.

We evaluated technically feasible system alternatives in terms of their ability to meet the project objectives, namely to provide firm transportation capacity for 180,000 dekatherms per day to the new

Lackawanna Energy Center in Lackawanna County, Pennsylvania. Two options on Tennessee's system were considered: new pipeline looping and new compression.

4.1 Pipeline Looping Alternative

Looping involves expanding the existing pipeline system by modifying existing facilities and using existing rights-of-way to increase the capacity of the existing pipeline. Looping installs a segment of pipeline adjacent to an existing pipeline and connected to the existing pipeline at both ends. The hydraulics of the system determine the location and sizing of loops.

Loop Alternative 1

We evaluated a looping alternative that would require construction of approximately 8.0 miles of 36-inch-diameter pipeline looping west of the proposed Project. While this alternative would affect fewer structures than the proposed Project (18 structures located within 200 feet of the alternative loop versus 23 structures located within 200 feet of the proposed Project), this alterative would require construction in steep terrain and affect 3.8 more miles of forested land and 109 more feet of wetlands than the proposed Project, increasing construction complexity and resulting in higher costs. While this alternative would meet the purpose and need and is technically and economically feasible and practical, it presents no environmental advantage over the proposed Project. Table C.4-1 provides a comparison of Loop Alternative 1 to the proposed Project.

Loop Alternative 2

We also evaluated a looping alternative with construction of approximately 8.0 miles of 36-inch-diameter loop on either side of CS 321. The west side of this looping alternative would require 5.25 miles of new looping, and the east side would require 2.75 miles of new looping. The area involved in this alternative would include the steep terrain of Elk Mountain, have three more structures along the right-of-way than the proposed Project (26 versus 23 structures), affect 3.5 more miles of forested land, and have higher construction complexity than the proposed Project. While this alternative would meet the purpose and need and is technically and economically feasible and practical, it presents no environmental advantage over the proposed Project. Table C.4-1 provides a comparison of Loop Alternative 2 to the proposed Project.

TABLE C.4-1

Comparison of System Alternatives

Aspect	Unit	Proposed Project	Looping Alternative 1	Looping Alternative 2	Compression Alternative
Length of new pipeline	Miles	7.0	8.0	8.0	0
Construction right-of-way	Acres	162.4	145.5	145.5	40
New permanent right-of-way	Acres	6.0	48.5	48.5	40
New aboveground facility land impacts (temporary / permanent)	Acres	8.1 / 0.2	0 / 0	0 / 0	40
Road crossings	Number	14	11	14	0
Public land crossings	Miles	0	0	0	0
Structures within 200 feet	Number	23	18	26	0
Wetlands crossed	Feet	894	1,003	316.8	0
Waterbodies crossed	Number	14	10	10	0
Steep terrain crossed	Feet	1,320	1,372.8	2,164.8	0
Forested areas crossed	Miles or acres	1.8 miles	5.6 miles	5.3 miles	20 acres
Agricultural land affected	Miles or acres	1.2 miles	1.5 miles	1.7 miles	20 acres
Additional compression	Horsepower	0	0	0	10,000
New noise source	Number	0	0	0	1
Fuel efficiency	Comparative	Base case	Comparable	Comparable	Higher
Meets purpose and need	Comparative	Yes	Yes	Yes	Yes
Technical feasibility	Comparative	Yes	Yes	Yes	Yes
Environmental impacts	Comparative	Base case	Different but comparable	Higher	Higher
Economic efficiency	Comparative	Base case	Lower	Lower	Lower

4.2 Compression Alternative

Compression options involve either the addition of more compressor horsepower at existing facilities or the installation of a new compressor station facility. To achieve the project objectives, we identified one possible compression alternative. This alternative requires development of a new compressor station requiring approximately 40 acres of new greenfield construction. The compressor station would add approximately 10,000 horsepower of capacity between the existing CS 319 and CS 321 to overcome the loss of capacity from loop elimination. Other upgrades to existing compressor stations, without looping, did not offer the same reliability and flexibility on the system.

The new station would require permanent clearing of trees and other vegetation and installation of permanent access roads, fencing, buildings, and other appurtenance equipment. Construction would require permanent land use conversion of the 40-acre area and would present a new source of light, air emissions, and noise. The general location of a new compressor station that would be required for this alternative would impact approximately 20 acres of forested land and 20 acres of agricultural land, based on an assessment of land use in the general study area. The new station would, however, eliminate the need for 7.0 miles of new pipeline construction, which would eliminate 14 waterbody crossings, 14 road crossings, and impacts on wetlands and other land use impacts along the pipeline route. A more detailed comparison of this alternative to the proposed Project is presented in table C.4-1. This alternative also comes at higher project operating and fuel cost than the proposed Project, resulting in higher GHG emissions than the proposed Project.

This alternative meets the purpose and need, is technically feasible, and has some environmental advantages as well as disadvantages over the proposed Project. This alternative would have different environmental impacts from the proposed Project; however, the impacts associated with this alternative would be comparable or possibly lower. The impacts of the compressor station noise source and aboveground facility are permanent, while the bulk of the proposed project impacts are temporary (such as waterbody crossings) or adjacent to the existing right-of-way.

4.3 Comparison of System Alternatives to the Proposed Project

Table C.4-1 summarizes the comparison of the system alternatives to the proposed Project. We conclude that the system alternatives identified would not provide a significant environmental advantage over the proposed Project.

5. ALTERNATIVE PIPELINE ROUTES

Route alternatives are alternatives that differ from the proposed route and may be major and deviate from the proposed route for an extended distance, or minor and deviate from the proposed route for a short distance. The proposed routes for the pipeline loops are primarily colocated within and adjacent to Tennessee's existing 300 Line right-of-way. Any newly identified alternative pipeline route would involve development of new right-of-way, resulting in greater environmental impacts than the proposed pipeline route. Since the proposed Project is colocated within existing rights-of-way, we did not identify any routing alternatives that could result in a reduced environmental impact. In addition, we did not receive any comments requesting that we consider any pipeline route alternatives.

6. ABOVEGROUND FACILITY SITE ALTERNATIVES

There are no modifications to or construction of new major aboveground facilities associated with the proposed Project. The only aboveground alternative evaluated was the compression alternative in section C.4.2.

D. CONCLUSIONS AND RECOMMENDATIONS

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

1. Tennessee 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. Tennessee 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 the 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**, Tennessee 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**, Tennessee 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.

    Tennessee'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. Tennessee's right of eminent domain granted under NGA section 7(h) does not

authorize them to increase the size of their 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. Tennessee 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 our Plan and/or minor field realignments per landowner needs and requirements that 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**, Tennessee shall file an Implementation Plan with the Secretary for review and written approval by the Director of OEP. Tennessee must file revisions to their plan as schedules change. The plan shall identify:

   a. how Tennessee 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 Tennessee 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 on-site construction and inspection personnel;

   c. the number of EIs assigned, and how Tennessee will ensure that sufficient personnel are available to implement the environmental mitigation;

   d. Tennessee 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 Tennessee will give to all personnel involved with construction and restoration (initial and refresher training as the Project progresses and personnel change);

f. Tennessee personnel (if known) and specific portion of Tennessee's organization having responsibility for compliance;

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

h. for each discrete facility, a Gantt or Program Evaluation Review Technique (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 on-site personnel;
(3) the start of construction; and
(4) the start and completion of restoration.

7. Beginning with the filing of its Implementation Plan, Tennessee shall file updated status reports with the Secretary on a **biweekly 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 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 Tennessee from other federal, state, or local permitting agencies concerning instances of noncompliance, and Tennessee's response.

8. **Prior to receiving written authorization from the Director of OEP to commence construction of any project facilities**, Tennessee shall file with the Secretary documentation that it has received all applicable authorizations required under federal law (or evidence of waiver thereof).

9. Tennessee must receive written authorization from the Director of OEP **before placing the Project into service**. Such authorization will only be granted following a determination that rehabilitation and restoration of the right-of-way and other areas affected by the Project are proceeding satisfactorily.

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

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

    b. identifying which of the Certificate conditions the company 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. **Prior to construction,** Tennessee shall prepare a schedule identifying when trenching or blasting will occur within each waterbody greater than 10 feet wide, or within any coldwater fishery. Tennessee shall file, with **at least 14 days advance notice**, the schedule with the Secretary and revise it as necessary. Changes within this last 14 day period must provide for **at least 48 hours advance notice**.

12. **Prior to construction**, Tennessee shall file with the Secretary a copy of the final PADEP Chapter 105 Water Obstruction and Encroachment Permit for the Project documenting the instream work windows for the following waterbodies: Partners Creek, Sterling Brook, Nine Partners Creek, Tunkhannock Creek and its tributaries, Mud Pond, unnamed tributaries to Tower Branch, and tributaries to Lake Idlewild, as requested by the PAFBC, and incorporate the appropriate time windows into its final construction plans.

13. **Prior to construction**, Tennessee 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 for the residence at MP 1.1 where Project construction work areas would be within 10 feet of a residence.

14. **Prior to construction**, Tennessee shall file with the Secretary, for the review and written approval of the Director of OEP, a plan to reduce tree clearing on each parcel of land enrolled in the Clean and Green Program that would be crossed by the pipeline as necessary to ensure the property remains eligible for the program. In the event Tennessee is not able to avoid disqualifying a property from the program, Tennessee shall describe how it would compensate the affected landowner.

E. References

U.S. Department of Labor. 2007. Consumer Price Index - Bureau of Labor Statistics. Census of Occupational Injuries. Available online at http://www.bls.gov/iif/. Accessed April 2016.

U.S. Environmental Protection Agency. 2016. Sole Source Aquifers for Drinking Water. Available online at https://www.epa.gov/dwssa. Accessed April 2016.Federal Emergency Management Agency. 2014. National Flood Hazard Layer (Official). Available online at http://fema.maps.arcgis.com/home/. Accessed October 2015.

Federal Energy Regulatory Commission. 2015. Order on Remand: Issued November 19, 2015. Available online at https://www.ferc.gov/whats-new/comm-meet/2015/111915/C-2.pdf. Accessed February 2016.

Federal Energy Regulatory Commission and U.S. Army Corps of Engineers (cooperating agency). 2016. Atlantic Sunrise Project Draft Environmental Impact Statement: Issued May 2016. Available online at http://www.ferc.gov/industries/gas/enviro/eis/2016/05-05-16-eis.asp. Accessed May 2016.

Google Earth. 2015. V 7.1.5.1557. Google Incorporated. Imagery date May 10, 2014.

Google Earth. 2016. V 7.1.5.1557. Google Incorporated. Imagery date May 10, 2014.

National Oceanic and Atmospheric Administration. 2016. National Hazard Statistics, 30-Year Average (1985–2014). National Weather Service, Office of Climate, Water and Weather Services. Available online at http://www.nws.noaa.gov/om/hazstats.shtml. Accessed February 17, 2016.

Natural Resources Conservation Service Soil Survey Division Staff. 1993. Soil Survey Manual. Soil Conservation Service. U.S. Department of Agriculture Agricultural Handbook 18.

Natural Resources Conservation Service Soil Survey Staff . 2015a. Web Soil Survey. U.S. Department of Agriculture. Available online at: http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm. Accessed October 2015.

Natural Resources Conservation Service Soil Survey Staff. 2015b. Official Soil Series Descriptions. U.S. Department of Agriculture. Available online at: https://soilseries.sc.egov.usda.gov/osdname.asp. Accessed October 2015.

Padamonsky, S. and R. Peltier. 2015. Phase I Archaeological Investigations Report, Triad Expansion Project. ER# 2015-0832-115-A, Susquehanna County, July 2015. Technical report prepared for Tennessee Gas Pipeline Company, LLC by Tetra Tech, Inc.

Padamonsky, S. and K. Stuck. 2016. Addendum Phase I Archaeological Investigations Report, Triad Expansion Project. ER# 2015-0832-115, Susquehanna County, February 2016. Technical report prepared for Tennessee Gas Pipeline Company, LLC by Tetra Tech, Inc.

Peltier, R. 2015. Phase I Historic Architecture Survey Report, Triad Expansion Project. ER# 2015-0832-115-A, Susquehanna County, March 2015. Technical report prepared for Tennessee Gas Pipeline Company, LLC by Tetra Tech, Inc.

Pennsylvania Department of Conservation and Natural Resources. 2014. Areas of Pennsylvania Susceptible to Landslides. Available online at http://www.dcnr.state.pa.us/topogeo/hazards/landslides/sliedareas/index.htm. Accessed October 2015.

Pennsylvania Department of Conservation and Natural Resources. 2015. Landforms of Pennsylvania. Available online at http://www.dcnr.state.pa.us/topogeo/field/map13/index.htm. Accessed October 2015.

Pennsylvania Department of Environmental Protection. 2015a. Coal Mining Operations. Available online at http://www.pasda.psu.edu/. Accessed October 2015.

Pennsylvania Department of Environmental Protection. 2015b. Industrial Mineral Mining Operations. Available online at http://www.pasda.psu.edu/. Accessed October 2015.

Pennsylvania Department of Environmental Protection. 2015c. Oil & Gas Locations – Conventional Unconventional. Available online at http://www.pasda.psu.edu/. Accessed October 2015.

Pennsylvania Department of Environmental Protection. 2015d. Regulated Storage Tank Cleanup Incidents Database. Available online at http://www.depreportingservices.state.pa.us/ReportServer/Pages/ReportViewer.aspx?/Cleanup/Tank_Cleanup_Incidents. Accessed January 15, 2016

Pennsylvania Department of Environmental Protection. 2015e. Oil & Gas Locations – Conventional Unconventional. Available online at http://www.pasda.psu.edu/. Accessed October 2015

Stuck, K. and S. Johnston. 2015. Phase II Archaeological Investigations Report, Triad Expansion Project. ER# 2015-0832-115-A, Susquehanna County, July 2015. Technical report prepared for Tennessee Gas Pipeline Company, LLC by Tetra Tech, Inc.

U.S. Census Bureau. 2010. Statistical Abstract of the United States (129th Edition). Washington: DC. Available online at http://www.census.gov/statab. Accessed February 17, 2015.

U.S. Energy Information Administration. 2014a. Annual Energy Outlook 2014 with Projections to 2040. April 2014. Available online at http://www.eia.gov/forecasts/aeo/. Accessed December 2015.

U.S. Department of Health and Human Services. 2016. National Vital Statistics Report, Vol. 64, No. 2, dated February 16, 2016. Centers for Disease Control and Prevention, National Center for Health Statistics. Available online at http://www.cdc.gov/nchs/data/nvsr/nvsr64/nvsr64_02.pdf. Accessed April 2016.

U.S. Department of Transportation. 2015. U.S. Oil and Gas Pipeline Mileage. Available online at http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_01_10.html. Accessed September 2015.

U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration. 2014. Significant Incident Files: 20-Year Average. Available online at http://primis.phmsa.dot.gov/comm/reports/safety/. Accessed on March 25, 2014.

U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration. 2015. Pipeline Incident Flagged Files Website. Available online at http://phmsa.dot.gov/pipeline/library/data-stats/flagged-data-files. Accessed on March 6, 2015.

U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration. 2016. Oracle BI Interactive Dashboard Website for Significant Transmission Pipeline Incidents. Available online at http://www.phmsa.dot.gov/pipeline/library/data-stats. Accessed on February 17, 2016.

U.S. Geological Survey. 1997. Ground Water Atlas of the United States: Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, Virginia, West Virginia. Available online at http://pubs.usgs.gov/ha/ha730/gwa.html. Accessed October 2015.

U.S. Geological Survey. 2006b. Quaternary Fault and Fold Database of the United States. Available online at: http://earthquake.usgs.gov/hazards/qfaults/http://earthquakes.usgs.gov/regional/qfaults/. Accessed October 2015.

U.S. Geological Survey. 2014. 1:250,000-scale Hydrologic Units of the United States. Available online at http://water.usgs.gov/GIS/metadata/usgswrd/XML/huc250k.xml. Accessed October 2015.

U.S. Geological Survey. 2015. Pennsylvania geologic map data. Available online at http://mrdata.usgs.gov/geology/state/state.php?state=PA. Accessed October 2015.

Weary, D.J., and Doctor, D.H. 2014. Karst in the United States: A digital map compilation and database. U.S. Geological Survey Open-File Report 2014-1156. Available online at http://pubs.usgs.gov/of/2014/1156/. Accessed October 2015.

Appendix A

Project Maps

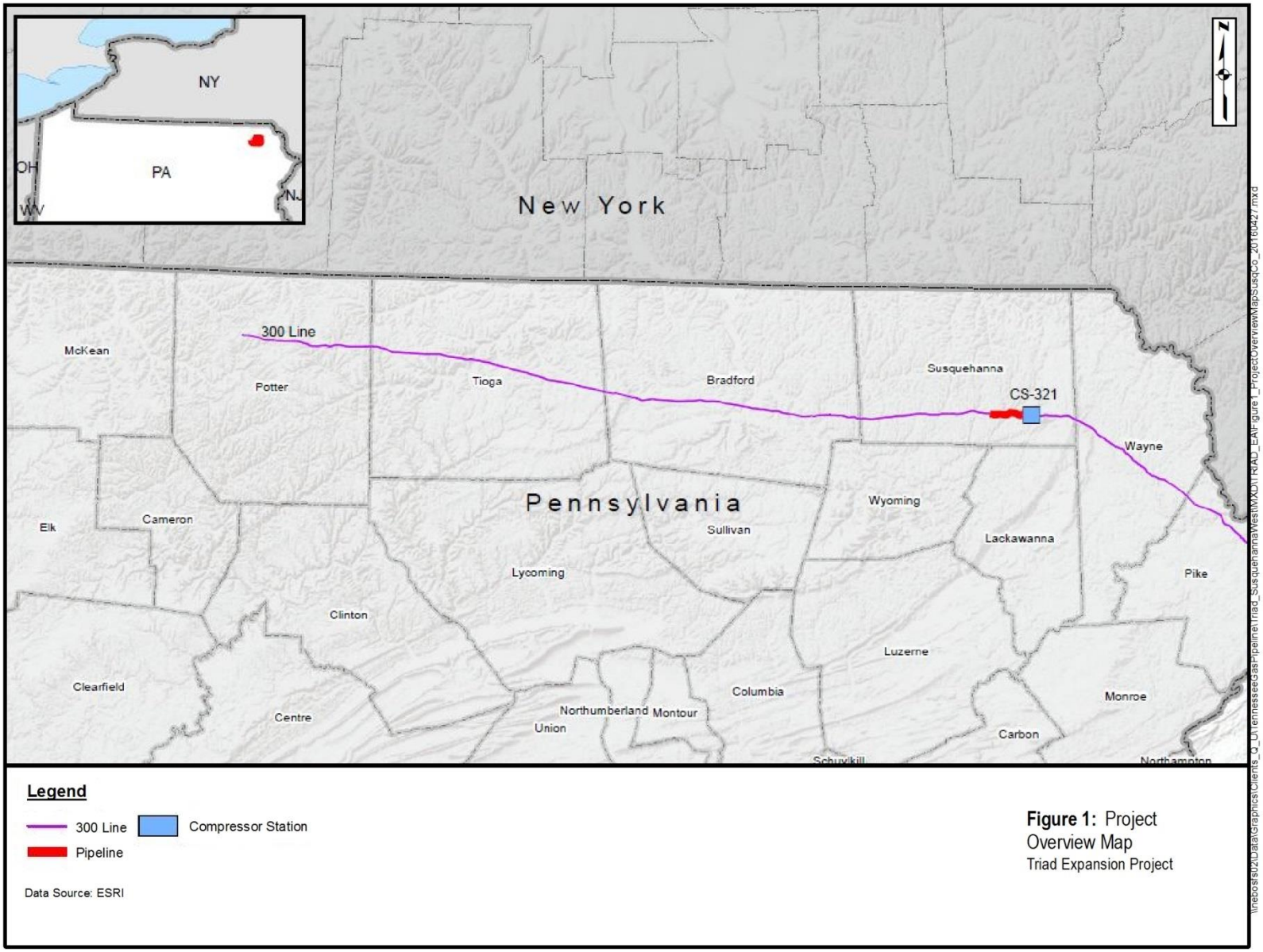

Figure 1: Project Overview Map
Triad Expansion Project

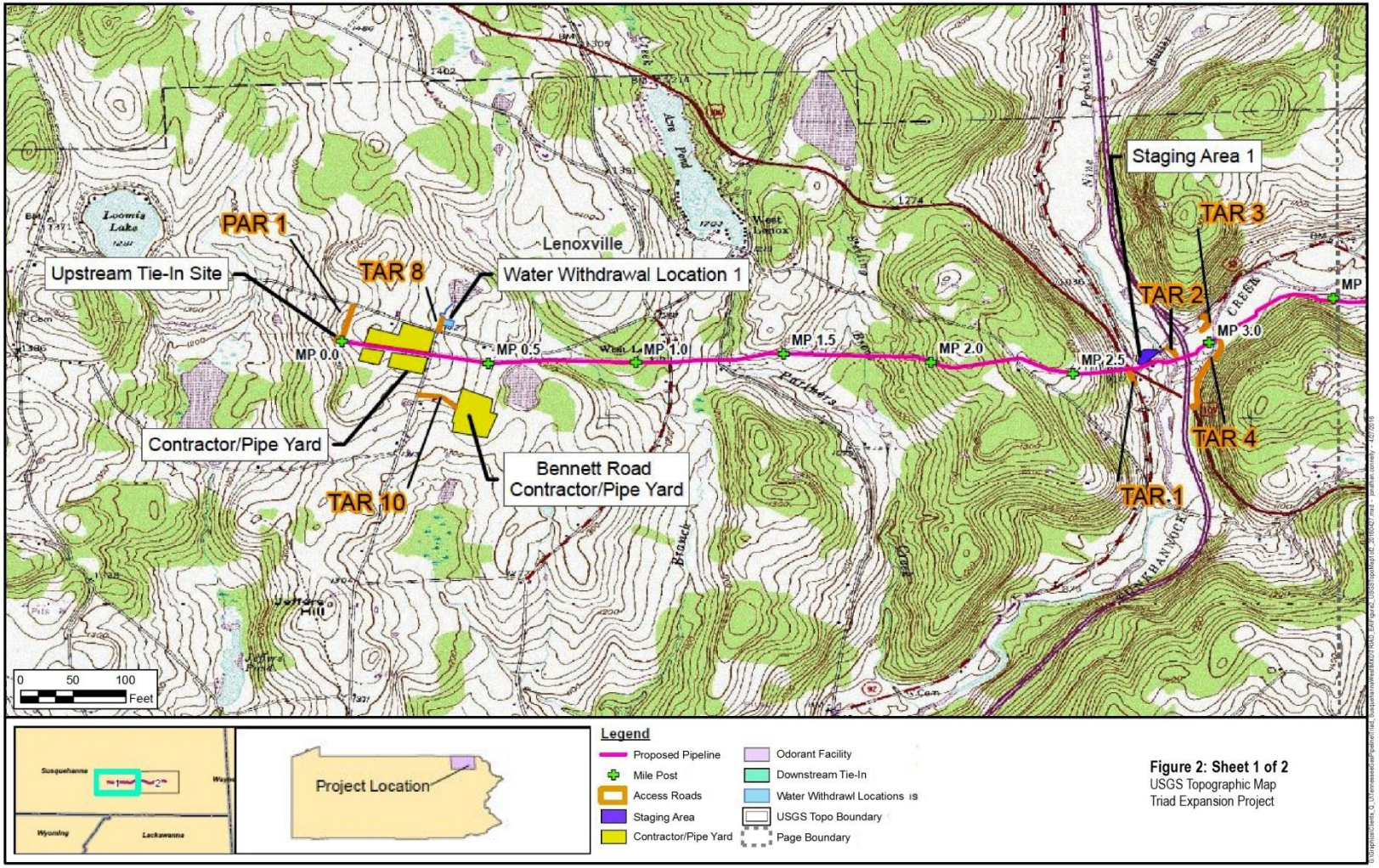

Figure 2: Sheet 1 of 2
USGS Topographic Map
Triad Expansion Project

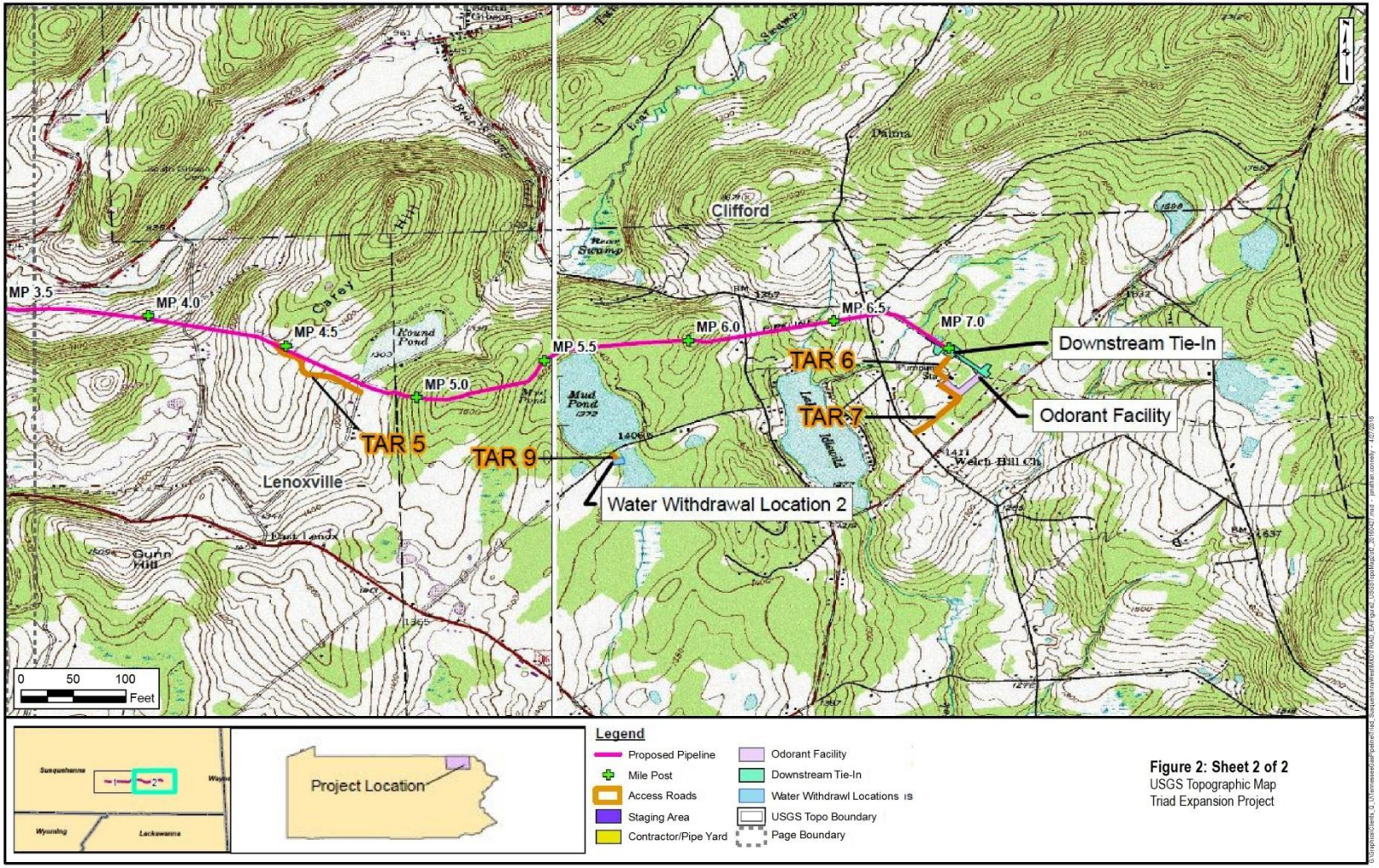

Figure 2: Sheet 2 of 2
USGS Topographic Map
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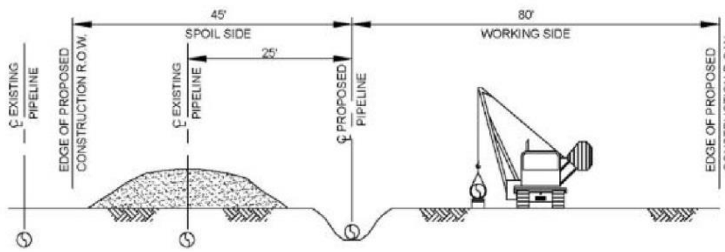
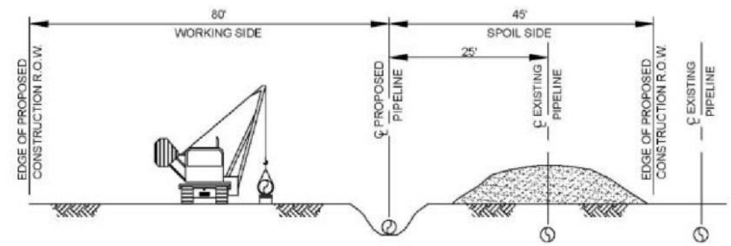


PROFILE
(NOT TO SCALE)



NOT TO SCALE

NOTES:

1. CONSTRUCTION RIGHT-OF-WAY WILL TYPICALLY BE 125' WIDE CONSISTING OF 25' OF PERMANENT EASEMENT AND 100' OF TEMPORARY WORKSPACE. IN MOST LOCATIONS, 45' OF TEMPORARY WORKSPACE WILL BE LOCATED WITHIN THE PERMANENT R.O.W. OF THE EXISTING PIPELINE. EXTRA TEMPORARY WORKSPACE WILL BE NECESSARY AT MAJOR ROAD, RAIL, RIVER CROSSINGS AND OTHER SPECIAL CIRCUMSTANCES, AS REQUIRED. CERTAIN SITUATIONS MAY REQUIRE A NARROWER WIDTH.
2. LEAVE GAPS IN SPOIL PILES AT OBVIOUS DRAINAGES. DO NOT PUSH UPLAND SOILS INTO CREEKS OR WETLANDS. DO NOT USE TOPSOIL FOR PADDING. AVOID SCALPING VEGETATED GROUND SURFACE WHEN BACKFILLING TOPSOIL AND SPOIL PILES.
3. THE OFFSET FROM EXISTING PIPELINE, WHERE APPLICABLE, WILL BE 25', BUT MAY BE INCREASED OR DECREASED DEPENDING ON THE SITE SPECIFIC CONSTRUCTION REQUIREMENTS.
4. SAME LAYOUT APPLIES WHERE CONSTRUCTION R.O.W. DOES NOT ABUT EXISTING R.O.W.
5. BOTTOM OF TRENCH WIDTH WILL BE AN AVERAGE OF 5' (TYPICAL) HOWEVER, UNDER CERTAIN CIRCUMSTANCES, THE TRENCH MAY BE A MAXIMUM OF 10' WIDE.

Figure 3:
Typical Construction Right-of-Way Cross Section
Triad Expansion Project

Appendix B

Oversized Tables

Table 1

Common Wildlife in the Project Area

Wildlife Habitats	Species	
	Common Name	Scientific Name
Upland Forest	White-tailed deer	*Odocoileus virginianus*
	American black bear	*Ursus americanus*
	American beaver	*Castor canadensis*
	Porcupine	*Erethizon dorsatum*
	Eastern chipmunk	*Tamias striatus*
	Groundhog	*Marmota monax*
	Cottontail rabbit	*Sylvilagus floridanus*
	Mouse	*Peromyscus sp.*
	Grey squirrel	*Sciurus carolinensis*
	Raccoon	*Procyon lotor*
	Gray fox	*Urocyon cinereoargenteus*
	Red fox	*Vulpes vulpes*
	Striped skunk	*Mephitis mephitis*
	Coyote	*Canis latrans*
	Northern short-tailed shrew	*Blarina brevicauda*
	White-footed mouse	*Peromyscus leucopus*
	Small-footed myotis	*Myotis leibii*
	Silver-haired bat	*Lasionycteris noctivagans*
	Little brown bat	*Myotis lucifugus*
	Big brown bat	*Eptesicus fuscus*
	Fisher	*Martes pennanti*
	Bald eagle	*Haliaeetus leucocephalus*
	Canada warbler	*Wilsonia Canadensis*
	Black-billed cuckoo	*Coccyzus erythropthalmus*
	Blue-winged warbler	*Dendroica cerulean*
	Red-headed woodpecker	*Melanerpes erythrocephalus*
	Wood thrush	*Hylocichla mustelina*
	Worn-eating warbler	*Helmitheros vermivorum*
	Kentucky warbler	*Oporomis formosus*
	Black-billed cuckoo	*Coccyzus erythropthalmus*
	Cerulean warbler	*Dendroica caerulea*
	Prothonotary warbler	*Protonotaria citrea*
	Yellow-bellied flycatcher	*Empidonax flavescens*
	Swainson's thrush	*Catharus ustulatus*
	Red-backed salamander	*Plethodon cinereus*
	Slimy salamander	*Plethodon glutinosus*
	Eastern garter snake	*Thamnophis sirtalis*
	Red spotted newt	*Notophthalmus viridescens*
	Snapping turtle	*Chelydra serpentine*
	Northern black racer	*Coluber constrictor*
	Black rat snake	*Elaphe allegheniensis*
	Northern coal skink	*Plestiodon anthracinus anthracinus*
	Milk snake	*Lampropeltis triagulum*
	Red-bellied snake	*Storeria occipitomaculatum*
	Timber rattlesnake	*Crotalus horridus*
	Wild turkey	*Meleagris gallopavo*
	Rock pigeon	*Columba livia*
	European starling	*Sturnus vulgaris*
	House sparrow	*Passer domesticus*
	Ruffed grouse	*Bonasa umbellus*
	Ring-necked pheasant	*Phasianus colchicus*

Table 1

Common Wildlife in the Project Areas (cont'd)

Wildlife Habitats	Species	
	Common Name	Scientific Name
Open Lands	Meadow vole	*Microtus pennsylvanicus*
	Prairie warbler	*Dendroica discolor*
	Red-headed woodpecker	*Melanerpes erythrocephalus*
	Short-eared owl	*Asio flammeus*
	Gold-winged warbler	*Vermivora chrysoptera*
	Black-billed cuckoo	*Coccyzus erythropthalmus*
	Smooth green snake	*Liochlorophis vernalis*
Aquatic Habitat	Northern water shrew	*Sorex palustris albibarbis*
	Muskrats	*Ondatra zibethicus*
	American bittern	*Botaurus lengtiginosus*
	Pied-billed grebe	*Podilymbus podiceps*
	Least bittern	*Ixobrychus exilis*
	Rusty blackbird	*Euphagus carolinus*
	Louisiana waterthrush	*Parkesia motacilla*
	Black-billed cuckoo	*Coccyzus erythropthalmus*
	Bull frog	*Rana catesbeiana*
	Pickerel frog	*Rana palustris*
	Northern leopard frog	*Rana pipiens*
	Spring peeper	*Pseudacris crucifer*
	Northern dusky salamander	*Desmognathus fuscus*
	Mountain dusky salamander	*Desmognathus ochrophaeus*
	Two-lined salamander	*Eurycea bislineata),*
	Long-tailed salamander	*Eurycea longicauda*
	Northern spring salamander	*Gyrinophilus porphyriticus*
	Brilliant northern red salamander	*Pseudotriton ruber*
	Eastern hellbender	*Cryptobranchus alleganiensis*
	Painted turtle	*Chrysemys picta*
	Wood turtle	*Glyptemys insculpta*
	Northern water snake	*Nerodia sipedon*
Wetlands	Muskrats	*Ondatra zibethicus*
	Northern water shrew	*Sorex palustris albibarbis*
	Pied-billed grebe	*Podilymbus podiceps*
	Least bittern	*Ixobrychus exilis*
	Rusty blackbird	*Euphagus carolinus*
	Black-billed cuckoo	*Coccyzus erythropthalmus*
	American bittern	*Botaurus lengtiginosus*
	Red spotted newt	*Notophthalmus viridescens*
	Eastern ribbon snake	*Thamnophis sauritis*

Table 1

Common Wildlife in the Project Areas (cont'd)

Wildlife Habitats	Species	
	Common Name	Scientific Name
Developed	Mouse	*Peromyscus sp.*
	Eastern cottontail	*Sylvilagus floridanus*
	Gray squirrel	*Sciurus carolinensis*
	Opossum	*Didelphis virginiana*
	Raccoon	*Procyon lotor*
	Striped skunk	*Mephitis mephitis*
	White-tailed deer	*Oedicoileus virginiana*
	Groundhog	*Marmota monax*
	Eastern milk snake	*Lampropeltus triangulum*
	Northern brown snake	*Storeia dekayi dekayi*
	European starling	*Sturnus vulgaris*
	Wild turkey	*Meleagris gallopavo*
	Rock pigeon	*Columba livia*
	House sparrow	*Passer domesticus*

Table 2

Additional Temporary Workspaces, Staging Areas, and Water Withdrawal Locations Associated with the Project

County	Township	Nearest Milepost	Area Affected (acres) [a]	Existing Land Use	Justification [b]
Susquehanna	Lenox	0.0	1.3	Open	Pe
Susquehanna	Lenox	0.3	0.9	Agriculture/Forest/ Road	H
Susquehanna	Lenox	0.3	0.1	Agriculture	R
Susquehanna	Lenox	0.3	0.1	Agriculture	R
Susquehanna	Lenox	0.3	15.0	Agriculture	Py
Susquehanna	Lenox	0.5	20.4	Agriculture	Py
Susquehanna	Lenox	0.6	0.1	Open	We
Susquehanna	Lenox	0.8	0.2	Open	We
Susquehanna	Lenox	0.9	0.3	Residential/Open	Wa
Susquehanna	Lenox	0.9	0.1	Open	Wa
Susquehanna	Lenox	1.0	0.1	Open	Wa
Susquehanna	Lenox	1.1	0.1	Forest	R
Susquehanna	Lenox	1.1	0.1	Agriculture	R
Susquehanna	Lenox	1.1	0.1	Agriculture	R
Susquehanna	Lenox	1.3	0.2	Forest	Wa
Susquehanna	Lenox	1.3	0.2	Open	Wa
Susquehanna	Lenox	1.3	0.2	Open	Wa
Susquehanna	Lenox	1.3	0.2	Forest	Wa
Susquehanna	Lenox	1.7	0.1	Open	Wa/We
Susquehanna	Lenox	1.8	0.1	Open	Wa/We
Susquehanna	Lenox	2.3	0.2	Open	R
Susquehanna	Lenox	2.3	0.1	Forest/Open	R
Susquehanna	Lenox	2.3	0.5	Open/Forest	R
Susquehanna	Lenox	2.3	0.1	Forest	R
Susquehanna	Lenox	2.6	0.7	Forest	R/C
Susquehanna	Lenox	2.7	0.3	Open/Forest	R/C
Susquehanna	Lenox	2.7	0.5	Open	R/C
Susquehanna	Lenox	2.8	1.9	Developed	ST
Susquehanna	Lenox	2.8	0.2	Open	Wa
Susquehanna	Lenox	2.8	0.2	Open	Wa
Susquehanna	Lenox	2.9	0.2	Road	R (I-81)
Susquehanna	Lenox	2.9	0.1	Road	R (I-81)
Susquehanna	Lenox	2.9	1.8	Agriculture/Open	R (I-81)
Susquehanna	Lenox	3.0	0.5	Agriculture/Forest	Wa
Susquehanna	Lenox	3.1	0.2	Agriculture/Open	Wa
Susquehanna	Lenox	3.2	2.4	Agriculture/Forest	H
Susquehanna	Lenox	3.5	0.2	Open	Wa
Susquehanna	Lenox	3.6	0.3	Open	Wa
Susquehanna	Lenox	3.6	0.2	Open	Wa
Susquehanna	Lenox	3.8	0.2	Open	Wa/We
Susquehanna	Lenox	3.9	0.1	Forest/Open	We
Susquehanna	Lenox	4.0	0.2	Open	We
Susquehanna	Lenox	4.1	0.1	Open	R
Susquehanna	Lenox	4.1	0.2	Open	R
Susquehanna	Lenox	4.1	0.1	Forest/Open	R
Susquehanna	Lenox	4.4	0.1	Forest/Open	R
Susquehanna	Lenox	4.5	0.5	Industrial	R

Table 2

Additional Temporary Workspaces, Staging Areas, and Water Withdrawal Locations Associated with the Project (cont'd)

County	Township	Nearest Milepost	Area Affected (acres)	Existing Land Use	Justification [b]
Susquehanna	Lenox	4.6	0.1	Forest/Open	We
Susquehanna	Lenox	4.7	0.6	Forest/Open	Wa/We
Susquehanna	Lenox	4.8	0.3	Forest	R/We
Susquehanna	Lenox	4.8	0.1	Open	R
Susquehanna	Lenox	4.8	0.1	Open	R
Susquehanna	Lenox	4.9	0.1	Forest/Open	PI
Susquehanna	Lenox	4.9	0.3	Forest/Open	PI
Susquehanna	Clifford	5.5	0.7	Agriculture	H
Susquehanna	Clifford	5.6	0.2	Forest	Wa
Susquehanna	Clifford	5.7	0.2	Forest	Wa
Susquehanna	Clifford	6.2	0.1	Open	R
Susquehanna	Clifford	6.2	0.1	Open	R
Susquehanna	Clifford	6.2	0.1	Open	R
Susquehanna	Clifford	6.2	0.1	Open	R
Susquehanna	Clifford	6.4	0.4	Agriculture	Wa/We
Susquehanna	Clifford	6.5	0.6	Agriculture	Wa/We
Susquehanna	Clifford	6.6	0.2	Agriculture	R
Susquehanna	Clifford	6.7	0.7	Agriculture/Open	Wa/We
TOTAL [c]			**56.6**		

[a] Dimensions are approximate

[b] Justifications for the use of additional temporary workspace (ATWS) include: A = Access road; C = commercial development area crossing; H = Hydrostatic test section or withdrawal location; Pe = Pipeline start/endpoint; PI = Point of inflection; R = roadway crossing; ST = Staging Area; Wa = waterbody crossing; We = wetland crossing; Py = Pipe yard

[c] Totals may not match due to rounding.

Table 3

Triad Expansion Project Existing and Future Projects Identified in the Project Area

Project Name	Location	Nearest Facility Location (Distance to Project)	Project Description	Status	Date of Construction Activities
FERC JURISDICTIONAL PROJECTS					
Tennessee's 300 Line Project, Docket No. CP09-44-000	Potter, Tioga, Bradford, Susquehanna, Wayne, Pike, Venango, and McKean, PA and Sussex and Passaic, NJ	CS 321 (0.0 miles)	Constructed eight 30-inch loops and two new compressor stations on Tennessee's 300 Line. Modifications were made to seven existing compressor stations including CS 321	Approved	Placed in service-October 2011
Tennessee's Northeast Upgrade Project, Docket No. CP11-161-000	Bradford, Susquehanna, Wayne, and Pike, PA, and Sussex, Passaic, and Bergen, NJ	CS 321 (0.0 miles)	Constructed five 30- inch loops on Tennessee's 300 Line, and modified t four existing compressor stations in Pennsylvania and New Jersey including CS 321	Approved	Placed in service November 2011
Tennessee's Uniondale Expansion Project, Docket No. CP13-526-000	Susquehanna, PA	CS-321 (0.0)	Modifications to CS-321 and a metering station along Tennessee's existing 300 Line.	Approved	Placed in service-November 2014
Tennessee's Susquehanna West Project, Docket No. CP15-148-000	Tioga and Bradford Counties, PA	Upstream tie-in (25 miles)	Construct approximately 8.1 miles of new pipeline along Tennessee's existing 300-Line and modifications to existing CS 315, CS 317 and CS 319.	Application for Certificate of Public Convenience and Necessity submitted April 2, 2015, FERC Notice of Availability of the EA issued March 17, 2016	Construction is expected to begin as early as November 2016. Anticipated in service date November 2017
Tennessee's Orion Project, Docket No. CP-16-4-000	Wayne and Pike Counties, PA	CS 321 (25 miles)	Construction of approximately 12.93 miles of new pipeline and associated facilities looping Tennessee's existing 300-Line. Modifications will also be made to the existing CS 323.	Application for Certificate of Public Convenience and Necessity submitted October 9, 2015, FERC Notice of Intent to Prepare an EA issued November 23, 2015	Construction is expected to begin as early as January 2017. Anticipated in service date June 1, 2018

Table 3

Triad Expansion Project Existing and Future Projects Identified in the Project Area (cont'd)

Project Name	Location	Nearest Facility Location (Distance to Project)	Project Description	Status	Date of Construction Activities
Transco Atlantic Sunrise Expansion Project, Docket No. CP15-138-000	Susquehanna, Lancaster, Columbia, Clinton, Lycoming, PA	Triad Expansion Project (0.0 miles)	Construct 197.7 miles of pipeline, of which 183.7 miles would be new greenfield pipeline. Construction of new aboveground facilities and modifications to existing facilities.	Application for Certificate of Public Convenience and Necessity submitted March 31, 2015, FERC issuance of final EIS scheduled for October 21, 2016	Expected in service July 2017
OIL AND GAS EXPLORATION AND PRODUCTION					
Williams Natural Gathering System Pipelines	Susquehanna, PA	Triad Expansion Project (0.0 mile)	Existing natural gas gathering pipelines of various diameters.	In operation	Unknown
Southwestern Energy Production Company (South Valentine Price 6H)	Susquehanna, PA	Triad Expansion Project (0.09 miles)	Horizontal Gas Well	Operator Reported Not Drilled	Permit Date: 5/8/2012
Southwestern Energy Production Company (South Valentine Price 7H)	Susquehanna, PA	Triad Expansion Project (0.09 miles)	Horizontal Gas Well	Operator Reported Not Drilled	Permit Date: 5/8/2012
Southwestern Energy Production Company (South Valentine Price 6H)	Susquehanna, PA	Triad Expansion Project (0.09 miles)	Horizontal Gas Well	Operator Reported Not Drilled	Permit Date: 7/1/2013
Southwestern Energy Production Company (South Valentine Price 7H)	Susquehanna, PA	Triad Expansion Project (0.10 miles)	Horizontal Gas Well	Operator Reported Not Drilled	Permit Date: 7/1/2013
Southwestern Energy Production Company (North Valentine Price 4H)	Susquehanna, PA	Triad Expansion Project (0.10 miles)	Horizontal Gas Well	Operator Reported Not Drilled	Permit Date: 5/8/2012
Southwestern Energy Production Company (North Valentine Price 2H)	Susquehanna, PA	Triad Expansion Project (0.10 miles)	Horizontal Gas Well	Operator Reported Not Drilled	Permit Date: 7/1/2013
Southwestern Energy Production Company (North Valentine Price 2H)	Susquehanna, PA	Triad Expansion Project (0.10 miles)	Horizontal Gas Well	Operator Reported Not Drilled	Permit Date: 4/12/2012
Southwestern Energy Production Company (Belcher Combs Gas Unit 1)	Susquehanna, PA	Triad Expansion Project (0.1 miles)	Horizontal Gas Well	Active	Permit Date: 11/16/2010 Date Drilled: 7/22/2011

Table 3

Triad Expansion Project Existing and Future Projects Identified in the Project Area (cont'd)

Project Name	Location	Nearest Facility Location (Distance to Project)	Project Description	Status	Date of Construction Activities
Southwestern Energy Production Company (South Valentine Price Gas Unit 5H)	Susquehanna, PA	Triad Expansion Project (0.1 miles)	Horizontal Gas Well	Active	Permit Date: 10/4/2011 Date Drilled: 10/15/2011
Southwestern Energy Production Company (North Valentine Price GU 1H)	Susquehanna, PA	Triad Expansion Project (0.1 miles)	Horizontal Gas Well	Active	Permit Date: 8/31/2011 Date Drilled: 9/6/2011
Southwestern Energy Production Company (Belcher Combs 5H)	Susquehanna, PA	Triad Expansion Project (0.1 miles)	Horizontal Gas Well	Operator Reported Not Drilled	Permit Date: 1/27/2014
Southwestern Energy Production Company (North Valentine Price GU 3H)	Susquehanna, PA	Triad Expansion Project (0.1 miles)	Horizontal Gas Well	Active	Permit Date: 5/10/2011 Date Drilled: 8/31/2011
Southwestern Energy Production Company (Price 2H)	Susquehanna, PA	Triad Expansion Project (0.2 miles)	Horizontal Gas Well	Proposed But Never Materialized	Permit Date: 1/15/2009
Southwestern Energy Production Company (Price 1)	Susquehanna, PA	Triad Expansion Project (0.2 miles)	Vertical Well	Plugged Oil and Gas Well	Permit Date: 3/12/2008 Date Drilled: 4/3/2008
Cabot Oil and Gas Corporation (Stalter 1)	Susquehanna, PA	Triad Expansion Project (0.3 miles)	Horizontal Gas Well	Active	Permit Date: 3/2/2011 Date Drilled: 4/7/2011
Cabot Oil and Gas Corporation (Stalter 8)	Susquehanna, PA	Triad Expansion Project (0.3 miles)	Vertical Gas Well	Active	Permit Date: 11/1/2010 Date Drilled: 12/9/2010
Cabot Oil and Gas Corporation (Stalter 2)	Susquehanna, PA	Triad Expansion Project (0.3 miles)	Horizontal Gas Well	Active	Permit Date: 2/7/2011 Date Drilled: 4/11/2010
Cabot Oil and Gas Corporation (Stalter 3)	Susquehanna, PA	Triad Expansion Project (0.3 miles)	Horizontal Gas Well	Proposed But Never Materialized	Permit Date: 2/23/2011
Cabot Oil and Gas Corporation (Stalter 4)	Susquehanna, PA	Triad Expansion Project (0.3 miles)	Horizontal Gas Well	Proposed But Never Materialized	Permit Date: 2/7/2011
Cabot Oil and Gas Corporation (Stalter 6)	Susquehanna, PA	Triad Expansion Project (0.3 miles)	Horizontal Gas Well	Proposed But Never Materialized	Permit Date: 3/22/2011
Southwestern Energy Production Company (North Price GU 4H)	Susquehanna, PA	Triad Expansion Project (0.4 miles)	Horizontal Gas Well	Operator Reported Not Drilled	Permit Date: 5/19/2011

Table 3

Triad Expansion Project Existing and Future Projects Identified in the Project Area (cont'd)

Project Name	Location	Nearest Facility Location (Distance to Project)	Project Description	Status	Date of Construction Activities
Southwestern Energy Production Company (North Price Gas Unit 6H)	Susquehanna, PA	Triad Expansion Project (0.4 miles)	Horizontal Gas Well	Active	Permit Date: 8/18/2011 Date Drilled: 8/27/2011
Southwestern Energy Production Company (South Price 7H)	Susquehanna, PA	Triad Expansion Project (0.4 miles)	Horizontal Gas Well	Active	Permit Date: 10/4/2011 Date Drilled: 10/12/2011
Southwestern Energy Production Company (North Price 5H)	Susquehanna, PA	Triad Expansion Project (0.4 miles)	Horizontal Gas Well	Active	Permit Date: 10/4/2011 Date Drilled: 10/19/2011
Southwestern Energy Production Company (North Price 4H)	Susquehanna, PA	Triad Expansion Project (0.4 miles)	Horizontal Gas Well	Operator Reported Not Drilled	Permit Date: 7/01/2013
Cabot Oil and Gas Corporation (Housel R 2)	Susquehanna, PA	Triad Expansion Project (0.4 miles)	Horizontal Gas Well	Active	Permit Date: 4/25/2013 Date Drilled: 7/12/2013
Southwestern Energy Production Company (South Price 10H)	Susquehanna, PA	Triad Expansion Project (0.4 miles)	Horizontal Gas Well	Operator Reported Not Drilled	Permit Date: 5/08/2012
Southwestern Energy Production Company (South Price 9H)	Susquehanna, PA	Triad Expansion Project (0.4 miles)	Horizontal Gas Well	Operator Reported Not Drilled	Permit Date: 7/01/2013
Cabot Oil and Gas Corporation (Housel R 1)	Susquehanna, PA	Triad Expansion Project (0.4 miles)	Horizontal Gas Well	Active	Permit Date: 4/25/2013 Date Drilled: 7/12/2013
Southwestern Energy Production Company (South Price 9H)	Susquehanna, PA	Triad Expansion Project (0.4 miles)	Horizontal Gas Well	Active	Permit Date: 5/08/2012
Southwestern Energy Production Company (South Price 8H)	Susquehanna, PA	Triad Expansion Project (0.4 miles)	Horizontal Gas Well	Operator Reported Not Drilled	Permit Date: 6/27/2013
Southwestern Energy Production Company (South Price 8H)	Susquehanna, PA	Triad Expansion Project (0.4 miles)	Horizontal Gas Well	Operator Reported Not Drilled	Permit Date: 5/08/2012
Southwestern Energy Production Company (North Price 3H)	Susquehanna, PA	Triad Expansion Project (0.4 miles)	Horizontal Gas Well	Operator Reported Not Drilled	Permit Date: 5/08/2012
Cabot Oil and Gas Corporation (Housel R 5)	Susquehanna, PA	Triad Expansion Project (0.4 miles)	Horizontal Gas Well	Active	Permit Date: 4/25/2013 Date Drilled: 7/12/2013

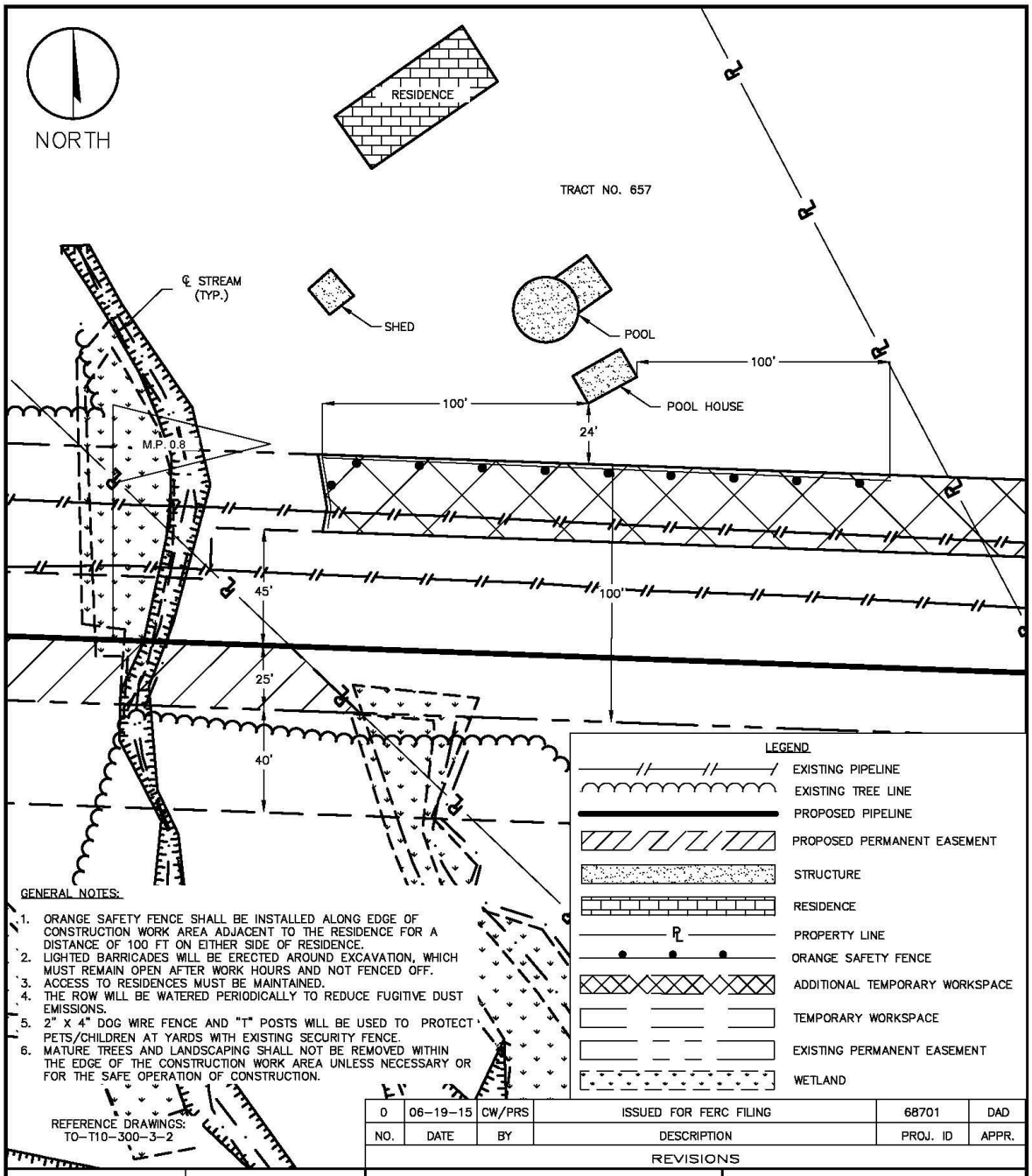
Table 3

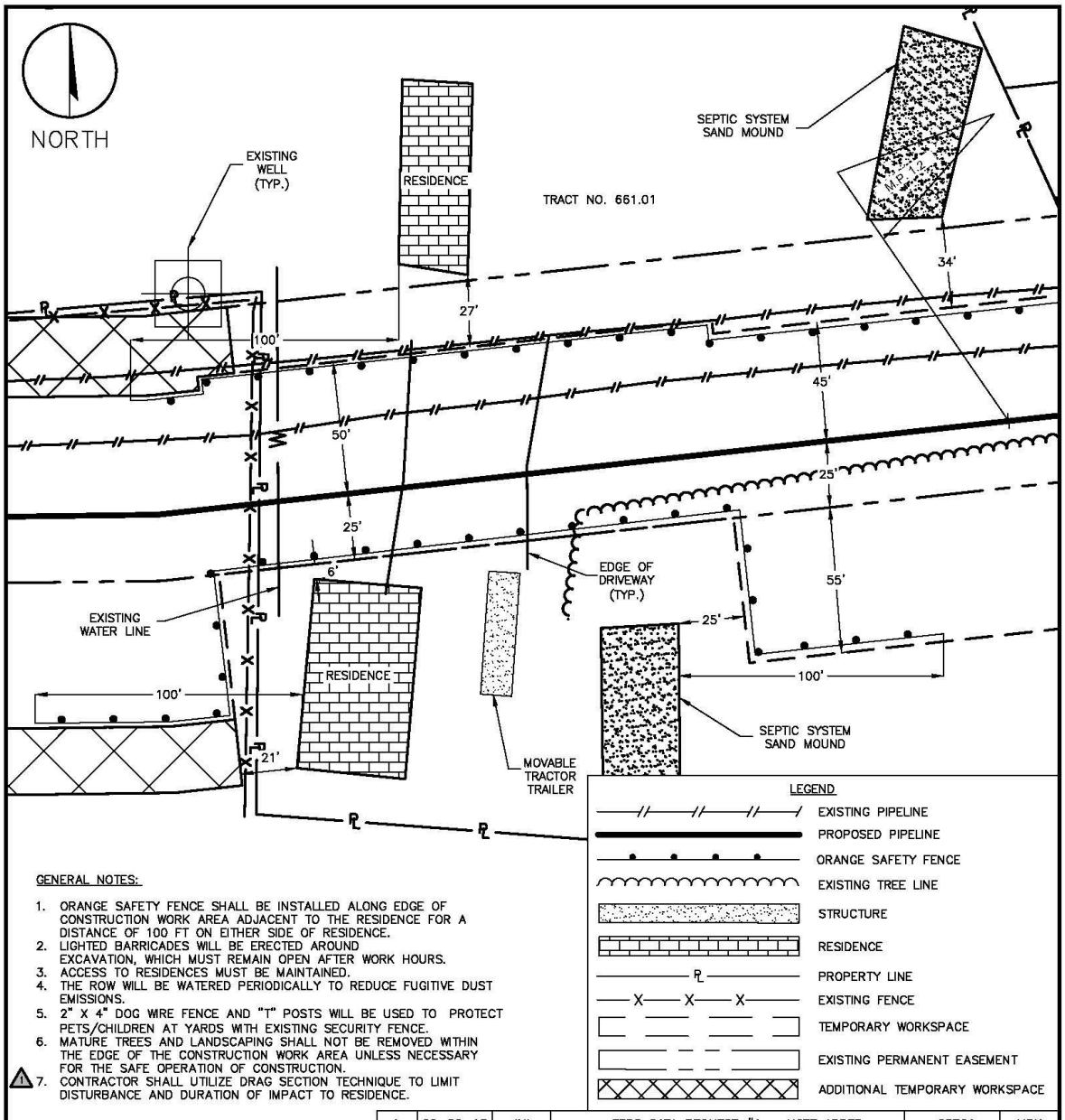
Triad Expansion Project Existing and Future Projects Identified in the Project Area (cont'd)

Project Name	Location	Nearest Facility Location (Distance to Project)	Project Description	Status	Date of Construction Activities
Cabot Oil and Gas Corporation (Housel R 8)	Susquehanna, PA	Triad Expansion Project (0.4 miles)	Horizontal Gas Well	Active	Permit Date: 4/25/2013 Date Drilled: 7/13/2013
Exco Resources PA Inc (Lopatofsky 1)	Susquehanna, PA	Triad Expansion Project (0.3 miles)	Vertical Gas Well	Plugged	Permit Date: 5/07/2009 Date Drilled: 7/15/2009
Southwestern Energy Production Company (Bernstein Price 5H)	Susquehanna, PA	Triad Expansion Project (0.5 miles)	Horizontal Gas Well	Active	Permit Date: 11/04/2011 Date Drilled: 11/17/2011
Southwestern Energy Production Company (Bernstein Price 2H)	Susquehanna, PA	Triad Expansion Project (0.5 miles)	Horizontal Gas Well	Active	Permit Date: 5/09/2013 Date Drilled: 8/07/2013
Southwestern Energy Production Company (Bernstein Price 1H)	Susquehanna, PA	Triad Expansion Project (0.5 miles)	Horizontal Gas Well	Active	Permit Date: 6/24/2013 Date Drilled: 8/07/2013

Appendix C

Site-Specific Residential Construction Plans


NORTH
RESIDENCE
TRACT NO. 657
℄ STREAM (TYP.)
SHED
POOL
POOL HOUSE
100'
100'
24'
M.P. 0.8
45'
100'
25'
40'
LEGEND
EXISTING PIPELINE
EXISTING TREE LINE
PROPOSED PIPELINE
PROPOSED PERMANENT EASEMENT
STRUCTURE
RESIDENCE
PROPERTY LINE
ORANGE SAFETY FENCE
ADDITIONAL TEMPORARY WORKSPACE
TEMPORARY WORKSPACE
EXISTING PERMANENT EASEMENT
WETLAND
GENERAL NOTES:
1. ORANGE SAFETY FENCE SHALL BE INSTALLED ALONG EDGE OF CONSTRUCTION WORK AREA ADJACENT TO THE RESIDENCE FOR A DISTANCE OF 100 FT ON EITHER SIDE OF RESIDENCE.
2. LIGHTED BARRICADES WILL BE ERECTED AROUND EXCAVATION, WHICH MUST REMAIN OPEN AFTER WORK HOURS AND NOT FENCED OFF.
3. ACCESS TO RESIDENCES MUST BE MAINTAINED.
4. THE ROW WILL BE WATERED PERIODICALLY TO REDUCE FUGITIVE DUST EMISSIONS.
5. 2" X 4" DOG WIRE FENCE AND "T" POSTS WILL BE USED TO PROTECT PETS/CHILDREN AT YARDS WITH EXISTING SECURITY FENCE.
6. MATURE TREES AND LANDSCAPING SHALL NOT BE REMOVED WITHIN THE EDGE OF THE CONSTRUCTION WORK AREA UNLESS NECESSARY OR FOR THE SAFE OPERATION OF CONSTRUCTION.
REFERENCE DRAWINGS: TO-T10-300-3-2
0 | 06-19-15 | CW/PRS | ISSUED FOR FERC FILING | 68701 | DAD
NO. | DATE | BY | DESCRIPTION | PROJ. ID | APPR.
REVISIONS
Division: | Op. Area:
St.: PENNSYLVANIA | Co./Par.: SUSQUEHANNA
Section: N/A | Township: N/A | Range: N/A
Dft: CW/PRS | Date: 12-15-2014 | Project ID: 68701
Chk: BP | Date: 12-15-2014 | Scale: 1"=50'
Appr: DAD | Date: 05-18-2015 | Filename: TA-L10-320-300-3-1.DWG
TRIAD EXPANSION PROJECT
36" PENNSYLVANIA LOOP 300-3
RESIDENTIAL CONSTRUCTION DETAIL
TRACT NO. 657
SUSQUEHANNA COUNTY, PA
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company
TA-L10-320-300-3-1
Sheet: 1 of 1
Type:
Rev. 0



GENERAL NOTES:

1. ORANGE SAFETY FENCE SHALL BE INSTALLED ALONG EDGE OF CONSTRUCTION WORK AREA ADJACENT TO THE RESIDENCE FOR A DISTANCE OF 100 FT ON EITHER SIDE OF RESIDENCE.
2. LIGHTED BARRICADES WILL BE ERECTED AROUND EXCAVATION, WHICH MUST REMAIN OPEN AFTER WORK HOURS.
3. ACCESS TO RESIDENCES MUST BE MAINTAINED.
4. THE ROW WILL BE WATERED PERIODICALLY TO REDUCE FUGITIVE DUST EMISSIONS.
5. 2" X 4" DOG WIRE FENCE AND "T" POSTS WILL BE USED TO PROTECT PETS/CHILDREN AT YARDS WITH EXISTING SECURITY FENCE.
6. MATURE TREES AND LANDSCAPING SHALL NOT BE REMOVED WITHIN THE EDGE OF THE CONSTRUCTION WORK AREA UNLESS NECESSARY FOR THE SAFE OPERATION OF CONSTRUCTION.
7. CONTRACTOR SHALL UTILIZE DRAG SECTION TECHNIQUE TO LIMIT DISTURBANCE AND DURATION OF IMPACT TO RESIDENCE.

REFERENCE DRAWINGS:
TO-T10-300-3-2

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.
1	09-29-15	JML	FERC DATA REQUEST #1 – NOTE ADDED	68701	MDK
0	06-19-15	CW/PRS	ISSUED FOR FERC FILING	68701	DAD

REVISIONS

Division:		Op. Area:	
St.:	PENNSYLVANIA	Co./Par.:	SUSQUEHANNA
Section:	N/A	Township: N/A	Range: N/A
Dft: CW,PRS	Date: 12-15-2014	Project ID:	68701
Chk: BP	Date: 12-15-2014	Scale:	1"=50'
Appr: DAD	Date: 05-18-2015	Filename:	TA-L10-320-300-3-3.DWG

TRIAD EXPANSION PROJECT
36" PENNSYLVANIA LOOP 300-3
RESIDENTIAL CONSTRUCTION DETAIL
TRACT NO. 661.01
SUSQUEHANNA COUNTY, PA

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

TA-L10-320-300-3-3 | Sheet: 1 of 1 | Type: | Rev. 0

Appendix D

List of Preparers

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Document Content(s)