Office of Energy Projects

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FERC/EIS-0269F
Docket No. CP15-138-000

FINAL ENVIRONMENTAL IMPACT STATEMENT

Volume I

Atlantic Sunrise Project

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC

Federal Energy Regulatory Commission
Division of Gas – Environment and Engineering
888 First Street, NE, Washington, DC 20426

Cooperating Agencies:

U.S. Army Corps of Engineers

Natural Resources Conservation Service

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas 2
Transcontinental Gas Pipe Line Company, LLC
Docket No. CP15-138-000

FERC/EIS-0269F

TO THE PARTY ADDRESSED:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared a final environmental impact statement (EIS) for the Atlantic Sunrise Project, proposed by Transcontinental Gas Pipe Line Company, LLC (Transco) in the above-referenced docket. Transco requests authorization to expand its existing pipeline system from the Marcellus Shale production area in northern Pennsylvania to deliver an incremental 1.7 million dekatherms per day of year-round firm transportation capacity to its existing southeastern market areas.

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

The U.S. Army Corps of Engineers and the U.S. Department of Agriculture's Natural Resources Conservation Service participated as cooperating agencies in the preparation of the final EIS. Cooperating agencies have jurisdiction by law or special expertise with respect to resources potentially affected by the proposal and participate in the NEPA analysis. Although the U.S. Army Corps of Engineers and the Natural Resources Conservation Service provided input to the conclusions and recommendations presented in the final EIS, the agencies will present their own conclusions and recommendations in their respective records of decision or determinations for the project.

The final EIS addresses the potential environmental effects of the construction and operation of about 199.4 miles of pipeline composed of the following facilities:

- 185.9 miles of new 30- and 42-inch-diameter natural gas pipeline in Pennsylvania;
- 11.0 miles of new 36- and 42-inch-diameter pipeline looping in Pennsylvania;

- 2.5 miles of 30-inch-diameter replacements in Virginia; and
- associated equipment and facilities.

The project's proposed aboveground facilities include two new compressor stations in Pennsylvania; additional compression and related modifications to three existing compressor stations in Pennsylvania and Maryland; two new meter stations and three new regulator stations in Pennsylvania; and minor modifications at existing aboveground facilities at various locations in Pennsylvania, Virginia, Maryland, North Carolina, and South Carolina to allow for bi-directional flow and the installation of supplemental odorization, odor detection, and/or odor masking/deodorization equipment.

The FERC staff mailed copies of the final EIS to federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; Native American tribes; potentially affected landowners and other interested individuals and groups; newspapers and libraries in the project area; and parties to this proceeding. Paper copy versions of this EIS were mailed to those specifically requesting them; all others received a CD version. In addition, the final EIS is available for public viewing on the FERC's website (www.ferc.gov) using the eLibrary link. A limited number of copies 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

In accordance with the Council on Environmental Quality's (CEQ) regulations implementing NEPA, no agency decision on a proposed action may be made until 30 days after the U.S. Environmental Protection Agency publishes a notice of availability of the final EIS in the federal register. However, the CEQ regulations provide an exception to this rule when an agency decision is subject to a formal internal appeal process that allows other agencies or the public to make their views known. In such cases, the agency decision may be made at the same time the notice of the final EIS is published, allowing both periods to run concurrently. The Commission decision for this proposed action is subject to a 30-day rehearing period.

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., CP15-138). 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; 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 that allows you to keep track of all formal issuances and submittals in specific dockets. This can reduce the amount of time you spend researching proceedings by automatically providing you with notification of these filings, document summaries, and direct links to the documents. Go to www.ferc.gov/docs-filing/esubscription.asp.

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TECHNICAL ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
ACHP	Advisory Council of Historic Preservation
Agricultural Plan	Draft Agricultural Construction and Monitoring Plan
AMD	acid mine drainage
AML	abandoned mine land
AMLI	abandoned mine land inventory
AOAA	Anthracite Outdoor Adventure Area
APE	area of potential effect
Appalachian Trail	Appalachian National Scenic Trail
AQCR	air quality control region
AQRV	Air Quality Related Values
ASA	Agricultural Security Areas
ATV	all-terrain vehicle
ATWS	additional temporary workspace
BA	Biological Assessment
BACT	Best available control technology
BAT	Best Available Technology
BCC	Birds of Conservation Concern
bcf/d	billion cubic feet per day
BCM	Bat Conservation and Management, Inc.
BCR	Bird Conservation Regions
BGE	Baltimore Gas and Electric
BMP	best management practice
BO	Biological Opinion
Btu	British Thermal Units
CAA	Clean Air Act
CEQ	Council on Environmental Quality
Certificate	Certificate of Public Convenience and Necessity
CFR	Code of Federal Regulations
CH_4	methane
CNYOG	Central New York Oil & Gas Company
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COMAR	Code of Maryland Regulations
Commission	Federal Energy Regulatory Commission
CPL	Central Penn Line
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CWA	Clean Water Act
CWF	coldwater fishes
CZMA	Coastal Zone Management Act of 1972
dB	decibels
dBA	decibels using the A-weighted scale
DOE	U.S. Department of Energy
DOI	U.S. Department of Interior
DOT	U.S. Department of Transportation
Dth/d	dekatherms per day
EAWA	Elizabethtown Area Water Authority

TECHNICAL ACRONYMS AND ABBREVIATIONS (cont'd)

ECP	Environmental Construction Plan
EI	Environmental Inspector
EIS	environmental impact statement
ELRC	Eastern Land and Resources Corporation
EPA	U.S. Environmental Protection Agency
ERC	emission reduction credit
ESA	Endangered Species Act of 1973
ESFO	Ecological Services Field Office
EV	Exceptional Value
FDCP	Fugitive Dust Control Plan
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FLAG	National Park Service Federal Land Managers' Air Quality Related Values Work Group
FLM	Federal Land Managers
FRPP	Farm and Ranch Lands Protection Program
FWS	U.S. Fish and Wildlife Service
g	gravitational acceleration
ga.	gauge
GHG	greenhouse gas
GIS	geographic information system
gpm	gallons per minutes
gwp	global warming potential
HAP	hazardous air pollutant
HAZWOPER	Hazardous Waste Operations and Emergency Response
HCA	high consequence area
HDD	horizontal directional drill
HDD Contingency Plan	Horizontal Directional Drilling Contingency Plan
hibernacula	hibernation sites
hp	horsepower
HQ	High Quality
I-81	Interstate 81
IBA	Important Bird Area
ICE	internal combustion engines
IMA	Important Mammal Area
IMAP	Important Mammal Areas Project
INGAA	Interstate Natural Gas Association of American Foundation
IPCC	Intergovernmental Panel on Climate Change
ISO	International Standards Organization
km	kilometer
kV	kilovolt
L_d	dBA daytime
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
LiDAR	Light Detection and Ranging
L_n	dBA nighttime
M&R	metering and regulating
MACT	Maximum Achievable Control Technology
Management Plan	Draft Noxious and Invasive Plant Management Plan

MAOP	maximum allowable operating pressure
MBTA	Migratory Bird Treaty Act
MDE	Maryland Department of Environment
MDNR	Maryland Department of Natural Resources
Memorandum	Memorandum of Understanding on Natural Gas Transportation Facilities
MLV	mainline valve
MMcf/d	million cubic feet per day
MMDth/d	million dekatherms per day
MOU	Memorandum of Understanding
MP	milepost
MSA	Magnuson-Stevens Fishery Conservation and Management Act of 1976
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NCDENR	North Carolina Department of Environment and Natural Resources
NCWRC	North Carolina Wildlife Resources Commission
NEPA	National Environmental Policy Act of 1969
NESHAP	National Emission Standards for Hazardous Air Pollutants
NGA	Natural Gas Act
NHD	National Hydrography Dataset
NHPA	National Historic Preservation Act
NNSR	Nonattainment New Source Review
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent to Prepare an Environmental Impact Statement for the Planned Atlantic Sunrise Expansion Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meetings
NO_X	oxides of nitrogen
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSA	noise sensitive areas
NSPS	New Source Performance Standards
NSR	New Source Review
NWI	National Wetlands Inventory
OCRM	NOAA Office of Coast and Management
OTR	Ozone Transport Region
Pa. Code	Pennsylvania Code
PADCNR	Pennsylvania Department of Conservation and Natural Resources
PADEP	Pennsylvania Department of Environmental Protection
PBS	Pennsylvania Biological Survey
PCB	polychlorinated biphenyls
pCi/L	picocuries per liter
PCO	Pennsylvania Certified Organic
PennDOT	Pennsylvania Department of Transportation
PennEast	PennEast Pipeline Company, LLC
PennEast Project	PennEast Pipeline Project
PFBC	Pennsylvania Fish and Boat Commission

PGA	peak ground acceleration
PGC	Pennsylvania Game Commission
PHMSA	Pipeline and Hazardous Materials Safety Administration
Plan	Upland Erosion Control, Revegetation, and Maintenance Plan
PM_{10}	inhalable particulate matter with an aerodynamic diameter less than or equal 10 microns
$PM_{2.5}$	inhalable particulate matter with an aerodynamic diameter less than or equal to 2.5 microns
PNHP	Pennsylvania Natural Heritage Program
PRM	Permittee-Responsible Mitigation Plan
Procedures	Wetland and Waterbody Construction and Mitigation Procedures
Project	Atlantic Sunrise Project
PSD	Prevention of Significant Deterioration
psig	pounds per square inch gauge
PTE	potential to emit
PWS	public water system
RICE	reciprocating internal combustion engines
ROI	region of influence
SCDNR	South Carolina Department of Natural Resources
SDWA	Safe Drinking Water Act
SER	Significant Emissions Rate
SGL	State Game Land
SHEW-CHNI	Safe Harbor East Woods – County Natural Heritage Inventory
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	sulfur dioxide
Spill Plan	Spill Plan for Oil and Hazardous Materials
SRBC	Susquehanna River Basin Commission
SSA	sole or principal source aquifer
SSURGO	Soil Survey Geographic Database
SWPA	source water protection areas
tcf	trillion cubic feet
TDS	total dissolved solids
TEAM 2014 Project	Texas Eastern Appalachian to Market 2014 Project
TGP	Tennessee Gas Pipeline Company, L.L.C.
TMDL	total maximum daily load
tpy	tons per year
Transco	Transcontinental Gas Pipe Line Company, LLC
Tribes	federally recognized Indian tribes
Unanticipated Discovery Plans	Unanticipated Discovery Plan for Cultural Resources and an Unanticipated Discovery Plan for Paleontological Resources
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
VAC	Virginia Administrative Code
VADCR	Virginia Department of Conservation and Recreation
VADEQ	Virginia Department of Environmental Quality

VDGIF	Virginia Department of Game and Inland Fisheries
VDMME	Virginia Department of Mines, Minerals, and Energy
VDOT	Virginia Department of Transportation
VOC	volatile organic compounds
WEG	wind erodibility group
WHPA	wellhead protection area
Williams	Williams Partners L.P.
WRP	Wetland Reserve Program
WWF	warmwater fishes

EXECUTIVE SUMMARY

INTRODUCTION

On March 31, 2015, Transcontinental Gas Pipe Line Company, LLC (Transco) filed an application with the Federal Energy Regulatory Commission (FERC or Commission) under section 7(c) of the Natural Gas Act (NGA) and part 157 of the Commission's regulations. In Docket No. CP15-138-000, Transco requests authorization to construct, operate, and maintain expansions of its existing interstate natural gas pipeline system in Pennsylvania, Maryland, Virginia, North Carolina, and South Carolina. Transco's proposed project is referred to as the Atlantic Sunrise Project (Project).

The purpose of this environmental impact statement (EIS) is to inform FERC decision-makers, the public, and the permitting agencies about the potential adverse and beneficial environmental impacts of the Project and its alternatives, and recommend mitigation measures that would reduce adverse impacts to the extent practicable. We[1] prepared this EIS to assess the environmental impacts associated with construction and operation of the Project as required under the National Environmental Policy Act of 1969, as amended. Our analysis was based on information provided by Transco and further developed from data requests; field investigations; scoping; literature research; contacts with or comments from federal, state, and local agencies; and comments from individual members of the public.

FERC is the lead agency for the preparation of the EIS. The U.S. Army Corps of Engineers and the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) are participating in the National Environmental Policy Act review as cooperating agencies.[2]

PROPOSED ACTION

The Project includes about 199.4 miles of pipeline composed of the following facilities:

- 185.9 miles of new 30- and 42-inch-diameter greenfield[3] natural gas pipeline known as Central Penn Line (CPL) North and CPL South in Pennsylvania;
- 11.0 miles of new 36- and 42-inch-diameter pipeline looping[4] known as Chapman and Unity Loops in Pennsylvania;
- 2.5 miles of 30-inch-diameter replacements in Virginia (Mainline A and B Replacements); and
- associated equipment and facilities.

The Project's aboveground facilities include:

- two new compressor stations in Pennsylvania (Compressor Stations 605 and 610);
- additional compression and related modifications to three existing compressor stations in Pennsylvania and Maryland (Compressor Stations 517, 520, and 190);

[1] "We," "us," and "our" refer to the environmental staff of the FERC's Office of Energy Projects.
[2] A cooperating agency is an agency that has jurisdiction over all or part of a project area and must make a decision on a project, and/or an agency that provides special expertise with regard to environmental or other resources.
[3] A "greenfield" pipeline crosses land previously untouched by natural gas infrastructure rather than using or paralleling existing rights-of-way.
[4] "Looping" is the practice of installing a pipeline in parallel to another pipeline to increase the capacity along an existing stretch of right-of-way, often beyond what can be achieved by one pipeline or pipeline expansion.

- two new meter stations and three new regulator stations in Pennsylvania; and
- minor modifications at existing aboveground facilities at various locations in Pennsylvania, Virginia, Maryland, North Carolina, and South Carolina to allow for bi-directional flow and the installation of supplemental odorization, odor detection, and/or odor masking/deodorization equipment.

Subject to the receipt of FERC authorization and all other applicable permits, authorizations, and approvals, Transco anticipates starting construction as soon as possible. Transco would construct its proposed facilities over a 1-year period, with an estimated in-service date of February or March 2018.

The Project would provide an incremental 1.7 million dekatherms per day of year-round firm transportation capacity from the Marcellus Shale production area in northern Pennsylvania to Transco's existing market areas, extending to the Station 85 Pooling Point in Choctaw County, Alabama. Transco indicates that the Project would provide Transco's customers and the markets they serve with greatly enhanced access to Marcellus Shale natural gas supplies, support the overall reliability and diversification of energy infrastructure along the Atlantic seaboard and points south, and meet the anticipated increase in market demands for natural gas consumption.

PUBLIC INVOLVEMENT

On April 4, 2014, FERC began its pre-filing review of the Project and established pre-filing Docket No. PF14-8-000 to place information related to the Project into the public record. The U.S. Army Corps of Engineers agreed to conduct its environmental review of the Project in conjunction with the Commission's environmental review process.

On July 18, 2014, the Commission issued a *Notice of Intent to Prepare an Environmental Impact Statement for the Planned Atlantic Sunrise Expansion Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meetings*. This notice was sent to nearly 2,500 interested parties including federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; federally recognized tribes (tribes); affected property owners; other interested parties; and local libraries and newspapers. Publication of the notice established a 30-day public comment period for the submission of comments, concerns, and issues related to the environmental aspects of the Project.

Between August 4 and 7, 2014, FERC conducted public scoping meetings in Millersville, Annville, Bloomsburg, and Dallas, Pennsylvania to provide an opportunity for the public to learn more about the Project and to participate in our analysis by providing oral comments on environmental issues to be included in the EIS. On October 22, 2015, the Commission mailed a letter to over 300 landowners potentially affected by the path of several proposed Project reroutes under evaluation during the preparation of the draft EIS. The letter briefly described the proposed alternative routes, invited newly affected landowners to participate in the environmental review process, and opened a special 30-day limited scoping period.

On May 5, 2016, we issued a *Notice of Availability of the Draft Environmental Impact Statement for the Proposed Atlantic Sunrise Project*. Copies of the draft EIS were sent to over 4,500 stakeholders. The U.S. Environmental Protection Agency (EPA) noticed receipt of the draft EIS in the Federal Register on May 12, 2016, establishing a closing date for receiving comments on the draft EIS of June 27, 2016. Between June 13 and 16, 2016, we held public comment meetings in Lancaster, Annville, Bloomsburg, and Dallas, Pennsylvania to receive comments on the draft EIS. In total, we received verbal comments from 203 individuals at the public meetings. We also received over 560 written comment letters from federal, state, and local agencies; tribes; companies/organizations; and individuals in response to the draft

EIS. In addition, we received over 900 letters that were identical copies of 45 different form letter variants.

Substantive environmental issues identified through this public review process are addressed in this EIS. Specific comments regarding the draft EIS, along with our responses, are presented in Volume III of this EIS.

ENVIRONMENTAL IMPACTS AND MITIGATION

We evaluated the potential impacts of construction and operation of the Project on geology; soils; water resources; wetlands; vegetation; wildlife and aquatic resources; threatened, endangered, and special status species; land use, recreation, and visual resources; socioeconomics; cultural resources; air quality and noise; reliability and safety; and cumulative impacts. In section 3 of this EIS, we summarized the evaluation of alternatives to the Project, including the no-action alternative, system alternatives, major route alternatives, and minor route variations. Where necessary, we are recommending additional mitigation measures to minimize or avoid the potential impacts of the Project. Sections 5.1 and 5.2 of the EIS contain our conclusions and a compilation of our recommended mitigation measures, respectively.

Construction of the Project would affect about 3,741.0 acres of land, including the pipeline facilities, aboveground facilities, pipe and contractor ware yards and staging areas, and access roads. Permanent operations would require about 1,235.4 acres of land, consisting of 1,100.9 acres for the pipeline right-of-way, 109.4 acres for new and modified aboveground facilities, and 25.1 acres for permanent access roads. The remaining 2,505.6 acres of land disturbed during construction would be restored and allowed to revert to its former use.

Important issues identified as a result of our analyses, scoping comments, and agency consultations include impacts on geology; groundwater, surface water, water use, and wetlands; vegetation, wildlife, and aquatic species; special status species; land use, recreation, and visual resources; cultural resources; air quality and noise; safety and reliability; and the cumulative impacts of projects in the vicinity of the Project.

Geology

Ground subsidence could occur in areas where abandoned mine lands are crossed. Transco developed an *Abandoned Mine Investigation and Mitigation Plan* and would implement mitigation measures designed to reduce the potential for stormwater infiltration that could initiate or accelerate subsidence, eliminate actual soft ground or void features associated with geophysical anomalies detected in relative high risk areas, and provide for long-term monitoring to identify any potential developing mine-related features following construction.

Transco completed an investigation of mine fires as part of its *Abandoned Mine Investigation and Mitigation Plan*. No active mine fires are currently crossed by the Project. The closest mine fire (the Glen Burn Luke Fidler Mine Fire) is about 0.4 mile west of the Project. Because mine fires could pose safety and integrity concerns during operation of the project facilities, we are recommending that Transco provide a *Mine Fire Investigation and Mitigation Plan* that identifies any mitigation measures that would be implemented to protect the integrity of the pipeline from underground mine fires during the lifetime operation of the Project.

To address concerns related to slope stability and construction on steep/side slopes, Transco would implement best management practices to manage surface water and maintain slope stability as described in its *Landslide Hazard Investigation and Mitigation Plan*. These practices include minimizing the potential for surface water ponding along the right-of-way and in open trenches; providing slope protection for falling rock on steep slopes containing boulders; removing unstable excavated material (e.g., coal refuse), where necessary; and compacting soft subsoils.

Transco has designed waterbody crossings to minimize potential impacts from flash flooding, scouring, and high flow velocities during pipeline construction and operation. At waterbody crossings, the pipeline would be buried to a greater depth allowing for a minimum of 60 inches of soil cover or 24 inches of cover in consolidated rock. In addition, Transco would implement the measures in its *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) to reduce the likelihood of sedimentation and erosion during flash flood events.

There are several areas along the CPL South pipeline route and within the workspace for existing Compressor Stations 190 and 145 where a karst hazard may be present. Transco developed a *Karst Investigation and Mitigation Plan*, which contains mitigation measures to be employed in areas of karst terrain to minimize the risk of sinkhole formation.

Because investigations to assess abandoned mine lands and karst areas are pending for some properties and secondary investigations are necessary to further characterize potential karst and mine-related features and identify site-specific mitigation measures, we are recommending that Transco file its final *Abandoned Mine Investigation and Mitigation* and *Karst Investigation and Mitigation Plans* prior to construction.

The CPL North, CPL South, Chapman Loop, and Unity Loop pipeline facilities in Pennsylvania would traverse about 121.0 miles of shallow bedrock that could require blasting. In order to minimize potential impacts from blasting, Transco would comply with all federal, state, and local regulations for blasting and has developed a Blasting Plan to be implemented during construction. In addition, Transco would prepare site-specific blasting plans as may be required by local permitting.

With the implementation of Transco's mitigation measures and our recommendations, as well as Transco's *Abandoned Mine Investigation and Mitigation Plan*, *Karst Investigation and Mitigation Plan*, other plans contained in its *Environmental Construction Plan* (ECP), including Transco's Plan and *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures), which are based on the FERC's Plan and Procedures,[5] we conclude that impacts on geological resources would be adequately minimized.

Groundwater, Surface Water, Water Use, and Wetlands

One hundred twenty-six private wells or springs have been identified within 150 feet of the proposed construction areas in Pennsylvania, including seven private wells within areas of known karst. Transco has agreed to test all water wells within 150 feet of the construction workspace for water quality and quantity prior to and after construction, and provide an alternative water source or a mutually agreeable solution in the event of construction-related impacts. In addition, we are recommending that Transco file a *Well and Spring Monitoring Plan* for the pre- and post-construction monitoring of well yield and water quality and provide a report describing any complaints it receives regarding water well yield or quality, the results of any water quality or yield testing performed, and how each complaint was resolved.

Transco has developed a *Karst Investigation and Mitigation Plan* to address risks associated with karst terrain identified prior to or during construction. Transco would also ensure that erosion and

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[5] The FERC Plan and Procedures are a set of construction and mitigation measures that were developed in collaboration with other federal and state agencies and the natural gas pipeline industry to minimize the potential environmental impacts of the construction of pipeline projects in general. The FERC Plan and Procedures can be viewed on the FERC Internet website at http://www.ferc.gov/industries/gas/enviro/plan.pdf and http://www.ferc.gov/industries/gas/enviro/procedures.pdf, respectively.

sedimentation measures adjacent to exposed karst areas are installed in accordance with all applicable standards and specifications and in a manner that would prevent direct discharge of runoff into known karst features.

Transco is proposing to cross two waterbodies using the horizontal directional drill (HDD) method near areas of known karst topography along CPL South (the Susquehanna and Conestoga River HDDs). Geotechnical investigations and HDD feasibility studies determined that limestone bedrock was present at the proposed Conestoga River HDD crossing site. In the event that there is an inadvertent release of drilling fluids during these HDD crossings, Transco would follow its *Horizontal Directional Drilling Contingency Plan*.

Contaminated groundwater resulting from acid mine drainage and mine pool discharges could be encountered during construction. Transco developed mitigation measures to minimize impacts from acid mine drainage and mine pool discharges and continues to consult with the Pennsylvania Department of Environmental Protection regarding proposed mitigation measures to manage and dispose of contaminated groundwater. Transco would further minimize the potential for impacts associated with encountering acid mine drainage and mine pool discharges by implementing the measures in its *Abandoned Mine Investigation and Mitigation Plan*.

The Project is not likely to significantly affect groundwater resources because the majority of construction would involve shallow, temporary, and localized excavation. Potential impacts would be avoided or further minimized by the use of construction techniques and mitigation measures described in Transco's ECP, Procedures, *Karst Investigation and Mitigation Plan,* and *Abandoned Mine and Investigation and Mitigation Plan*. In addition, Transco would prevent or adequately minimize accidental spills and leaks of hazardous materials into groundwater resources during construction and operation by adhering to its *Spill Plan for Oil and Hazardous Materials*. Given Transco's proposed measures, as well as our recommendations, we conclude that potential impacts on groundwater resources would be adequately avoided, minimized, or mitigated.

The pipeline facilities would cross 388 waterbodies, 5 of which are considered major waterbodies (greater than 100 feet wide). Transco is proposing to use trenchless crossing methods (conventional bore or HDD) for 11 waterbody crossing locations (4 conventional bore crossings of a single waterbody each and 4 HDD crossings, 2 of which would cross multiple waterbodies), including both Susquehanna River crossings and the Conestoga River. Transco would cross 325 waterbodies via dry crossing methods (i.e., dam-and-pump, flume). Implementation of the mitigation measures outlined in Transco's ECP and other project-specific plans would aid in the effective avoidance or minimization of impacts on surface water resources.

Based on currently available data, feasibility studies conclude that the HDD crossing method is feasible at the CPL North and CPL South Susquehanna River crossings, the Conestoga River crossing, and the I-80/Little Fishing Creek crossing and that the risk of inadvertent drilling returns is low. In the event that any of the HDD crossings fail, we are recommending that Transco provide final site-specific contingency crossing plans concurrent with its U.S. Army Corps of Engineers application for an alternative crossing method.

The Project would cross source water protection areas associated with the Susquehanna River, Swatara Creek, and four waterbodies with potable water intakes within 3.0 miles downstream of the proposed waterbody crossing. We are recommending that Transco provide a notification plan developed in consultation with the surface water intake operators identifying points of contact and procedures in the event of an inadvertent release of hazardous materials upstream of the surface water intake or within Zone A source water protection areas.

No long-term effects on surface waters are anticipated as a result of construction and operation of the Project. No designated water uses would be permanently affected because the pipeline would be buried beneath the bed of the waterbodies, erosion controls would be implemented during construction, and streambanks and streambed contours would be restored as closely as possible to preconstruction conditions. Operation of the Project would not result in any surface water effects, unless maintenance activities involving pipe excavation and repair in or near streams are required. If this should occur, Transco would employ protective measures similar to those proposed for construction of the Project. Consequently, we conclude that any maintenance-related effects would be short term and similar to those described above for the initial pipeline construction.

Transco is proposing to use both surface water and/or municipal water sources for hydrostatic testing, HDD crossings (i.e., drilling mud), and dust suppression. Impacts associated with the withdrawal and discharge of water would be effectively minimized by the implementation of the mitigation measures outlined in Transco's ECP, Procedures, and other project-specific mitigation plans. In addition, Transco would obtain appropriate National Pollutant Discharge Elimination System discharge permits prior to conducting hydrostatic testing. Accidental spills during construction and operations would be prevented or adequately minimized through implementation of Transco's *Spill Plan for Oil and Hazardous Materials*.

Based on the avoidance and minimization measures developed by Transco, including its ECP as well as our recommendations, we conclude that the Project would not have adverse impacts on surface water resources.

Construction of the pipeline facilities associated with the Project would affect a total of 46.3 acres of wetlands, including 11.3 acres of forested wetlands, 4.3 acres of scrub-shrub wetlands, and 30.8 acres of emergent wetlands. Of those impacts, 38.0 acres would be temporary and associated with construction of the Project. In emergent wetlands, the impact of construction would be relatively brief because the emergent vegetation would regenerate quickly, typically within 1 to 3 years. In scrub-shrub and forested wetlands, Transco would maintain a 10-foot-wide corridor centered over the pipeline in an herbaceous state and would selectively cut trees within 15 feet of the pipeline centerline. The remainder of forested and scrub-shrub vegetation would be allowed to return to preconstruction conditions and would not be affected during operation.

One hundred and five of the wetlands crossed by the proposed pipelines in Pennsylvania are classified as exceptional value, with 32 of these containing a forest component. The Project would cross 17 forested wetlands in Pennsylvania that are characteristic of the Hemlock/Mixed Hardwood Palustrine Forest Community type, which the Pennsylvania Department of Conservation and Natural Resources identified as a natural or special concern community type. In total, construction would affect about 3.6 acres and operation would permanently affect about 1.8 acre of this community type.

Construction and operation-related impacts on wetlands would be mitigated by Transco's compliance with the conditions of permits issued under sections 401 and 404 of the Clean Water Act and by implementing the wetland protection and restoration measures contained in its ECP, including its Procedures. We are recommending that Transco provide additional justification for the requested additional temporary workspaces at several locations near wetlands. Transco would conduct routine wetland monitoring of all wetlands affected by construction until revegetation is successful and would implement mitigation measures to control invasive species as described in its ECP. Transco would minimize and compensate for effects on the Hemlock/Mixed Hardwood Palustrine Forest Community types in the same manner as for other forested wetlands. Based on the avoidance and minimization measures developed by Transco, as well as our recommendations, we conclude that impacts on wetland resources would be effectively minimized or mitigated.

Vegetation, Wildlife, and Aquatic Species

The Project's impacts on vegetation would range from short term to permanent due to the varied amount of time required to reestablish certain community types, as well as the maintenance of grassy vegetation within the permanent right-of-way and the conversion of aboveground facility locations to non-vegetated areas. The Project would also affect vegetation communities of special concern, including Hemlock/Mixed Hardwood Palustrine Forest Communities, the Safe Harbor East Woods – County Natural Heritage Inventory, and 44 interior forests. Interior forests are quality habitat for wildlife and migratory birds, and fragmentation of large blocks of interior forest has the potential to effectively disconnect forested tracts. Transco attempted to avoid and minimize effects on interior forest habitat, which would account for 262.6 acres of interior forest habitat during construction and 118.5 acres during operations, by routing the proposed pipelines adjacent to existing rights-of-way when possible (43 percent of CPL North, 12 percent of CPL South, and 100 percent of Chapman and Unity Loops). Transco is also proposing to reduce the width of the construction right-of-way through some wetlands and interior forests to minimize effects.

The greatest impact on vegetation would be on forested areas because of the time required for tree regrowth back to preconstruction condition. The Project would affect a total of about 1,054.5 acres of upland and wetland forestland during construction, 432.1 acres of which would remain within the Project's operational easement. Construction in forestlands would remove the tree canopy over the width of the construction right-of-way, which would change the structure and local setting of the forest area. The regrowth of trees would take years and possibly decades. Moreover, the forestland on the permanent right-of-way would be permanently affected by ongoing vegetation maintenance during operations, which would preclude the re-establishment of trees on the right-of-way.

Invasive plant species are a threat to colonize areas disturbed by construction of the pipeline. Transco would minimize the potential impacts from invasive species by implementing the measures outlined in its *Draft Noxious and Invasive Plant Management Plan*, which was developed in consultation with the applicable state regulatory agencies. We are recommending that Transco revise its *Noxious and Invasive Plant Management Plan* to include mitigation measures to prevent forest disease spread from the construction corridor. Based on Transco's *Draft Noxious and Invasive Plant Management Plan* and our recommendation to finalize surveys and incorporate mitigation measures to prevent forest disease spread into the plan before construction, we conclude that the potential spread of noxious/invasive weeds and forest diseases would be effectively minimized or mitigated.

Based on our review of the potential impacts on vegetation, we conclude that the primary impact from construction and operation of the Project would be on forested lands. However, due to the prevalence of forested habitats within the project area and eventual regrowth of prior forested areas outside of the permanent right-of-way as well as Transco's adherence to its ECP, Plan and Procedures, *Permittee-Responsible Mitigation Plan*, *Draft Noxious and Invasive Plant Management Plan*, migratory bird provisions, and other mitigation measures described above, as well as our recommendations, we conclude that impacts on vegetation, including forested areas, would be reduced to less-than-significant levels.

The Project could have both direct and indirect impacts on wildlife species and their habitats. Some of these effects would be temporary, lasting only during construction, or short term, lasting no more than a few years until the preconstruction habitat and vegetation is reestablished. Other impacts would be longer term such as the re-establishment of forested habitats, which could take several years or decades. Forest fragmentation would increase in certain locations due to project construction, reducing the amount of habitat available for interior forest species (e.g., movement and dispersal corridors), increasing the risk of intrusion by invasive or noxious species, and potentially increasing predation due to the removal of vegetation and loss of cover.

Transco proposed several measures to minimize or avoid impacts on wildlife, including adhering to its ECP, Plan, and Procedures; routing of the pipeline to minimize effects on sensitive areas; and reducing the construction right-of-way width through wetlands and interior forests. Due to ongoing concerns regarding potential impacts on and restoration of wildlife habitat in the affected areas, we are recommending that Transco provide documentation of its correspondence with the Pennsylvania Game Commission and Pennsylvania Department of Conservation and Natural Resources and any avoidance or mitigation measures developed with these agencies regarding the State Game Land and Sproul State Forest crossings.

Transco would avoid mortalities or injuries to breeding birds and their eggs or young by conducting vegetation clearing and maintenance activities outside of the breeding season to the extent practicable, particularly in key habitat areas. Transco would also implement the avoidance and minimization measures included in its *Migratory Bird Plan*, developed in coordination with the U.S. Fish and Wildlife Service (FWS) Pennsylvania Ecological Services Field Office and the Pennsylvania Game Commission, to reduce direct and indirect effects on migratory birds and their habitats. The FWS is in the process of determining a methodology for standardizing the mitigation ratios for effects on interior forest habitat, and Transco continues to work with the FWS to develop a project-specific memorandum of understanding that would specify the voluntary conservation measures that would be provided to offset the removal of upland forest and indirect impacts on interior forests. Therefore, we are recommending that Transco file its project-specific memorandum of understanding with the FWS prior to construction.

Given the impact avoidance, minimization, and mitigation measures proposed by Transco, as well as our recommendations, we conclude that the construction and operation of the Project would not have a significant adverse effect on wildlife, including migratory birds.

In Pennsylvania, the Project would cross 221 waterbodies that may contain sensitive fisheries. Transco would cross all of these special concern waterbodies using a dry crossing method (i.e., dam-and-pump, flume, conventional bore, or HDD), minimizing the potential for downstream sedimentation and turbidity. In Virginia, the Project would cross one waterbody (unnamed tributary to Broad Run) designated as a Stream Conservation Unit, which would be crossed using the dam-and-pump dry crossing method. Transco would further minimize effects on fisheries resources within these waterbodies by adhering to the measures in its ECP and the Pennsylvania Fish and Boat Commission's and Virginia Department of Game and Inland Fisheries' recommended construction windows.

Transco would minimize the effects of the Project on aquatic resources through the use of various trenchless or dry crossing methods, construction timing windows, extra workspace restrictions, and restoration procedures. Transco would also implement the measures outlined in its ECP and Procedures, such as restoring stream beds and banks to preconstruction conditions. Adherence to the ECP would maximize the potential for regrowth of riparian vegetation.

Transco would use surface water and municipal sources of water for hydrostatic testing. Transco proposes to use 13 waterbodies as sources of hydrostatic test water, 3 of which contain sensitive fisheries. Transco would minimize impacts of hydrostatic testing on aquatic resources by adhering to its ECP, conducting activities in accordance with applicable regulatory requirements, fitting intake lines with screens to minimize the entrainment of fish, and regulating withdrawal rates to maintain downstream flow rates. Following the completion of the hydrostatic tests, Transco would discharge the test water into an upland dewatering structure. The discharge rates would be regulated and diffusers or energy dissipation devices would be employed to prevent erosion and streambed scour. No chemicals or additives would be added to the water except where necessary to eradicate non-native aquatic species.

Transco would minimize the potential for spills to affect aquatic resources by implementing the measures in its ECP and *Spill Plan for Oil and Hazardous Materials*. These plans include measures that restrict refueling or other handling of hazardous materials within 100 feet of a waterbody, require the use of secondary containment around all containers and tanks, and require routine inspections of tank and storage areas to reduce the potential for spills or leaks of hazardous materials.

Given the impact avoidance, minimization, and mitigation measures proposed by Transco, including its adherence to multiple resource protection plans, as well as our additional recommendations, we conclude that the Project would result in some temporary effects on aquatic resources but these effects would be adequately mitigated.

Special Status Species

Based on consultations with the FWS and state resource agencies, we identified eight federally listed species as potentially occurring in the project area.[6] It was subsequently determined that the gray bat, dwarf wedgemussel, dwarf-flowered heartleaf, and harperella would not be affected by construction and operation of the Project. We have determined that the Project *may affect, but would not likely adversely affect* the Indiana bat, bog turtle, northern long-eared bat, and northeastern bulrush. We are recommending that Transco not begin construction activities until we complete consultation with the FWS and Transco receives written notification from the Director of OEP that construction or use of mitigation may begin.

Five additional state-listed animal species (Allegheny woodrat, eastern small-footed bat, brook floater, bald eagle, and timber rattlesnake) and five state-listed plant species (jeweled shooting-star, American holly, cranefly orchid, puttyroot, and stiff cowbane) may occur in the project area. Transco completed surveys for the state-listed animal species as well as consultation with the Pennsylvania Game Commission and Pennsylvania Fish and Boat Commission, including development of avoidance or mitigation measures in consultation with these agencies.

Two separate cranefly orchid occurrences and one puttyroot occurrence were identified within the proposed workspace for the Project. Transco plans to transplant all individual listed plant species within the workspace into a similar suitable nearby habitat that would not be affected by the Project. Transplanting would occur during the appropriate season with suitable conditions varying by plant species. Transco would also conduct a one-time monitoring event the year following transplant. All of the remaining occurrences of rare plant species were determined to be either non-native or outside the proposed workspace and not affected by the Project. The Pennsylvania Department of Conservation and Natural Resources concurred with the assessment of impacts on and the mitigation plan for state-listed plant species. In areas where survey access has not been granted, Transco indicated that it would complete state-listed plant surveys and submit survey results and avoidance and mitigation measures to the Pennsylvania Department of Conservation and Natural Resources prior to constructing in these areas. Therefore, we have determined that the Project would avoid adverse impacts on Pennsylvania state-listed plants.

The bald eagle receives federal protection under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act, which prohibit the taking of eagles, their eggs, or their nests. A small section of CPL South would be within the 0.5-mile blasting buffer zone of one of the bald eagle nests, but Transco indicated it does not anticipate the need to blast in this area. Therefore, the Project would be in compliance with the Bald and Golden Eagle Protection Act and management guidelines and avoid adverse impacts on nesting bald eagles.

Although no federally listed mussel species are known to occur in the vicinity of the project facilities, the Pennsylvania Fish and Boat Commission would require mussel survey and relocation of

[6] Consultation with the National Oceanic and Atmospheric Administration's National Marine Fisheries Service is not required for the Project because there are no marine or anadromous habitats within the project area.

native mussel species within the Susquehanna River if impacts due to the Project are anticipated. While Transco anticipates avoiding impacts at the Susquehanna River due to the use of the HDD crossing method, Transco conducted baseline mussel surveys in case an alternative crossing method becomes necessary or other unanticipated impacts could occur. No federally or state-listed species were found during these surveys.

The Mainline A and B Replacements would cross tributaries to the main stem of Broad Run, which serves as habitat for the state-listed brook floater. A mussel habitat evaluation and freshwater mussel survey of Dawkin's Branch identified suitable habitat within the waterbody but no brook floater or other sensitive mussel species were identified. To avoid potential impacts on the brook floater, Transco would adhere to the Virginia Department of Game and Inland Fisheries-recommended timing restrictions for crossing Dawkin's Branch and/or conduct relocation surveys at two sites identified by this agency. Transco's ECP, Plan and Procedures, and *Horizontal Directional Drill Contingency Plan* outline best management practices and sediment and erosion control measures to be implemented during construction of the Project. With the implementation of these measures, we do not anticipate any significant adverse impacts on the brook floater or any freshwater mussel species of special concern. The Pennsylvania Fish and Boat Commission and Virginia Department of Game and Inland Fisheries agreed with these findings.

Although a number of other candidate, state-listed, or special concern species were identified as potentially present in the project area, none were detected during surveys and we do not expect any significant adverse effects given Transco's proposed measures and our recommendations. Based on implementation of these measures and our recommendations, we conclude that impacts on special status species would be adequately avoided or minimized.

Land Use, Recreation, and Visual Resources

Construction of the Project would affect a total of 3,741.0 acres of land. About 75 percent of this acreage would be utilized for the pipeline facilities, including the construction right-of-way (62 percent) and additional temporary workspace (13 percent). The remaining acreage affected during construction would be associated with contractor yards and staging areas (11 percent), new and modified aboveground facilities (8 percent), and access roads (6 percent). During operation, the new permanent pipeline right-of-way, aboveground facilities, and permanent access roads would newly encumber 1,235.4 acres of land.

The land retained as new permanent right-of-way would generally be allowed to revert to its former use, except for forested land. Certain activities, such as the construction of permanent structures or the planting of trees, would be prohibited within the permanent right-of-way. To facilitate pipeline inspection, operation, and maintenance, the entire permanent right-of-way in upland areas would be maintained in an herbaceous/scrub-shrub vegetated state. This maintained right-of-way would be mowed no more than once every 3 years, but a 10-foot-wide strip centered over the pipeline might be mowed annually to facilitate corrosion and other operational surveys.

Transco's proposed construction work area is within 50 feet of 152 residential and commercial structures. Twelve residential or commercial structures (one house [an abandoned hunting cabin], one shed, and two structures associated with CPL North; three mobile homes, three sheds, and one building associated with CPL South; and one shed associated with Unity Loop) are within the proposed construction workspace. Of these structures, five would intersect the pipeline centerline, including a structure, a shed, and an abandoned hunting cabin at about mileposts (MP) 1.2, 20.0, and M-0071 3.6 of CPL North; a shed at about MP 65.2 of CPL South; and a shed at about MP 126.0 of Unity Loop. Transco has compensated or would compensate the landowners for the relocation or removal of these structures. Transco has developed site-specific residential construction plans for the residential structures within 50 feet of the construction work area. However, because we are recommending Transco incorporate several minor reroutes and to further minimize effects on residences, we are recommending that Transco file a complete set of site-specific residential construction plans. For all residences located within 10 feet of the construction work area, we are recommending that Transco file revised plans that modify the construction work area so that it is not closer than 10 feet to a residence or provide site-specific justification for the use of the construction workspace. In addition, Transco should file additional site-specific mitigation to minimize effects on one commercial and one residential property, along with documentation of consultation with the landowners.

Three developments would be directly crossed by the pipeline routes, including the Goodleigh Manor residential development, Eastern Land and Resources Company (ELRC) commercial development, and Prince William County residential inventory area. Transco sited the proposed route to minimize impacts on the Goodleigh Manor residential development. Transco has been working with the ELRC regarding several possible route deviations across its property; therefore, we are recommending that Transco file the final results of consultations with the landowner/developer of the ELRC commercial and residential development, including any project modifications or mitigation measures Transco would implement to minimize impacts on the development. Because Transco is not proposing to widen its existing permanent right-of-way through the Prince William County residential inventory area, the Project would not result in a significant impact on this development.

Transco has developed a *Draft Agricultural Construction and Monitoring Plan* for the Project, which documents the measures it would follow to minimize and mitigate effects on agricultural lands. In addition, Transco has proposed to provide an agricultural inspector that would be on site to monitor construction activities within agricultural lands and would hire a subject matter expert to provide guidance to ensure these lands are restored to their original uses and crop yields. Transco's *Draft Agricultural Construction and Monitoring Plan* also includes mitigation measures to minimize impacts on and/or meet the needs of specialty agricultural crop areas (i.e., orchards and tree farms), certified organic farms, and no-till farms. To further ensure that organic certification is protected, we are recommending that, prior to construction, Transco file an organic certification mitigation plan developed in consultation with Pennsylvania Certified Organic to ensure organic certification is maintained on the organic farms crossed by the Project.

In general, the effects of the Project on recreational and special interest areas occurring outside of forestland would be temporary and limited to the period of active construction, which typically lasts several weeks or months in any one area. These effects would be minimized by implementing the measures in Transco's ECP, best management practices, and other project-specific construction plans. In addition, Transco would continue to consult with the owners and managing agencies of recreation and special interest areas regarding the need for specific construction mitigation measures. Transco proposes to cross the Appalachian National Scenic Trail using the conventional bore method, maintaining trees between the entry and exit sites (a 100-foot forested buffer on either side of the trail), and restoring the trees cleared from workspaces to minimize effects. To further minimize effects on other recreation and special interest areas, we are recommending that Transco file final site-specific crossing plans for each of the recreation and special interest areas listed as being crossed or otherwise affected by the Project, including site-specific timing restrictions, proposed closure details and notifications, specific safety measures, and other mitigation to be implemented.

The Project would cross a number of areas enrolled in a variety of federal and Commonwealth of Pennsylvania conservation programs including the Conservation Reserve Program/ Conservation Reserve Enhancement Program, Wetland Reserve Program, Farm and Ranch Lands Protection Program, Clean and Green Program, and Agricultural Security Areas and agricultural conservation easements. Transco is working with landowners, the Natural Resources Conservation Service (Wetland Reserve Program and Farm and Ranch Lands Protection Program), and the Farm Service Agency (Conservation Reserve Program and Conservation Reserve Enhancement Program) to identify these areas and would develop restoration measures that would ensure enrolled properties remain eligible to participate in the programs. Transco would negotiate compensation of fees or penalties, including roll-back taxes and increased annual taxes, as part of the land purchase or easement agreement if the Project would render the tract or a portion of the tract ineligible for a program. Transco would restore agricultural properties with conservation easements in accordance with the methods described in its *Draft Agricultural Construction and Monitoring Plan*. To further ensure that all conservation easements have been identified prior to construction, we are recommending that Transco file with its Implementation Plan a revised table 4.8.6-3 that includes any newly identified conservation easements and copies of correspondence documenting any mitigation measures developed in consultation with the administering agency(ies). In addition, we are recommending that Transco notify the NRCS 1 week prior to the start of construction across NRCS-held conservation easements to facilitate NRCS monitoring of construction and restoration of disturbed areas within these easements.

Transco proposes to cross Tucquan Creek, designated as Wild and Scenic by the Pennsylvania Scenic Rivers Act, using the dam-and-pump crossing method because geotechnical testing results indicated that the conventional bore method was not feasible. Transco would reduce the construction right-of-way width to 75 feet. Construction would temporarily affect the visual character at the crossing location, but the effect would be temporary because the crossing would be in an agricultural area, which would be quickly restored following installation of the pipeline. Following construction, land within the permanent right-of-way would be allowed to revert to the pre-existing agricultural use.

Twenty-three waterbody crossings in Pennsylvania would require that Aids to Navigation Plans be submitted to the Pennsylvania Fish and Boat Commission as part of the state permitting process. Therefore, we are recommending that Transco file the final Pennsylvania Fish and Boat Commission-approved Aids to Navigation Plan for each crossing prior to construction.

The Project would cross three BicyclePA Routes. Transco is consulting with the Pennsylvania Department of Transportation on these BicyclePA routes as part of the road crossing permit process. However, no direct effects on any of the BicyclePA routes would be anticipated because Transco is proposing to cross the bicycle routes and adjacent roadways using the conventional bore crossing method.

One potential railroad bed landfill was identified near CPL South at about MP 66.8. If subsurface debris or contamination is encountered, Transco would implement the protocols in its *Unanticipated Discovery of Contamination Plan*, including suspension of construction activities when suspected contamination is encountered, evacuations if necessary, proper notifications, and follow-up actions as appropriate. Transco would manage any excavated subsurface debris or contaminated soil in accordance with applicable state and federal solid waste management regulations.

Impacts on visual resources would be greatest where the pipeline route parallels or crosses roads and the pipeline right-of-way may be seen by passing motorists; from residences where vegetation used for visual screening or for ornamental value is removed; and where the pipeline is routed through forested areas. The visual effects of construction in forested areas would be permanent on the maintained right-of-way where the regrowth of trees would not be allowed, and would be long term in the temporary workspaces. The greatest potential visual effect would result from the removal of large specimen trees. After construction, all disturbed areas, including forested areas, would be restored in compliance with Transco's ECP and Plan; federal, state, and local permits; landowner agreements; and easement requirements. Generally, this would include seeding the restored areas with grasses and other herbaceous vegetation, after which trees would be allowed to regenerate within the temporary workspaces.

Transco has proposed mitigation measures to reduce visual impacts at the new aboveground facilities, including installing perimeter fences, limiting outdoor lighting to the minimum required for security during unmanned nighttime operation, and utilizing directional control or downward-facing lighting at the main gates, yards, and building entry and exit doors. Additionally, the proposed communication towers could affect the viewshed. In most cases, existing forested areas would provide natural visual screening or the tower would be sited adjacent to an existing industrial facility (i.e., would be consistent with the existing viewshed).

With adherence to Transco's proposed impact avoidance, minimization, and mitigation plans, and our recommendations, we conclude that overall impacts on land use and visual resources would be adequately minimized.

Cultural Resources

Transco identified 440 architectural resources and 149 archaeological sites (including 22 precontact sites, 27 historic sites, and 24 multicomponent sites) within the area of direct impact for the proposed pipeline facilities in Pennsylvania. The Pennsylvania State Historic Preservation Office's (SHPO) preliminary review of the architectural resources recommended that 415 of the architectural resources were ineligible and 24 were eligible for the National Register of Historic Places (NRHP). The Pennsylvania SHPO has not provided comments on the eligibility of one architectural resource site. Of the sites recommended as eligible, the Pennsylvania SHPO made a recommendation of no adverse effect for nine resources and a recommendation of adverse effect for two resources, including the Nesbitt Estate Rural Historic District and the Pedrick Farm. The Pennsylvania SHPO's comments of effect are pending for 13 sites. Of the 149 archaeological sites, the Pennsylvania SHPO approved the treatment plan for 3 sites, and considered that 134 sites are not eligible for the NRHP and 5 sites that would require additional testing for the NRHP or would be avoided. Transco identified two additional sites as not eligible but the Pennsylvania SHPO has not provided comments on their eligibility. Four additional sites were not formally evaluated for their NRHP eligibility because they would not be affected during construction. One site is listed on the NRHP but would be avoided by HDD. The archaeological and architectural surveys in Virginia did not identify any new resources. One lithic artifact was recovered from a disturbed context within a previously recorded precontact archaeological site. The site is not recommended as eligible.

We consulted and Transco conducted outreach with 21 federally recognized tribes and 3 tribes not federally recognized, as well as several other non-governmental organizations, local historical societies, museums, historic preservation and heritage organizations, conservation districts, and other potential interested parties to provide them an opportunity to comment on the proposed Project. Several tribes and organizations requested additional consultation or information, and the Delaware Nation requested mitigation of sites that cannot be avoided by the Project in Lancaster County, Pennsylvania. The Reading Company Technical and Historical Society requested that railroad structures associated with the Reading Railroad be preserved; Transco confirmed that railroad structures crossed by the Project would be avoided through use of the bore crossing method.

To ensure that our responsibilities under section 106 of the National Historic Preservation Act are met, we are recommending that Transco not begin construction until any additional required surveys are completed, survey reports and treatment plans (if necessary) have been reviewed by the appropriate parties, and we provide written notification to proceed. The studies and impact avoidance, minimization, and measures proposed by Transco, and our recommendation, would ensure that any adverse effects on historic properties would be appropriately mitigated.

Air Quality and Noise

Air quality impacts associated with construction of the Project would include emissions from fossil-fueled construction equipment and fugitive dust. Such air quality impacts would generally be temporary and localized, and are not expected to cause or contribute to a violation of applicable air quality standards. Local emissions may be elevated, and nearby residents may notice elevated levels of fugitive dust, but these would not be significant. Operation of the Project would result in air emissions from stationary equipment (e.g., compressor stations, emergency generators, meter stations), including emissions of nitrogen oxides (NO_X), carbon monoxide, particulate matter, sulfur dioxide, volatile organic compounds, greenhouse gases (including fugitive methane), and hazardous air pollutants. Emissions from the new aboveground facilities and modifications to existing facilities, including the proposed meter and regulator stations, would not have a significant impact on local or regional air quality.

Based on Transco's September 2016 revised construction emission estimates, which compressed the construction schedule for the Project to one year (2017), the 2017 NO_X construction emissions for Lancaster County, Pennsylvania would exceed the General Conformity applicability threshold. Therefore, we developed and issued a draft General Conformity Determination on November 3, 2016. Transco has committed to using emission reduction credits (ERC) to demonstrate conformity and the Pennsylvania Department of Environmental Protection has indicated that the use of ERCs is an acceptable method for demonstrating compliance with the Pennsylvania State Implementation Plan and that sufficient NO_X ERCs are available. Therefore, we conclude that the portions of the Project to which General Conformity would apply would conform to the Pennsylvania State Implementation Plan. However, to allow us to prepare a final General Conformity Determination, we are recommending that Transco file proof of purchase or transfer of NO_X ERCs to offset the estimated 2017 NO_X construction emissions for Lancaster County that exceed General Conformity thresholds and confirmation from the Pennsylvania Department of Environmental Protection that the ERCs will conform with the Pennsylvania State Implementation Plan.

The estimated NO_X construction emissions for Lebanon County, Pennsylvania do not exceed the General Conformity applicability threshold. However, if significant changes occur to construction activities, the potential may exist for exceeding the General Conformity applicability threshold for NO_X emissions in Lebanon County. Therefore, we are recommending that Transco file a Construction Emission Plan identifying how Transco would track its construction schedule for each component of the Project within the Lebanon County Nonattainment Area for particulate matter less than 2.5 microns in aerodynamic diameter and to ensure that construction emissions of NO_X would remain below the General Conformity applicability threshold. If a change in the construction schedule or Project results in emissions of NO_X greater than the General Conformity applicability threshold of 100 tons per year, Transco should provide and document all mitigation measures it would implement to comply with the General Conformity regulations at Title 40 Code of Federal Regulations (CFR) Part 93.158.

Compressor Stations 517 and 520 are existing major sources based on potential emissions of NO_X and/or carbon monoxide. The estimated emission increases due to the compressor station modifications would be below all Prevention of Significant Deterioration (PSD) Significant Emissions Rate thresholds. Therefore, the emission increases at Compressor Stations 517 and 520 are not subject to PSD permitting requirements but are subject to Nonattainment New Source Review requirements. The modifications to Compressor Station 190 would result in an exceedance of the NO_X Significant Emissions Rate threshold; however, the NO_X emissions are not subject to the Maryland Department of Environment's Nonattainment New Source Review requirement. Transco completed a "pollution control project" that consisted of a modification to the turbine burners at Compressor Station 190 resulting in emission reductions that offset and netted out the emission increases from the proposed modification. Therefore, the modifications to Compressor Station 190 would not be subject to Nonattainment New Source Review or PSD.

Compressor Stations 605 and 610 would be equipped with electric motor-driven compressors, natural gas-fired emergency generators, and building heating and ventilation equipment. The modifications would not be expected to result in significant air emissions.

FERC staff conducted a supplemental modeling analysis for Compressor Stations 517, 520, and 190 to present potential impacts associated with the operation of the existing emission sources at these stations, along with the proposed new sources, including monitored background. Based on this analysis, the existing sources at Compressor Stations 517, 520, and 190 are shown to be below the national ambient air quality standards (NAAQS) for all pollutants. Based on the modeling analysis, modeled concentrations for one-hour NO_2 for existing sources at Compressor Stations 517 and 520 have the potential to exceed the NAAQS during some operating scenarios and meteorological conditions. However, the new emission sources associated with the Project would not incrementally contribute to the potential exceedance of the one-hour NO_2 standard. The potential exceedances in the model are based on existing equipment and would not be caused or significantly contributed to by the Project. To ensure that the operation of Compressor Stations 517, 520, and 190 do not result in a violation of the NAAQS, we are recommending that Transco continue to operate the air quality monitoring stations at Compressor Stations 517, 520, and 190 for a period of 3 years after the newly modified facilities begin operation. In the event that the air quality monitoring shows a violation of the NAAQS, we are recommending that Transco immediately contact the state air quality agency to report the violation and establish a plan of action to correct the violation in accordance with the terms of the facility air permit and applicable state law.

In response to a comment received on the draft EIS regarding additional diesel emission control measures for new construction equipment, we are recommending that Transco review the Northeast Diesel Collaborative's recommendations for reducing diesel emissions from new on- and off-road construction equipment and indicate what measures it would implement.

With this additional data, our recommendations, and the continued monitoring at the compressor stations, we conclude that operational emissions would not have a significant impact on local or regional air quality.

Noise would be generated during construction of the pipeline and aboveground facilities. Construction noise associated with the pipeline would be spread over the length of the pipeline route and would not be concentrated at any one location for an extended period of time, except at the proposed HDD sites. Construction noise associated with the installation of the compressor, metering, and regulator stations would be concentrated in the vicinity of each site and would extend for several months, but would vary depending on the specific activities taking place at any given time. To ensure that the noise levels during operation of the compressor stations meet the FERC's day-night sound level (L_{dn}) criterion of 55 decibels on the A-weighted scale (dBA), we are recommending that Transco file noise surveys at full load conditions and install additional noise controls if the levels are exceeded.

Mitigated noise levels attributable to the CPL North and CPL South Susquehanna River and CPL South Conestoga River HDDs are anticipated to be below the FERC's 55 dBA L_{dn} threshold at all noise-sensitive areas (NSA) within a 0.5-mile radius of the HDD entry and exit points. However, to ensure that noise levels would be adequately reduced to below 55 dBA at the nearest NSAs during drilling activities, we are recommending that Transco file in its weekly construction status reports the noise measurements from the nearest NSA for the CPL North Susquehanna River HDD entry site and the CPL South Conestoga River HDD entry and exit sites. Overnight construction, if necessary, is not expected to create significant impacts on surrounding NSAs. Transco indicated that the owners of the properties at the nearby NSAs would be notified in advance of planned nighttime construction activities, advising them that noise-generating equipment may be operated during nighttime hours. However, if the noise levels cannot be reduced to target levels, Transco has committed to providing temporary housing or equivalent monetary compensation to the occupants of affected NSAs until the construction activities are completed.

In August 2016, Transco incorporated the CPL South I-80/Little Fishing Creek HDD into the CPL South route. Because ambient sound measurements for the I-80/Little Fishing Creek HDD sites and noise assessments are still pending, we are recommending that, prior to construction at the CPL South I-80/Little Fishing Creek HDD, Transco file the results of the noise impact assessment for the nearest NSAs within a 0.5-mile radius of the HDD entry and exit points. If the results of the noise impact assessment indicate that the estimated noise attributable to HDD equipment operations would exceed FERC's noise level criterion of 55 dBA L_{dn} at any of the NSAs, we are recommending that Transco provide additional information on the mitigation measures, such as sound barriers, that would be implemented to reduce noise levels below 55 dBA.

The Project would likely require blasting in some areas of the proposed route to dislodge bedrock resulting in potential noise and vibration impacts. Transco's Blasting Plan includes mitigation measures related to blasting activity. Blasting would be conducted in accordance with applicable agency regulations, including advance public notification and mitigation measures as necessary.

If blow-off valves are to be used during planned maintenance, Transco would affix a silencer to the blow-off valve to minimize noise impacts. Maintenance blowdown events would typically occur only during daytime hours and Transco plans to notify all landowners in the immediate area. Due to the infrequency and short duration of the blowdown events, noise impacts are expected to be minimal.

Based on the analyses conducted, the proposed mitigation measures, and our recommendations, we concluded that construction and operation of the Project would not result in significant noise impacts on residents and the surrounding environment.

Given adherence to Transco's proposed measures as well as our additional recommendations, we conclude that potential air and noise-related impacts associated with the Project would be adequately minimized or mitigated.

Safety and Reliability

The pipeline and aboveground facilities associated with the Project would be designed, constructed, operated, and maintained to meet the U.S. Department of Transportation's (DOT) Minimum Federal Safety Standards in 49 CFR 192 and other applicable federal and state regulations. These regulations include specifications for material selection and qualification; minimum design requirements; and protection of the pipeline from internal, external, and atmospheric corrosion. The DOT rules require regular inspection and maintenance, including repairs as necessary, to ensure the pipeline has adequate strength to transport the natural gas safely. Further, although regulations requiring remote control shut-off valves have not yet gone into effect and would apply to pipelines built in the future, Transco committed to the use of remote control shut-off valves for the proposed pipelines. In addition, Transco has developed specific engineering controls to safely implement bidirectional flow in compliance with the DOT's pipeline safety standards in 49 CFR 191 and 192 for stations and pipeline segments involved with flow reversals.

We conclude that Transco's implementation of the above measures would ensure compliance with the DOT's regulations regarding public safety and the integrity of the proposed facilities.

Cumulative Impacts

A majority of the impacts associated with the Project in combination with other projects such as residential developments, wind farms, utility lines, and transportation projects, would be temporary and relatively minor overall. We included recommendations in the EIS to further reduce the environmental impacts associated with the Project. However, some long-term cumulative impacts would occur on wetland and forested vegetation and associated wildlife habitats. Some long-term cumulative benefits to the community would be realized from the increased tax revenues from Transco's Project. Short-term cumulative benefits would also be realized through jobs and wages and purchases of goods and materials. Emissions associated with the Project would contribute to cumulative air quality impacts. There is also the potential, however, that the Project would contribute to a cumulative improvement in regional air quality if a portion of the natural gas associated with the Project displaces the use of other more polluting fossil fuels. With implementation of specialized construction techniques, the relatively short construction timeframe in any one location, and carefully developed resource protection and mitigation plans designed to minimize and control environmental impacts for the Project as a whole, we conclude that the cumulative impacts associated with the Project, when combined with other known or reasonably foreseeable projects, would be effectively limited.

ALTERNATIVES CONSIDERED

As alternatives to the proposed action, we evaluated the no-action alternative, system alternatives, route alternatives, and minor route variations. While the no-action alternative would eliminate the short- and long-term environmental impacts identified in the EIS, the stated objectives of Transco's proposal would not be met.

Our analysis of system alternatives determined that there is no available capacity for existing pipeline systems to transport the required volumes of natural gas to the range of delivery points proposed by Transco. Moreover, with the exception of Tennessee Gas Pipeline, none of these existing pipeline systems are in close proximity to the production areas of northern Pennsylvania. We determined that the existing systems in the area of the Project would require significant expansions, which would result in environmental impacts similar to or greater than the Project. Consequently, there are no practicable existing or proposed system alternatives that are environmentally preferable to the Project.

We evaluated five major route alternatives to the proposed pipeline routes. Because none of these would offer major environmental advantages over the proposed pipeline route, we eliminated them from further consideration. We evaluated 30 minor route alternatives that were identified by Transco or suggested by landowners, municipalities, and other stakeholders. We are recommending that Transco incorporate four of these minor alternatives into the proposed route.

During the pre-filing period, as part of Transco's application, or in its supplemental filings, Transco incorporated 132 route variations into the proposed route to avoid or reduce effects on environmental or other resources, resolve engineering or constructability issues, or address stakeholder concerns. We have reviewed the route variations and agree with Transco's conclusions regarding their incorporation into the proposed route. In response to our recommendations in the draft EIS, Transco incorporated CPL North Alternative 5 and CPL South Alternative 22 and minor realignments of Alternative 24C and the Neil Bushong Deviation into the proposed route; the environmental impacts associated with the new routing are assessed as part of the overall Project in section 4 of the EIS. To further address landowner concerns, we are recommending that Transco incorporate the Byron Reroute, Route Deviation M-0431, the Kochan Preferred Alternative 1, the Sharon and Russel Olt Option 2 Alternative, an adjustment to the workspace associated with Route Deviation M-0209, and either the Option A, B, or C valve site location for Alternative 24D. In addition, we are recommending that, if Transco is unable to secure the necessary easement on tract PA-LA-137 B.000 along the proposed route, Transco incorporate the Conestoga River Alternative.

We reviewed the locations of the proposed aboveground facilities to determine whether environmental impacts would be reduced or mitigated by the use of alternative facility sites. Transco identified seven potential locations for Compressor Station 605 and six potential locations for Compressor Station 610. We agree with Transco's conclusion that the alternative sites would not be preferable or provide a significant environmental advantage over the currently proposed Compressor Station 605 and

610 sites. We did not receive any requests to evaluate specific sites for alternative compressor station locations.

CONCLUSIONS

We determined that construction and operation of the Project would result in some adverse environmental impacts, but impacts would be reduced to less-than-significant levels with the implementation of Transco's proposed and our recommended mitigation measures. This determination is based on a review of the information provided by Transco and further developed from data requests; field investigations; scoping; literature research; alternatives analysis; and contacts with federal, state, and local agencies as well as tribes and individual members of the public.

Although many factors were considered in this determination, the principal reasons are:

- About 53.6 miles (27 percent) of the 199.4 miles of project pipeline facilities would be within or adjacent to existing rights-of-way, consisting of existing pipelines and/or electric transmission line rights-of-way.
- Transco would minimize impacts on natural and cultural resources during construction and operation of the Project by implementing its ECP, Plan and Procedures, and other project-specific plans (*Fugitive Dust Control Plan*, *Horizontal Directional Drilling Contingency Plan*, *Unanticipated Discovery Plans for Cultural and Human Remains and Paleontological Resources*, *Agricultural Construction and Monitoring Plan*, *Karst Investigation and Mitigation Plan*, *Unanticipated Discovery of Contamination Plan*, *Spill Plan for Oil and Hazardous Materials*, *Blasting Plan*, *Noxious and Invasive Plant Management Plan*, *Winter Construction Plan*, *Traffic and Transportation Management Plan*, *Abandoned Mine Investigation and Mitigation Plan*, and *Landslide Hazard Investigation and Mitigation Plan*).
- The FERC staff would complete the process of complying with section 7 of the Endangered Species Act prior to construction.
- The FERC staff would complete consultation under section 106 of the National Historic Preservation Act and implementing regulations at 36 CFR 800.
- Transco would comply with all applicable air and noise regulatory requirements during construction and operation of the Project.
- An environmental inspection program would be implemented to ensure compliance with the mitigation measures that become conditions of the FERC authorization.

In addition, we developed project-specific mitigation measures that Transco should implement to further reduce the environmental impacts that would otherwise result from construction and operation of the Project. We determined that these measures are necessary to reduce adverse impacts associated with the Project and, in part, are basing our conclusions on implementation of these measures. Therefore, we are recommending that these mitigation measures be attached as conditions to any authorization issued by the Commission. These recommended mitigation measures are presented in section 5.2 of the EIS.

1.0 INTRODUCTION

On March 31, 2015, Transcontinental Gas Pipe Line Company, LLC (Transco), an indirect subsidiary of Williams Partners L.P. (Williams), filed an application with the Federal Energy Regulatory Commission (FERC or Commission) under section 7(c) of the Natural Gas Act of 1938 (NGA) and part 157 of the Commission's regulations. The application was assigned Docket No. CP15-138-000 and a Notice of Application was issued on April 8, 2015 and noticed in the Federal Register on April 15, 2015. Transco is seeking a Certificate of Public Convenience and Necessity (Certificate) from FERC to construct, install, own, operate, and maintain expansions of its existing interstate natural gas pipeline system in Pennsylvania, Maryland, Virginia, North Carolina, and South Carolina.

Transco's proposal, referred to as the Atlantic Sunrise Project (Project), would involve the construction and operation of about 199.4 miles of pipeline facilities, including:

- 185.9 miles of new, greenfield[1] natural gas pipeline in Columbia, Lancaster, Lebanon, Luzerne, Northumberland, Schuylkill, Susquehanna, and Wyoming Counties, Pennsylvania (58.7 miles of 30-inch-diameter and 127.3 miles of 42-inch-diameter pipeline);
- 11.0 miles of new pipeline looping[2] in Clinton and Lycoming Counties, Pennsylvania (2.5 miles of 36-inch-diameter and 8.5 miles of 42-inch-diameter pipeline);
- 2.5 miles of 30-inch-diameter pipeline replacements in Prince William County, Virginia; and
- associated equipment and facilities.

In addition to the pipeline facilities, Transco proposes to construct and operate the following aboveground facilities:

- two new compressor stations in Columbia and Wyoming Counties, Pennsylvania;
- additional compression and related modifications to two existing compressor stations in Columbia and Lycoming Counties, Pennsylvania and one in Howard County, Maryland;
- two new meter stations and three new regulator stations in Columbia, Lancaster, Luzerne, Susquehanna, and Wyoming Counties, Pennsylvania; and
- minor modifications at existing aboveground facilities at various locations to allow for bi-directional flow and the installation of supplemental odorization, odor detection, and/or odor masking/deodorization equipment.

The proposed facilities are described in detail in section 2.0.

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1 A "greenfield" pipeline crosses land previously untouched by natural gas infrastructure rather than using existing rights-of-way.

2 "Looping" is the practice of installing a pipeline in parallel to another pipeline to increase the capacity along an existing stretch of right-of-way, often beyond what can be achieved by one pipeline or pipeline expansion.

Transco seeks approval to begin construction as soon as possible after receiving all necessary federal authorizations, with an estimated in-service date in February or March 2018. The proposed facilities and project schedule are described in more detail in section 2.0.

We[3] prepared this draft environmental impact statement (EIS) to assess the environmental impacts associated with construction and operation of the facilities proposed by Transco in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, as amended. The U.S. Army Corps of Engineers (USACE) and the U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) are cooperating agencies assisting in the preparation of the EIS because they have jurisdiction by law or special expertise with respect to environmental impacts associated with Transco's proposal. The roles of FERC, the USACE, and the NRCS in the review process are described in section 1.2.

The vertical line in the margin identifies text that is new or modified in the final EIS and differs materially from corresponding text in the draft EIS. Changes were made to address comments from cooperating agencies and other stakeholders on the draft EIS; incorporate modifications to the Project proposed by Transco after publication of the draft EIS; and incorporate information filed by Transco in response to our recommendations in the draft EIS. As a result of the changes, 27 of the recommendations identified in the draft EIS are no longer applicable to the Project and do not appear in the final EIS. Additionally, 10 recommendations identified in the draft EIS have been substantively modified in the final EIS, and 25 new recommendations have been added in the final EIS.

1.1 PROJECT PURPOSE AND NEED

According to Transco, the purpose of the Project is to provide an incremental 1.7 million dekatherms per day (MMDth/d) of year-round firm transportation capacity from the Marcellus Shale production area in northern Pennsylvania to Transco's existing market areas, extending to the Station 85 Pooling Point in Choctaw County, Alabama. Transco has indicated that the Project has not been designed to provide natural gas service to any particular end user or market. The Project would include modifications to the existing Transco mainline system to reverse the direction of flow, enabling new north-to-south capabilities (bi-directional flow) to transport this new source of natural gas to existing markets. Transco indicated that shippers would have primary firm transportation rights to existing points of delivery located on Transco's mainline to the Transco Station 85 Pooling Point and the firm transportation path of the Project, and that no new delivery point is being created. While this EIS briefly describes Transco's stated purpose, it will not determine whether the need for the Project exists, because this will later be determined by the Commission. 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.

Transco held an open season for the Project from August 8 to September 27, 2013. As a result, it has executed long-term, binding precedent agreements[4] with nine shippers for the entire proposed 1.7 MMDth/d or about 1.65 billion cubic feet per day (bcf/d) of additional firm transportation capacity the Project would provide. Table 1.1-1 lists Transco's shippers and contracted volumes. The non-jurisdictional facilities associated with the delivery of these volumes are addressed in sections 1.4 and 4.13.

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

[4] A precedent agreement is a binding contract under which one or both parties has the ability to terminate the agreement if certain conditions, such as receipt of regulatory approvals, are not met.

TABLE 1.1-1 **Customers and Transportation Capacity Subscribed to the Atlantic Sunrise Project**	
Shipper	Transportation Contract Quantity (dekatherms per day)
Anadarko Energy Services Company	44,048
Cabot Oil & Gas Corporation	850,000
Chief Oil & Gas LLC	420,000
Inflection Energy LLC	26,429
MMGS, Inc.	22,024
Seneca Resources Corporation	189,405
Southern Company Services	60,000
Southwestern Energy Services Company	44,048
WGL Midstream, Inc.	44,048
Total Contracted Volume	**1,700,002**

We received several comments on the draft EIS questioning our acceptance of Transco's stated purpose. The Commission does not direct the development of the gas industry's infrastructure regionally or on a project-by-project basis, or redefine an applicant's stated purpose. Commission staff (e.g., the various environmental, regulatory, accounting, engineering, and legal divisions) analyzes the applicant's filed application and stated purpose in order to disclose the impacts resulting from the proposed action to inform the Commission, which will make the eventual decision on whether or not to approve the Project.

We also received comments on the draft EIS questioning the need for the Project and whether it serves the public convenience and necessity. A project's need is established by FERC when it determines whether a project is required by the public convenience and necessity (i.e., when the Commission's decision is made). FERC's Certificate Policy Statement provides guidance as to how the Commission evaluates proposals for new construction, as discussed below, and establishes criteria for determining whether there is a need for a proposed project and whether it would serve the public interest. The FERC environmental staff and hence this EIS does not make that determination.

The Commission's analysis of whether a proposed project is required by the public convenience and necessity consists of three steps. The Commission's Statement of Policy on the Certification of New Interstate Natural Gas Pipeline Facilities[5] explains that in deciding whether to authorize the construction of major new pipeline facilities, the Commission must first balance the public benefits against the adverse effects on specific economic interests. If the conclusion is that the public benefits would not outweigh the adverse effects on the economic interests, the Commission will deny the proposal. If, however, the conclusion that the public benefits do outweigh the adverse effects on the economic interests, the Commission next takes a "hard look" at potential environmental impacts of the proposed action under the requirements of NEPA. If the Commission finds the potential environmental impacts to be unacceptable, it will deny authorization. If, however, the Commission determines that, based on the environmental analysis, market analysis, evaluation of rates, engineering analysis, and consideration of all comments submitted, the proposed project can be constructed and operated in an environmentally acceptable manner, the Commission will issue an Order that finds the project is required by the public convenience and necessity. That Order will contain the environmental conditions the Commission deems necessary and appropriate to ensure acceptable mitigation of potential environmental harms.

[5] The Policy Statement can be found on our website at http://www.ferc.gov/legal/maj-ord-reg/PL99-3-000.pdf. Clarifying statements can be found by replacing "000" in the URL with "001" and "002."

In summary, if the Commission finds the Project to be environmentally unacceptable based on Commission staff-prepared NEPA documents, the Commission will not approve the Project. If the Commission finds the Project to be environmentally acceptable based on the NEPA documents, as well as market analysis, evaluation of rates, and engineering analysis, the Commission will approve it, typically with conditions, provided it is otherwise required by the public convenience and necessity.

1.2 PURPOSE AND SCOPE OF THIS STATEMENT

Our principal purposes for preparing this EIS are to:

- identify and assess the potential impacts on the natural and human environment that would result from the implementation of the Project;
- describe and evaluate reasonable alternatives to the Project that would avoid or substantially lessen adverse effects of the Project on the environment while still meeting the project objectives;
- identify and recommend specific mitigation measures, as necessary, to avoid or minimize environmental effects; and
- encourage and facilitate involvement by the public and interested agencies in the environmental review process.

The topics addressed in the EIS include geology; soils; groundwater; surface waters; wetlands; vegetation; wildlife and aquatic resources; special status species; land use, recreation, special interest areas and visual resources; socioeconomics; cultural resources; air quality and noise; reliability and safety; and cumulative impacts. The EIS describes the affected environment as it currently exists based on available information and the environmental consequences of construction and operation of the Project. It also compares the Project's potential impact to that of various alternatives. The EIS also presents our conclusions and recommended mitigation measures.

Our description of the affected environment is based on a combination of data sources including desktop resources such as scientific literature and regulatory agency reports as well as field data collected by Transco. Since the filing of Transco's application in March 2015 and the printing of this document, Transco had field surveyed over 95 percent of the proposed pipeline route. Completion of field surveys is primarily dependent upon acquisition of survey permission from landowners. If the necessary access cannot be obtained through coordination with landowners and the Project is approved by FERC, Transco may use the right of eminent domain granted to it under section 7(h) of the NGA to obtain a right-of-way. Therefore, it is likely that access to complete these outstanding surveys (and associated agency permitting) would have to be done after issuance of a Certificate.

1.2.1 Federal Energy Regulatory Commission

FERC is an independent federal regulatory agency responsible for evaluating applications for authorization to construct and operate interstate natural gas pipeline facilities. If the Commission determines that a project is required by the public convenience and necessity, a Certificate would be issued under section 7(c) of the NGA and part 157 of the Commission's regulations. As such, FERC is the lead federal agency for the preparation of this EIS in compliance with the requirements of NEPA, the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of

NEPA (Title 40 Code of Federal Regulations [CFR] Parts 1500-1508), and the FERC's regulations implementing NEPA (18 CFR 380).

This EIS presents our review of potential environmental impacts and reasonable recommendations to avoid or mitigate impacts. This EIS will be used as an element in the Commission's review of the Project to determine whether a Certificate would be issued. FERC will also consider non-environmental issues in its review of Transco's application. A Certificate will be granted if the Commission finds that the evidence produced on financing, rates, market demand, gas supply, existing facilities and service, environmental impacts, long-term feasibility, and other issues demonstrates that the Project is required by the public convenience and necessity. Environmental impact assessment and mitigation development are important factors in the overall public interest determination.

1.2.2 U.S. Army Corps of Engineers

The USACE is a federal agency within the U.S. Department of Defense with jurisdictional authority pursuant to section 404 of the Clean Water Act (CWA) (Title 33 of the United States Code [USC] section 1344), which governs the discharge of dredged or fill material into waters of the United States (including wetlands), and section 10 of the Rivers and Harbors Act (33 USC 403), which regulates any work or structures that potentially affect the navigable capacity of a waterbody. Because the USACE must comply with the requirements of NEPA before issuing permits under this statute, it has elected to cooperate in the preparation of the EIS. The USACE would adopt the EIS per 40 CFR 1506.3 if, after an independent review of the document, it concludes that its comments and suggestions have been satisfied. The Project would be in the Baltimore and Norfolk Districts of the USACE.

The primary decisions to be addressed by the USACE include:

- issuance of a section 404 permit for wetland impacts associated with construction of the Project; and
- issuance of a section 10 permit for construction activities within navigable waters of the United States.

This EIS contains information needed by the USACE to reach decisions on these issues. Through the coordination of this document, the USACE would obtain the views of the public and natural resource agencies prior to reaching decisions on the Project.

Transco submitted its section 404/10 application for the Pennsylvania facilities to the USACE, Baltimore District on April 9, 2015 and for the Virginia facilities to the USACE, Norfolk District on February 6, 2016. The USACE published a public notice for Transco's application in the Federal Register concurrent with the draft EIS. As an element of its review, the USACE must consider whether a proposed project avoids, minimizes, and compensates for impacts on existing aquatic resources, including wetlands, to strive to achieve a goal of no overall net loss of values and functions. Based on its participation as a cooperating agency and its consideration of the final EIS (including responses to public comments), the USACE would issue a Record of Decision to formally document its decision on the proposed action, including section 404(b)(1) analysis and required environmental mitigation commitments.

Although this document addresses environmental effects associated with the Project as they relate to section 404, it does not serve as a public notice for any of the USACE's permits.

1.2.3 U.S. Department of Agriculture, Natural Resources Conservation Service

On April 27, 1935 Congress passed Public Law 74-46, in which it recognized that "the wastage of soil and moisture resources on farm, grazing, and forest lands ... is a menace to the national welfare" and established the Soil Conservation Service as a permanent agency within the USDA. In 1994, the Soil Conservation Service's name was changed to the NRCS, which is charged with helping America's farmers, ranchers, and forest landowners conserve the nation's soil, water, air, and other natural resources. In a letter to the Commission dated April 11, 2016, the NRCS requested cooperating agency status should the proposed pipeline cross any NRCS easement holdings. Though not a permitting agency, the NRCS would ensure that the impact of the Project on NRCS-acquired easement holdings is fully and adequately considered.

1.3 PUBLIC REVIEW AND COMMENT

On March 31, 2014, Transco filed a request with FERC to implement the Commission's pre-filing process for the Project. At that time, Transco was in the preliminary design stage of the Project and no formal application had been filed with FERC. The main goals of the pre-filing process are to encourage the early involvement of interested stakeholders, facilitate interagency cooperation, and identify and resolve issues before an application is filed. On April 4, 2014, FERC granted Transco's request and established pre-filing docket number PF14-8-000 to place information related to the Project into the public record. The USACE agreed to conduct its environmental review of the Project in conjunction with the Commission's environmental process.

During the pre-filing process, Transco held 10 open houses and 1 additional informational meeting[6] between May and July 2014. The purpose of the open houses and meeting was to provide affected landowners, elected and agency officials, and the general public with information about the Project and to give them an opportunity to ask questions and express their concerns. We participated in the open houses to provide information regarding the Commission's environmental review process to interested stakeholders and to take comments about the Project and alternatives. The substantive questions and concerns raised by the public at the open houses are addressed in this EIS. A summary of the route alternatives and minor variations evaluated during the pre-filing process is provided in section 3.3.

In addition, Transco established a toll-free project hotline, a project email address, a website with information about the Project, and also sent periodic update newsletters. Transco also communicated directly with certain landowners where specific issues were raised regarding individual properties.

On July 18, 2014, the Commission issued a *Notice of Intent to Prepare an Environmental Impact Statement for the Planned Atlantic Sunrise Expansion Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meetings* (NOI). The NOI was published in the Federal Register on July 29, 2014, and mailed to nearly 2,500 interested parties, including federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; Native American Tribes; affected property owners; other interested parties; and local libraries and newspapers. The NOI briefly described the Project and the EIS process, provided a preliminary list of issues identified by us, invited written comments on the environmental issues that should be addressed in the EIS, listed the date and location of four public scoping meetings to be held in the project area, and established a closing date for receipt of comments of August 18, 2014.

6 On July 29, 2014, Transco held an additional informational meeting for the Mount Joy Township landowners following the adoption of a reroute to avoid the Mount Joy Borough wellhead protection area.

We held four public scoping meetings to provide an opportunity for agencies, stakeholders, and the general public to learn more about the Project and participate in the environmental analysis by commenting on the issues to be addressed in the draft EIS. The meetings were held in:

- Millersville, Pennsylvania, on August 4, 2014;
- Annville, Pennsylvania, on August 5, 2014;
- Bloomsburg, Pennsylvania, on August 6, 2014; and
- Dallas, Pennsylvania, on August 7, 2014.

Thirty-eight people commented at the meeting in Millersville, 18 at the meeting in Annville, 22 at the meeting in Bloomsberg, and 15 at the meeting in Dallas. Each meeting was documented by a court reporter, and the transcripts were placed into the public record for the Project.

On October 22, 2015, the Commission mailed a letter to landowners potentially affected by the path of several proposed project reroutes under evaluation during the preparation of the draft EIS. The letter was mailed to over 300 affected property owners, government officials, and other stakeholders. The letter briefly described the proposed alternative routes, invited newly affected landowners to participate in the environmental review process, and opened a special 30-day limited scoping period.

In addition, during the pre-filing process, we conducted conference calls on an approximately bi-weekly basis with representatives from Transco and agencies to discuss the Project's progress and issues. Summaries of the calls were placed in the public record.

The transcripts of the public scoping meetings, summaries of the bi-weekly conference calls, and all written scoping comments are part of the public record for the Project and are available for viewing through eLibrary on the FERC website (http://ferc.gov).

Table 1.3-1 lists the environmental issues that were identified during scoping and indicates the section of the EIS in which each issue is addressed. In addition to the comments received at the public scoping meetings, over 1,880 written comments and 130 motions to intervene were filed with FERC and placed in the public record for the Project as of April 13, 2016. Table 1.3-1 also lists comments that were received after the formal scoping period closed, including the relevant environmental comments raised by individuals requesting to be intervenors in the Commission's proceeding, as well as environmental issues and concerns identified by cooperating agencies and other stakeholders in comments on the draft EIS. Additional issues we independently identified are also addressed in the EIS.

On May 5, 2016, we issued a *Notice of Availability of the Draft Environmental Impact Statement for the Proposed Atlantic Sunrise Project*. This notice, which was published in the Federal Register, listed the dates and locations of public comment meetings and established a closing date of June 27, 2016, for receiving comments on the draft EIS. Copies of the draft EIS were mailed to over 4,500 stakeholders. The U.S. Environmental Protection Agency (EPA) noticed receipt of the draft EIS in the Federal Register on May 12, 2016.

We held four public comment meetings in the project area to receive comments on the draft EIS. The meetings were held in:

- Lancaster, Pennsylvania, on June 13, 2016;
- Annville, Pennsylvania, on June 14, 2016;
- Bloomsburg, Pennsylvania, on June 15, 2016; and
- Dallas, Pennsylvania, on June 16, 2016.

TABLE 1.3-1

Environmental Concerns Identified for the Atlantic Sunrise Project

Issue/Specific Comment	EIS Section Addressing Comment
General	
Project purpose and need	1.1
Construction methodologies	2.3
Depth of pipe through various land uses	2.3.1.5 and 4.12.1
Alternatives	
Existing system alternatives	3.2
Renewable energy alternatives	3.1.2.3
Consideration of upgrades to or looping of Transco's existing mainline system instead of construction of new pipeline	3.4
Maximization of collocation opportunities to avoid resources (e.g., natural resources, farmlands, and open space)	2.2.1.1 and 3.3
Landowner-specific reroute requests	3.3
Geology and Soils	
Geologic hazards (e.g., sinkholes, karst features/limestone)	4.1.5
Seismic hazards	4.1.5.1
Crossings of Martic Fault and required special construction and restoration methods	4.1.5.2
Blasting impacts and mitigation	4.1.3
Modification of groundwater flow in karst areas resulting from pipeline construction (along the trench), and measures to minimize impacts	4.1.5.6
Anthracite Coal Region impacts (mine subsidence and mine fires)	4.1
Construction in active or reclaimed surface mining areas	4.1.4
Effects on trenching associated with glacial till and soils in the region	4.2
Effects associated with steep slopes and shallow bedrock	4.2.2
Effects on soil resources, including compaction, topsoil, erosion, runoff, rugged topography, and restoration/revegetation	4.2.2
Topsoil segregation with an emphasis on agricultural lands	4.2.2.2
Effects on soil temperature, moisture content, and agricultural activity	4.2.2.2
Potential pipe corrosion from acidic soils	4.12.1
Water Use and Quality	
Mitigation and prevention of effects on or pollution to waterways and groundwater	4.3.1.7 and 4.3.2.5
Stormwater management and erosion control	4.3
Effects on scenic rivers and compliance with the Scenic Rivers Act	4.3.2.4 and 4.8.6.3
Effects associated with crossing of exceptional value and high-quality streams or pristine surface waters and associated ecosystems, including loss of riparian buffers/filtration, flooding, introduction of sediment, stream impairment, and water quality degradation	4.3.2.3
Effects on the Susquehanna River, the Chesapeake Bay, and associated tributaries	4.3.2
Effects on springs, wells, community/public water supplies; and proposed mitigation measures to minimize or prevent impacts, including potential contamination of springs	4.3.1
Effects on private wells, geothermal wells, and leach fields/septic systems	4.3.1 and 4.8.3.1
Effects on floodplains	4.3.2.6
Effects associated with multiple crossings of streams	4.3.2
Effects on forest ecosystems	4.5.3
Impacts of forest fragmentation	4.5.3 and 4.6.1
Wildlife, Aquatic Resources, and Special Status Species	
Effects on aquatic resources, wildlife, and their food sources and habitat, including potential temperature or micro-climate changes	4.6
Timing restrictions and compliance with the Migratory Bird Treaty Act	4.6.1.3
Migratory birds, important bird areas, bald and golden eagles, and breeding grounds	4.6.1.2, 4.6.1.3, 4.7.3
Effects on trout streams	4.3.3, 4.6.2
Effects on wildlife habitat and wildlife survival as a result of fragmentation	4.6.1
Effects on bog turtles, bats, timber rattlesnakes, and associated habitats	4.7.2 and 4.7.3
Land Use	
Effects on land uses, including temporary and permanent acreages, number of landowners affected, proposed restoration, and restricted use	4.8
Effects on recreational resources	4.8.6
Effects on nature preserves and conservancy lands	4.8.4.3

TABLE 1.3-1 (cont'd)

Environmental Concerns Identified for the Atlantic Sunrise Project

Issue/Specific Comment	EIS Section Addressing Comment
Consideration for steep slope ordinances (Martic Township, Lancaster County, Pennsylvania)	4.1.5.4 and 4.2.2
Consideration for Pennsylvania's Clean and Green Program	4.8.6.2
Effects on Rails-to-Trails Routes	4.8.6.1
Effects on agricultural lands (including types of crops and organic farms), the agriculture preserve program, and the Conservation Reserve Enhancement Program, including restoration and monitoring	4.2.2 and 4.8.4
Effects on and restoration of drain tiles	4.2.2 and 4.8.4
Effects on viewshed and aesthetic resources, including scenic views	4.8.8
Effects on residential areas, including removal of trees/landscaping	4.8.3 and 4.8.8
Impact of expanded right-of-way on properties with existing utilities	2.2.1.1 and 4.8.1.2
Potential effects on established or potential sugar maple stands	4.8.4.1
Reduction in aerial extent of forested areas, including where forested land is limited in including Lancaster County, Pennsylvania	4.5.3 and 4.5.5
Effects on the Appalachian National Scenic Trail crossing	4.8.6 and 4.8.8
Effects on residences within 50 feet of construction	4.8.3
Effects on septic systems and drain fields	4.8.3.1
Effects on Fort Indiantown Gap National Guard Training Center	4.8.6
Impacts associated with lighting from compressor stations	4.8.8.2
Socioeconomics	
Use of local labor versus outside contractors, and effects on wage rate and workforce availability	4.9.7
Effects on insurance rates, local tax revenue, and property values	4.9.5, 4.9.6, and 4.9.7
Effects on tourism, including ecotourism	4.9.2
Effects on traffic and road conditions, including safety, public access, and emergency response	4.9.4
Cultural Resources	
Effects on cultural, historic, and prehistoric resources	4.10
Effects on Cordelia Furnace and Forry's Mill Covered Bridge	4.10.1.3
Effects on Native American tribes, the indigenous cultural landscape, and associated cultural resources (including burial sites)	4.10
Effects on the Underground Railroad in the lower Susquehanna River Valley, including historical cave systems	4.10.1.3
Effects on important archaeological sites in the project area	4.10.2
Air Quality	
Effects on air quality and pollution, including impacts on local residents, as well as regional health impacts/risks	4.11.1.4 and 4.13.8.9
Consideration for increased greenhouse gases including methane and effects on global warming, climate change, and pollution resulting from increased use of fossil fuels	4.11.1.2 and 4.13.8.9
Consideration for existing air quality, specifically in Lancaster County	4.11.1.2
Impacts associated with venting and flaring and related particulate matter	4.11.1., 4.11.1.4, and 4.11.1.5
Fugitive dust emissions during construction	4.11.1.4
Noise	
Noise impacts associated with construction and operation	4.11.2.3
Vibration	4.11.2.3
Reliability and Safety	
Transco's safety standards and safety record (including explosion/fire hazards, leaks, and emergency plans)	4.12.1 and 4.12.2
Pipeline monitoring and routine maintenance	2.5, 2.6, and 4.12.1
Safety associated with proximity of schools to the project area	4.9.3 and 4.12.1
Effects on ingress/egress routes for the public and emergency responders in the event of potential explosions or emergencies	4.9.3
Landowner notification of leaks	4.12.1
Leak detection and use of mercaptan	4.12
Safety of bidirectional flow	4.12.1
Pipeline safety improvements, including use of double-walled pipe	4.12.1
Cumulative Impacts	
Analysis of cumulative impacts associated with multiple other pipeline and infrastructure projects in the area	4.13

The meetings provided stakeholders an opportunity to present oral comments on the analysis of environmental impacts described in the draft EIS. Eighty-five people commented at the meeting in Lancaster, 36 at the meeting in Annville, 42 at the meeting in Bloomsberg, and 40 at the meeting in Dallas. Each meeting was documented by a court reporter, and the transcripts were placed into the public record for the Project. We also received over 560 written comment letters from federal, state, and local agencies; Native American tribes; companies/organizations; and individuals in response to the draft EIS. In addition, we received over 900 additional letters that were identical copies of 45 different form letter variants. Transcripts from the public comment meetings as well as the written comment letters are available for viewing on the FERC's eLibrary website (www.ferc.gov).

Most of the commentors expressed opposition to the Project. Health and safety concerns, a preference for renewable energy sources, and concerns about cumulative environmental impacts were common objections. Other concerns included the purpose and need for the Project; concerns about the environmental review process and alternatives analysis; land use impacts; and impacts on air quality, wildlife, wetlands, and water resources.

Except as noted below, all substantive, relevant, and timely comments on the draft EIS that pertain to environmental issues are addressed in this EIS. As noted previously, substantive changes in the final EIS are indicated by vertical bars that appear in the margins of the text. These changes were made in response to comments received on the draft EIS and as a result of updated information that became available after the issuance of the draft EIS, including information filed by Transco. The FERC staff's responses to relevant comments are provided in Volume III.

We received several comments on the draft EIS regarding impacts associated with production of natural gas from the Marcellus shale region or in other upstream areas. Development of the natural gas resource in the Marcellus shale is not the subject of this EIS nor is this issue directly related to the proposed Project. Production and gathering activities, and the pipelines and facilities used for these activities, are not regulated by FERC, but are overseen by the affected region's state and local agencies with jurisdiction over the management and extraction of the Marcellus shale gas resource. FERC's jurisdiction is further restricted to facilities used for the transportation of natural gas in interstate commerce, and does not extend to facilities used for intrastate transportation.

We also received a number of comments regarding the potential for overseas exportation of natural gas associated with the Project. The Project does not involve the export of liquefied natural gas (LNG). Based on the make-up of the nine project shippers, Transco anticipates that the vast majority of natural gas transported through the firm capacity under the Project would be consumed domestically in markets along the East Coast, displacing natural gas that previously originated in production areas located within the Gulf of Mexico; however, Transco does not control a shipper's use of its capacity and cannot dictate to which markets the shipper may sell gas. Cabot Oil & Gas is the only shipper for the Project that has publicly announced that it has contracted to sell gas supply to a party that is also a shipper (Sumitomo) in the Cove Point Terminal. Transco understands that the point of sale of that gas supply would occur at the existing pipeline interconnection with Cove Point Pipeline and not at the export terminal. While the international marketplace represents a potential destination for U.S. natural gas supply, it represents just one of many possible markets served through interconnections with existing transmission pipeline infrastructure. Market impacts would be further analyzed in any Order issued by the Commission.

Any export facility must receive FERC's approval, and the export of LNG must be approved by the U.S. Department of Energy (DOE). Any existing export facility has been, and any proposed export facility would have to be, reviewed by FERC and the DOE prior to it being approved to export LNG. These reviews would evaluate the potential impacts of the LNG project including, in FERC's case, the liquefaction and shipping of LNG and, in the DOE's case, the actual export of LNG to foreign markets. As such, any actions or consequences associated with the subsequent liquefaction and export of the gas transported by the Project from an LNG export facility in the United States has been contemplated.

On October 13, 2016, the Commission mailed a letter to landowners potentially affected by two alternative pipeline alignments identified following the issuance of the draft EIS. The letter was mailed to 56 potentially affected property owners, government officials, and other stakeholders. The letter briefly described the proposed alternative routes, invited potentially affected landowners to participate in the environmental review process, and opened a special 30-day limited scoping period. We received 25 comment letters from individuals in response to the alternative pipeline alignment letter (see section 3.3.2).

On November 3, 2016, the Commission issued a Notice of Availability of a draft General Conformity Determination to assess the potential air quality impacts associated with construction of the Project in accordance with NEPA, the Clean Air Act (CAA), and FERC's regulations.[7] The FERC staff concludes that the Project would achieve conformity in Pennsylvania through the transfer of emission reduction credits (ERC) (see section 4.11.1 for more information).

Copies of this final EIS have been mailed to the agencies, organizations, individuals, and other parties identified in the distribution list provided as appendix A. Additionally, the final EIS has been filed with the EPA for issuance of a formal Notice of Availability in the Federal Register. In accordance with the CEQ's regulations implementing NEPA, no agency decision on the proposed actions may be made until 30 days after the EPA publishes the Notice of Availability in the Federal Register. However, the CEQ regulations provide an exception to this rule when an agency decision is subject to a formal internal appeal process that allows other agencies or the public to make their views known. This is the case at FERC, where any Commission decision on the proposed action would be subject to a 30-day rehearing period. Therefore, the FERC decision may be made and recorded concurrently with the publication of the final EIS.

1.4 NON-JURISDICTIONAL FACILITIES

Under section 7 of the NGA, FERC is required to consider, as part of its decision to authorize interstate natural gas facilities, 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. These "non-jurisdictional" facilities may be integral to the need for the proposed facilities (e.g., a power plant at the end of a FERC-jurisdictional pipeline), or they may be merely associated as minor, non-integral components of the jurisdictional facilities that would be constructed and operated as a result of certification of the proposed facilities.

The following non-jurisdictional actions were identified in association with the Project:

- the Williams Field Services Owego pipeline and associated Zick Compressor Station discharge piping;
- electric transmission lines to proposed Compressor Stations 605 and 610; and
- electrical service distribution to existing Compressor Stations 517, 520, and 190.

[7] The draft General Conformity Determination is available for public viewing on our website at http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20161020-3044.

These facilities are described in more detail below and are also addressed in our cumulative impacts analysis in section 4.13 of this EIS.

Williams Field Services Owego Pipeline and Associated Zick Compressor Station Discharge Piping

Williams Field Services (midstream) would construct the Owego pipeline, about 5.9 miles of 24-inch-diameter gathering pipeline, to tie into the Zick Meter Station and about 742 feet of discharge piping to connect the Zick Compressor Station to the proposed Zick Meter Station. The Owego pipeline and associated discharge piping from the Zick Compressor Station would fall under the jurisdiction of the Pennsylvania Public Utility Commission. Williams Field Services would apply for required federal, state, and local permits for approval to construct and operate the Owego pipeline and associated discharge piping.

Electric Transmission Lines to Proposed Compressor Stations

PPL Electric Utilities would construct two 69-kilovolt (kV) extension electrical transmission lines, with an estimated combined length of about 6.1 miles, to supply power to the proposed Transco Compressor Stations 605 and 610. One line would extend from its existing Stanton-Brookside 69-kV line near the Brookside Substation to serve Compressor Station 605, and the second would extend from the Scott-Rohrsburg section of its existing Columbia-Scott 69-kV line to serve Compressor Station 610. The extension of these electrical transmission lines would fall under the jurisdiction of the Pennsylvania Public Utility Commission. PPL Electric Utilities would apply for required federal, state, and local permits for approval to construct and operate these transmission lines.

Electrical Service Distribution to Existing Compressor Stations

PPL Electric Utilities would install new electrical service distribution at both Compressor Stations 517 and 520 to power the new compressor buildings, power and control room buildings, motor control center, and other ancillary equipment. No new transmission lines would be required because the proposed electrical lines would tap into the existing transmission lines. PPL Electric Utilities would apply for all required federal, state, and local permits for the projects.

Baltimore Gas and Electric (BGE) would install a new distribution electrical service at Compressor Station 190 to power the new compressor building, power and control room building, motor control center, and other ancillary equipment. No new transmission line would be required because the proposed electrical line would tap into an existing transmission line. BGE would apply for all required federal, state, and local permits for the project.

1.5 PERMITS, APPROVALS, AND REGULATORY REVIEWS

As the lead federal agency for the Project, FERC is required to comply with section 7 of the Endangered Species Act of 1973 (ESA), the Migratory Bird Treaty Act (MBTA), the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (MSA), the Rivers and Harbors Act, the CWA, the CAA, and section 106 of the National Historic Preservation Act (NHPA). These and other statutes have been taken into account in the preparation of the EIS.

Table 1.5-1 lists the major federal, state, and local permits, approvals, and consultations identified for the construction and operation of the Project. Table 1.5-1 also provides the dates or anticipated dates when Transco commenced or anticipates commencing formal permit and consultation procedures. Transco would be responsible for obtaining all permits and approvals required to implement the Project prior to construction regardless of whether they appear in this table.

TABLE 1.5-1

Major Permits, Approvals, and Consultations for the Atlantic Sunrise Project

Agency	Permit/Approval/Consultation	Agency Action	Status
Federal			
FERC	Certificate under section 7(c) of the NGA	Determine whether the Project would be in the public interest, and consider issuing a Certificate	Application filed on March 31, 2015
USACE	Department of the Army permit under section 404 of the CWA	Consider issuing a permit for discharges of dredged or fill material into waters of the United States	Application for Pennsylvania facilities submitted April 9, 2015; permit for Virginia facilities received August 24, 2016
	Department of the Army permit under section 10 of the Rivers and Harbors Act	Consider issuing a permit for structures or work in or affecting navigable waters of the United States	Application for Pennsylvania facilities submitted April 9, 2015; permit for Virginia facilities received August 24, 2016
U.S. Fish and Wildlife Service, Pennsylvania, Chesapeake Bay, Asheville, Raleigh, and South Carolina Field Offices	Section 7 ESA consultation, Biological Opinion	Consider FERC's finding of impact on federally listed and proposed threatened and endangered species and their critical habitat, and provide a Biological Opinion if the action is likely to adversely affect federally listed species or their critical habitat	Ongoing
	MBTA and section 3 of Executive Order 13186	Provide comments regarding project effects on listed migratory birds	Ongoing
	Bald and Golden Eagle Protection Act	Provide comments regarding project effects on bald and golden eagles	Ongoing
National Park Service	Consultation regarding crossing of the Appalachian National Scenic Trail	Consider FERC's finding of impact on the Appalachian National Scenic Trail	Not applicable (Project does not cross National Park Service property)
Interstate Agencies			
Susquehanna River Basin Commission	Water Allocation Permit	Issuance of a Water Allocation Permit for withdrawal of surface water and groundwater	Permit issued September 8, 2016
Pennsylvania			
Pennsylvania Department of Environmental Protection (PADEP), Regional Bureaus of Watershed Management	Clean Water Act 401 Water Quality Certification	Issuance of a section 401 permit for discharge to waters of the United States.	Permit issued April 5, 2016
PADEP, Regional Bureaus of Watershed Management	Chapter 105 Application	Issuance of a Chapter 105 permit for wetlands and water obstructions	Chapman Loop – permit issued April 29, 2016; Unity Loop – application submitted August 7, 2015; Central Penn Line (CPL) North and CPL South – applications submitted August 28, 2015

TABLE 1.5-1 (cont'd)

Major Permits, Approvals, and Consultations for the Atlantic Sunrise Project

Agency	Permit/Approval/Consultation	Agency Action	Status
PADEP, Bureau of Land and Water Conservation, Division of Stormwater Management and Sediment Control	Chapter 102 ESCGP-2 Application	Issuance of a Chapter 102 permit	Compressor Station 517 and Chapman Loop – permits issued on October 9,2015 and April 29, 2016, respectively; Compressor Station 520 and Unity Loop – application submitted August 7, 2015; CPL North and CPL South – applications submitted August 28, 2015
PADEP, Bureau of Water Quality Protection	Clean Water Act Section 402 National Pollutant Discharge Elimination System (NPDES) – Hydrostatic Test Water Discharge Permit/Approval	Issuance of a section 402 and hydrostatic test water discharge permit	CPL North, CPL South, Chapman Loop, and Unity Loop – applications anticipated to be submitted third quarter of 2016 Compressor Stations 605 and 610 – applications anticipated to be submitted fourth quarter of 2016
PADEP, Regional Watershed Management	Submerged Land License Agreement	Issuance of Submerged Land License Agreement	Application anticipated to be submitted fourth quarter of 2016
PADEP, Bureau of Air Quality	Air Quality Request for Determination (RFD)	Air quality determination	Compressor Station 605, Springville and Zick Meter Stations – RFD exclusion approved July 17, 2015 Compressor Station 610 – RFD exclusion approved October 1, 2015 West Diamond Regulator Station – RFD exclusion approved February 8, 2016 River Road Regulator Station – RFD exclusion approved January 20, 2016
	Air Quality Plan Approval (minor)	Approval of Air Quality Plan	Compressor Stations 517 and 520 – application submitted in March 2015
Pennsylvania Fish and Boat Commission	Aid to Navigation Plans	Approval of Aid to Navigation Plans	Applications submitted October 4 and October 10, 2016
	Permit for Use of Explosives in Commonwealth Waters	Issuance of Permit for Use of Explosives in Commonwealth Waters	Application submitted October 10, 2016
	Consultation (rare aquatic and amphibian species)	Provide comments to prevent effects on rare aquatic and amphibian species	Clearance received May 31, 2016 and September 2, 2016
Pennsylvania Department of Transportation	Highway Occupancy Permit	Issuance of a Highway Occupancy Permit for installation of utilities that serve the public	Application anticipated to be submitted third quarter of 2016
Pennsylvania Department of Conservation and Natural Resources	Consultation (rare plant species)	Provide comments to prevent effects on rare species	Clearance received May 27, 2016 and August 31, 2016
	State Park Right-of-Way License	Issuance of State Park Right-of-Way License	Application submitted April 30, 2015

TABLE 1.5-1 (cont'd)

Major Permits, Approvals, and Consultations for the Atlantic Sunrise Project

Agency	Permit/Approval/Consultation	Agency Action	Status
Pennsylvania Game Commission	Consultation (rare mammalian and avian species)	Provide comments to prevent effects on rare species	Clearance received June 2, 2016 and September 19, 2016
	State Game Land Right-of-Way License	Issuance of State Game Land Right-of-Way License	License agreements received November 3, 2016
Pennsylvania Historical and Museum Commission, Bureau of Historic Preservation	Section 106, NHPA Consultation	Review and comment on the Project and its effects on historic properties	Consultation initiated in March 2014 and is ongoing
Maryland			
Maryland Department of the Environment	Maryland Joint Permit	Approval of wetland/waterway authorization	Permit received October 13, 2015
	NPDES Hydrostatic Discharge Permit	Issuance of NPDES Hydrostatic Discharge Permit	Application anticipated to be submitted third quarter of 2016
	Rare Species Clearance	Issuance of clearance to prevent effects on rare species	Clearance received May 30, 2014
	Air Permit Change Notice	Issuance of Air Permit Change Notice	Permit received March 17, 2016
Maryland Historical Trust	State Historic Preservation Office (SHPO) Categorical Exclusion	Clearance for SHPO Categorical Exclusion	Clearance received November 12, 2014
Howard County Conservation District	Permit for Stormwater Management Associated with Construction Activity	Issuance of Permit for Stormwater Management Associated with Construction Activity	Permit received December 2, 2015
	Soil Erosion and Sediment Control	Approval of erosion and sediment controls to minimize soil erosion and off-site sedimentation	Application anticipated to be submitted fourth quarter of 2016
Virginia			
Virginia Department of Environmental Quality	Soil Erosion Plans Associated with Construction Activity	Soil Erosion Plans Associated with Construction Activity	Application submitted February 2, 2016
	Virginia Pollutant Discharge Elimination System Hydrostatic Discharge Permit	Issuance of Virginia Pollutant Discharge Elimination System Hydrostatic Discharge Permit	Application anticipated to be submitted fourth quarter of 2016
	CAA Title V 502(b)(10) Notifications	Review of notification of facility changes covered under Title V Permit 502(b)(10)	Determined not applicable
Virginia Department of Conservation and Recreation	Rare Species Clearance	Provide comments to prevent effects on rare species	Consultation initiated April 2014 and is ongoing
Virginia Department of Game and Inland Fisheries	Rare Species Clearance	Provide comments to prevent effects on rare species	Clearance received October 31, 2016
Virginia Department of Historic Resources	Section 106, NHPA Consultation	Review and comment on the Project and its effects on historic properties	Concurrence received November 12, 2014 and December 22, 2015

TABLE 1.5-1 (cont'd)

Major Permits, Approvals, and Consultations for the Atlantic Sunrise Project

Agency	Permit/Approval/Consultation	Agency Action	Status
North Carolina			
North Carolina Department of Environment and Natural Resources (NCDENR), Division of Energy, Land and Mineral Resources	NPDES General Stormwater Construction Notification	Approval of NPDES General Stormwater Construction Notification	Compressor Station 155 – approved April 12, 2016; Compressor Stations 145 and 150 – approved April 21, 2016; Compressor Station 160 – approved June 21, 2016
NCDENR, Division of Air Quality	CAA Title V 502(b)(10) Notifications	Review of notification of facility changes covered under Title V Permit 502(b)(10)	Determined not applicable
North Carolina Wildlife Resources Commission	Rare Species Clearance	Provide comments to prevent effects on rare species	Consultation initiated in April 2014 and is ongoing
North Carolina Department of Cultural Resources	SHPO Categorical Exclusion	SHPO Categorical Exclusion clearance	Clearance received October 23, 2014
South Carolina			
South Carolina Department of Health and Environmental Control	NPDES General Stormwater Construction Notification	Approval of NPDES General Stormwater Construction Notification	Application anticipated to be submitted third quarter of 2016
	NPDES Hydrostatic Discharge Permit	Issuance of NPDES Hydrostatic Discharge Permit	Application anticipated to be submitted fourth quarter of 2016
South Carolina Department of Natural Resource – Natural Heritage Program	Rare Species Clearance	Provide comments to prevent effects on rare species	Consultation initiated in April 2014 and is ongoing
South Carolina Archive and History Center	SHPO Categorical Exclusion	SHPO Categorical Exclusion clearance	Clearance received October 21, 2014

2.0 PROPOSED ACTION

2.1 PROPOSED FACILITIES

Transco proposes to construct and operate an expansion of its existing natural gas transmission system in Pennsylvania, Virginia, Maryland, North Carolina, and South Carolina. Tables 2.1-1 and 2.1-2 summarize the proposed pipeline and aboveground facilities. Figure 2.1-1 is an overview map of the Project. Additional maps showing the locations of the pipeline routes, and aboveground and other facilities are included in appendix B. More detailed alignment sheets depicting the proposed pipeline route can be accessed at our website.[1]

2.1.1 Pipeline Facilities

Table 2.1-1 provides a summary of the Project's pipeline facilities, including two new greenfield pipelines (Central Penn Line [CPL] North and CPL South) two pipeline loops (Chapman and Unity Loops), and noncontiguous pipeline replacements.

2.1.1.1 Central Penn Line North

CPL North would consist of approximately 58.7 miles of new 30-inch-diameter pipeline in Pennsylvania with a maximum allowable operating pressure (MAOP) of 1,480 pounds per square inch gauge (psig). CPL North would begin near milepost (MP) L114.0 of the existing Transco Leidy Line in Columbia County and continue east, collocated with the Transco Leidy Line right-of-way, for about 25.3 miles. Between MPs 21.2 and 21.3 in Luzerne County, the pipeline would turn northeast, departing from the existing Transco Leidy Line system, and continue through Wyoming and Susquehanna Counties, Pennsylvania, to the proposed Zick Meter Station in Susquehanna County.

2.1.1.2 Central Penn Line South

CPL South would consist of 127.3 miles of new 42-inch-diameter pipeline in Pennsylvania with an MAOP of 1,480 psig. The proposed route of CPL South is adjacent to (or collocated with) existing pipeline or electric transmission utility rights-of-way for approximately 14.8 miles. CPL South would begin at MP 1,683.3 of the existing Transco Mainline system in Lancaster County, Pennsylvania, and would continue north through Lebanon, Schuylkill, Northumberland, and Columbia Counties, Pennsylvania, before reaching its terminus at MP L114.0 of the existing Transco Leidy Line system.

2.1.1.3 Chapman Loop

The Chapman Loop[2] would consist of 2.5 miles of 36-inch-diameter pipeline with an MAOP of 1,200 psig collocated with the existing Transco Leidy Line system between MPs L186.0 and L188.6 in Clinton County, Pennsylvania.

[1] Alignment sheets for the proposed pipeline route and facilities can be accessed at http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20160920-5019 (see attachments 1A through 1E).

[2] Once placed into service, the Chapman Loop would be referred to by Transco as the Leidy Line D.

TABLE 2.1-1

Summary of Pipeline Facilities Associated with the Atlantic Sunrise Project

State/Facility/County/Municipality	Milepost Range [a]	Length (miles)
PENNSYLVANIA		
CPL North		
Columbia		
Sugarloaf Township	0.0 to 5.0	5.0
Luzerne		
Fairmount Township	5.0 to 10.3	5.4
Ross Township	10.3 to 15.0	4.7
Lake Township	15.0 to 19.3	4.3
Lehman Township	19.3 to M-0060 0.2	3.1
Dallas Township	M-0060 0.2 to M-0088 1.6	5.7
Wyoming		
Franklin Township	M-0088 1.6 to M-0088 2.3	0.7
Northmoreland Township	M-0088 2.3 to M-0071 2.0	4.6
Eaton Township	M-0071 2.0 to 35.0	2.4
Falls Township	35.0 to 37.9	2.9
Overfield Township	37.9 to 41.6	3.7
Clinton Township	41.6 to 46.2	4.6
Nicholson Township	46.2 to 50.6	4.8
Susquehanna		
Lenox Township	50.6 to 57.3	6.7
CPL North Total		**58.7**
CPL South		
Lancaster		
Drumore Township	0.0 to 1.8	1.6
Martic Township	1.8 to 8.2	6.7
Conestoga Township	8.2 to 12.3	4.2
Manor Township	12.3 to 19.6	7.4
West Hempfield Township	19.6 to 23.9	4.4
Rapho Township	23.9 to 27.4	3.5
Mount Joy Borough	27.4 to 27.6	0.2
Rapho Township	27.6 to 34.5	7.0
Mount Joy Township	34.5 to 36.5	2.1
Lebanon		
South Londonderry Township	36.5 to 41.3	4.7
South Annville Township	41.3 to M-0424 1.5	5.0
North Annville Township	M-0424 1.5 to 49.3	3.7
East Hanover Township	49.3 to 52.8	3.6
Union Township	52.8 to 62.4	11.2
Cold Springs Township	62.4 to 64.3	0.2
Schuylkill		
Pine Grove Township	64.3 to 70.5	6.3
Tremont Township	70.5 to 73.1	2.6
Frailey Township	73.1 to M-0201 0.4	1.4
Porter Township	M-0201 0.4 to 75.0	0.5
Hegins Township	75.0 to 79.1	4.1
Eldred Township	79.1 to M-0247 0.4	3.6

TABLE 2.1-1 (cont'd)

Summary of Pipeline Facilities Associated with the Atlantic Sunrise Project

State/Facility/County/Municipality	Milepost Range [a]	Length (miles)
Northumberland		
East Cameron Township	M-0247 0.4 to M-0323 0.1	2.1
Coal Township	M-0323 0.1 to 89.7	5.1
Ralpho Township	89.7 to 91.0	1.3
Columbia		
Cleveland Township	91.0 to 91.7	0.8
Northumberland		
Ralpho Township	91.7 to M-0271 0.1	0.5
Columbia		
Cleveland Township	M-0271 0.1 to 95.4	3.2
Franklin Township	95.4 to 99.7	4.3
Montour Township	99.7 to 103.0	3.4
Hemlock Township	103.0 to M-0423 0.8	4.1
Mount Pleasant Township	M-0423 0.8 to 112.0	5.3
Orange Township	112.0 to 112.9	0.8
Greenwood Township	112.9 to 118.2	5.4
Jackson Township	118.2 to 125.0	6.8
Sugarloaf Township	125.0 to M-0353 0.1	0.2
CPL South Total [b]		**127.3**
Chapman Loop		
Clinton		
Chapman Township	186.0 to 188.5	2.5
Chapman Loop Total		**2.5**
Unity Loop		
Lycoming		
Jordan Township	120.3 to 121.4	1.0
Franklin Township	121.4 to 123.8	2.4
Penn Township	123.8 to 128.9	5.1
Unity Loop Total		**8.5**
Pennsylvania Subtotal		**197.0**
VIRGINIA		
Mainline A and B Replacements		
Prince William		
Brentville District	1,578.7 to 1,580.8	2.4
Gainesville District	1,580.8 to 1,581.0	0.1
Mainline A and B Replacements Total		**2.5**
Virginia Subtotal		**2.5**
PROJECT TOTAL		**199.4**

[a] Where route modifications have been incorporated into the proposed route, the new mileposts are identified by inclusion of the associated route modification number (M-####) preceding the milepost value. Beginning and ending mileposts are approximate; therefore, the difference between beginning and ending mileposts in these areas does not necessarily equal the total length.

[b] The total may not match the sum of addends due to rounding.

TABLE 2.1-2

Summary of New and Modified Aboveground Facilities Associated with the Atlantic Sunrise Project

Facility	Milepost	Municipality and/or County, State
New Compressor Stations		
Compressor Station 605 (30,000 horsepower)	44.9 (CPL North)	Clinton Township, Wyoming County, PA
Compressor Station 610 (40,000 horsepower)	112.5 (CPL South)	Orange Township, Columbia County, PA
Compressor Station Upgrades and Modifications		
Compressor Station 520	L157.6	Mifflin Township, Lycoming County, PA
Compressor Station 517	L115.2	Benton Township, Columbia County, PA
Compressor Station 190	1,628.8 (Mainline)	Ellicott City, Howard County, MD
Compressor Station 185	1,583.4 (Mainline)	Gainesville District, Prince William County, VA
Compressor Station 170	1,457.0 (Mainline)	Falling River District, Appomattox County, VA
Compressor Station 160	1,369.4 (Mainline)	New Bethel Township, Rockingham County, NC
Compressor Station 155	1,326.1 (Mainline)	Reddy Creek Township, Davidson County, NC
Compressor Station 150	1,287.1 (Mainline)	Davidson Township, Iredell County, NC
Compressor Station 145	1,247.0 (Mainline)	Grover Township, Cleveland County, NC
New Metering and Regulating (M&R) Stations		
Zick Meter Station	57.3 (CPL North)	Lenox Township, Susquehanna County, PA
Springville Meter Station	31.5 (CPL North)	Northmoreland Township, Wyoming County, PA
North Diamond Regulator Station	L92.7	Lehman Township, Luzerne County, PA
West Diamond Regulator Station	L114.0	Sugarloaf/Jackson Townships, Columbia County, PA
River Road Regulator Station	1,683.3 (Mainline)	Drumore Township, Lancaster County, PA
M&R Station Modifications		
Puddlefield Meter Station	31.4 (CPL North)	Rapho Township, Wyoming County, PA
Grover Meter Station	1,247.1 (Mainline)	Grover Township, Cleveland County, NC
Shelby M&R Station	1,247.2 (Mainline)	Cleveland County, NC
Cleveland County Meter Station	1,247.2 (Mainline)	Cleveland County, NC
Asheville M&R Station	1,249.3 (Mainline)	Cleveland County, NC
Foote Mineral M&R Station	1,251.6 (Mainline)	Cleveland County, NC
Kings Mountain M&R Station	1,252.7 (Mainline)	Cleveland County, NC
Lithium Meter Station	1,255.9 (Mainline)	Gaston County, NC
Gastonia Meter Station	1,260.8 (Mainline)	Gaston County, NC
Bessemer City M&R Station	1,260.8 (Mainline)	Gaston County, NC
Stanley Meter Station	1,269.2 (Mainline)	Gaston County, NC
Hickory Meter Station	1,269.2 (Mainline)	Gaston County, NC
Duke Lincoln Meter Station	1,274.8 (Mainline)	Lincoln County, NC
Lowesville Meter Station	1,277.7 (Mainline)	Lincoln County, NC
Charlotte Meter Station	1,287.1 (Mainline)	Iredell County, NC
Davidson Meter Station	1,287.1 (Mainline)	Iredell County, NC
NC Natural Tidewater Meter Station	1,287.1 (Mainline)	Iredell County, NC
Iredell Meter Station	1,287.1 (Mainline)	Iredell County, NC
Hicks Crossroads Meter Station	1,274.8 (Mainline)	Lincoln County, NC
Mooresville Meter Station	1,292.9 (Mainline)	Iredell County, NC
Linwood Road Meter Station	1,293.0 (Mainline)	Iredell County, NC
Statesville Meter Station	1305.8 (Mainline)	Rowan County, NC
Park Road Power Plant Meter Station	1,308.4 (Mainline)	Rowan County, NC
Salisbury M&R Station	1,308.5 (Mainline)	Rowan County, NC
Frontier Appalachian Meter Station	1,308.5 (Mainline)	Rowan County, NC
Spencer Buck Meter Station	1,312.9 (Mainline)	Rowan County, NC
West Lexington M&R Station	1,323.3 (Mainline)	Davidson County, NC
Lexington M&R Station	1,330.2 (Mainline)	Davidson County, NC
Winston Salem M&R Station	1,340.5 (Mainline)	Davidson County, NC
Kernersville Meter Station	1,348.9 (Mainline)	Forsyth County, NC
Greensboro M&R Station	1,355.1 (Mainline)	Guilford County, NC
Stokesdale Meter Station	1,359.6 (Mainline)	Guilford County, NC
Bethany M&R Station	1,366.0 (Mainline)	Rockingham County, NC

TABLE 2.1-2 (cont'd)

Summary of New and Modified Aboveground Facilities Associated with the Atlantic Sunrise Project

Facility	Milepost	Municipality and/or County, State
Rockingham Meter Station	1,368.4 (Mainline)	Rockingham County, NC
Timken M&R Station	1,228.3 (Mainline)	Cherokee County, SC
Gaffney M&R Station	1,233.7 (Mainline)	Cherokee County, SC
Cherokee Co-Gen Meter Station	1,234.1 (Mainline)	Cherokee County, SC
Skygen Co-Gen Meter Station	1,235.7 (Mainline)	Cherokee County, SC
Deering Milliken M&R Station	1,237.6 (Mainline)	Cherokee County, SC
Blacksburg M&R Station	1,240.0 (Mainline)	Cherokee County, SC
Broad River Meter Station	1,241.3 (Mainline)	Cherokee County, SC
York Road Meter Station	1,241.3 (Mainline)	Cherokee County, SC
Mill Creek Meter Station	1,245.9 (Mainline)	Cherokee County, SC
New MLVs and Tie-in Assemblies		
CN-MLV-01	0.0 (CPL North)	Sugarloaf Township, Columbia County, PA
CN-MLV-02	6.7 (CPL North)	Fairmount Township, Luzerne County, PA
CN-MLV-03	21.2 (CPL North)	Lehman Township, Luzerne County, PA
CN-MLV-04 Alt. [M-0114]	35.3 (CPL North)	Falls Township, Wyoming County, PA
CN-MLV-04	35.8 (CPL North)	Falls Township, Wyoming County, PA
CN-MLV-05	44.9 (CPL North)	Clinton Township, Wyoming County, PA
CN-MLV-06	57.3 (CPL North)	Lenox Township, Susquehanna County, PA
CS-MLV-01	0.0 (CPL South)	Drumore Township, Lancaster County, PA
CS-MLV-02	8.3 (CPL South)	Conestoga Township, Lancaster County, PA
CS-MLV-03	M-0185 0.1 (CPL South)	Manor Township, Lancaster County, PA
CS-MLV-04	23.7 (CPL South)	West Hempfield Township, Lancaster County, PA
CS-MLV-05	29.9 (CPL South)	Rapho Township, Lancaster County, PA
CS-MLV-06	43.3 (CPL South)	South Annville Township, Lebanon County, PA
CS-MLV-07	56.8 (CPL South)	Union Township, Lebanon County, PA
CS-MLV-08	67.7 (CPL South)	Pine Grove Township, Schuylkill County, PA
CS-MLV-09	80.8 (CPL South)	Eldred Township, Schuylkill County, PA
CS-MLV-10	M-0167 0.0 (CPL South)	Ralpho Township, Northumberland County, PA
CS-MLV-11	102.5 (CPL South)	Montour Township, Columbia County, PA
CS-MLV-12	112.5 (CPL South)	Orange Township, Columbia County, PA
CS-MLV-13	125.2 (CPL South)	Sugarloaf Township, Columbia County, PA
LFC-MLV-01 (Chapman east tie-in assembly)	L186.0	Chapman Township, Clinton County, PA
LFC-MLV-02 (Chapman west tie-in assembly)	L188.9	Chapman Township, Clinton County, PA
LFU-MLV-01 (Unity east tie-in assembly)	L120.3	Jordan Township, Lycoming County, PA
Relocate pig trap	L128.9	Penn Township, Lycoming County, PA
180A25	1,580.0	Brentsville District, Prince William County, VA
180B25	1,580.0	Brentsville District, Prince William County, VA
MLV Modifications		
MLV 145-10	1,255.9 (Mainline)	Gaston County, NC
MLV N545	1,261.8 (Mainline)	Gaston County, NC
MLV 145-20	1,269.9 (Mainline)	Gaston County, NC
MLV 145-21	1,277.7 (Mainline)	Lincoln County, NC
MLV 150-D5	1,294.6 (Mainline)	Iredell County, NC
MLV 150-10	1,305.8 (Mainline)	Rowen County, NC
MLV150-D15	1,315.5 (Mainline)	Davie County, NC
MLV 150-20	1,323.3 (Mainline)	Davidson County, NC
MLV 155-D2	1,329.4 (Mainline)	Davidson County, NC
MLV 155-B2	1,331.4 (Mainline)	Davidson County, NC
MLV 155-B5	1,337.6 (Mainline)	Davidson County, NC
MLV 155-10	1,339.8 (Mainline)	Davidson County, NC
MLV 155-20	1,355.2 (Mainline)	Guilford County, NC
MLV 140-D15	1,230.4 (Mainline)	Cherokee County, SC
MLV 140-20	1,237.6 (Mainline)	Cherokee County, SC

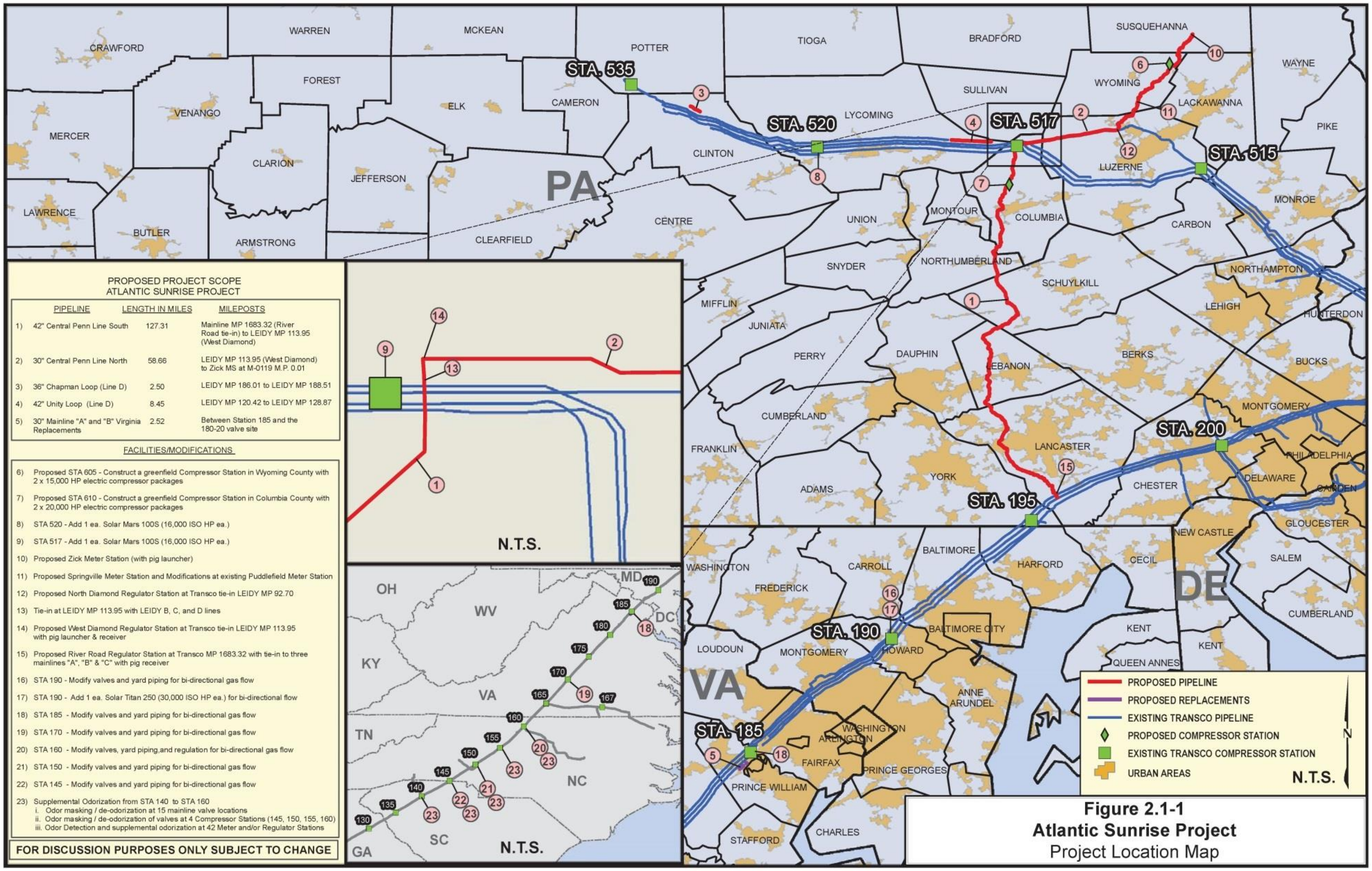


Figure 2.1-1
Atlantic Sunrise Project
Project Location Map

2.1.1.4 Unity Loop

The Unity Loop[3] would consist of approximately 8.5 miles of 42-inch-diameter pipeline with an MAOP of 1,200 psig collocated with the existing Transco Leidy Line system between MPs L120.3 and L128.9 in Lycoming County, Pennsylvania.

2.1.1.5 Mainline A and B Replacements

Transco would replace various noncontiguous segments of its existing 30-inch-diameter Mainline A and Mainline B pipelines totaling 2.5 miles along the existing Transco Mainline system between MPs 1,578.7 and 1,581.0 in Prince William County, Virginia. The pipeline replacements would be designed to an MAOP of 800 psig.

2.1.2 Aboveground Facilities

The Project would include both the construction of new aboveground facilities and modification of existing aboveground facilities (see table 2.1-2).

The new aboveground facilities would include:

- two compressor stations:
  - Compressor Station 605 (includes two electric motor-driven compressor units, each consisting of a 15,000-horsepower (hp) electric motor driving a centrifugal gas compressor, via a Voith Vorecon gearbox); and
  - Compressor Station 610 (includes two electric motor-driven compressors, each consisting of a 20,000-hp electric motor driving a centrifugal gas compressor, via a Voith Vorecon gearbox);
- five metering and regulating (M&R) stations (the Zick and Springville Meter Stations and the North Diamond, West Diamond, and River Road Regulator Stations); and
- ancillary facilities, including new mainline valves (MLV) and pig launchers and receivers along the CPL North, CPL South, Chapman Loop, Unity Loop, and the Mainline A and B Replacements.

In addition, communication towers are proposed at the following facilities:

- Compressor Station 605/CN-MLV-05 (new 190-foot tower);
- Compressor Station 610/CS-MLV-12 (new 190-foot tower);
- Compressor Station 520 (communication tower replacement with freestanding 100-foot tower);
- West Diamond Regulator Station/CN-MLV-01 (new 40-foot tower);
- North Diamond Regulator Station/CN-MLV-03 (new 90-foot tower);
- Zick Meter Station/CN-MLV-06 (new 190-foot tower);
- River Road Regulator Station/CS-MLV-01 (new 120-foot tower);
- CPL North – CN-MLV-02 (new 90-foot tower);
- CPL South – CS-MLV-08 (new 90-foot tower);
- CPL South – CS-MLV-09 (new 90-foot tower);
- Chapman Loop – LFC-MLV-01 (new 90-foot tower);
- Chapman Loop – LFC-MLV-02 (new 90-foot tower); and
- Mainline Replacement – MLVs 180A25/180B25 (new 90-foot tower).

[3] Once placed into service, the Unity Loop would be referred to by Transco as the Leidy Line D.

The modifications to the existing facilities would include:

- additional compression and related modifications to three existing compressor stations, including:
  - Compressor Station 190 (installation of one new Solar Titan 250, 30,000-hp gas turbine generator, modifications to valves and yard piping for bidirectional flow, and installation of a regulator setting);
  - Compressor Station 517 (installation of one new Mars 100S 16,000-hp gas turbine generator); and
  - Compressor Station 520 (installation of one new Mars 100S 16,000-hp gas turbine generator);
- other modifications including valves and piping for bi-directional flow and/or equipment, odor detection, and odor masking/deodorization at existing Compressor Stations 145, 150, 155, 160, 170, and 185;
- modification of the existing Puddlefield Meter Station in Pennsylvania for shared use of the existing flare system, communication tower, and additional piping to the adjacent new Springville Meter Station;
- modifications to 42 existing M&R stations for supplemental odorization, odor detection, and odor masking/deodorization along Transco's existing Mainline system in North Carolina and South Carolina (see figure 2.1.2-1); and
- installation of odor masking/deodorization equipment at 14 existing MLV locations in North Carolina and South Carolina (see figure 2.1.2-2).

2.2 LAND REQUIREMENTS

Table 2.2-1 summarizes the land requirements for the Project. A more detailed description and breakdown of land requirements and use is presented in section 4.8.1. Construction of the Project would disturb about 3,741.0 acres of land, including the pipeline facilities, aboveground facilities, pipe and contractor ware yards and staging areas, and access roads. Permanent operations would require about 1,235.4 acres, consisting of 1,100.9 acres for the pipeline right-of-way, 109.4 acres for new and modified aboveground facilities, and 25.1 acres for permanent access roads. The remaining 2,505.6 acres of land disturbed during construction would be restored and allowed to revert to its former use.

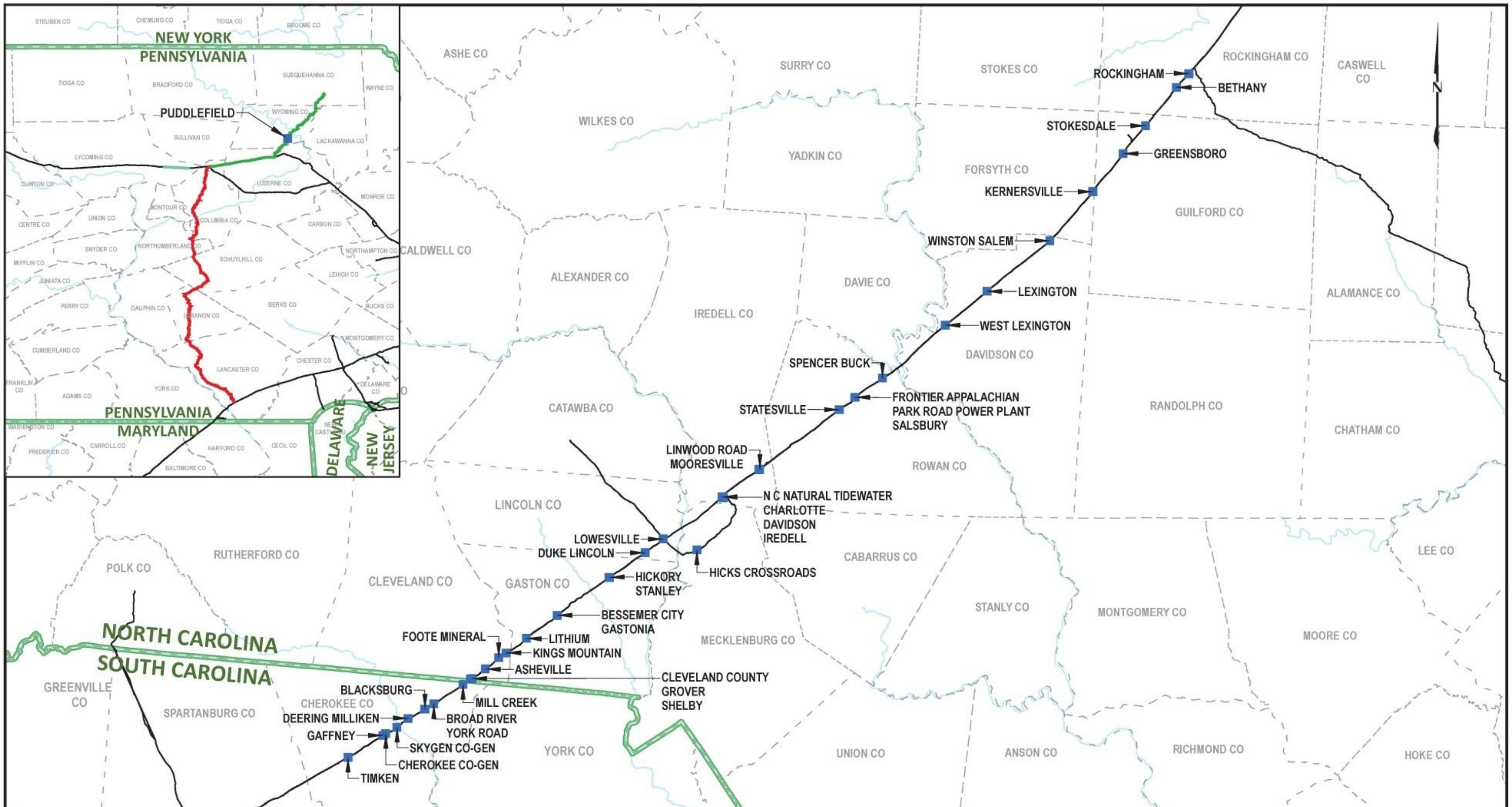
2.2.1 Pipeline Facilities

Of the 2,822.2 acres of land that would be disturbed during construction of the pipeline facilities (includes pipeline right-of-way, additional temporary workspace [ATWS] areas, and any MLV and tie-in assemblies located within the pipeline right-of-way),[4] 1,100.9 acres would be retained as permanent pipeline right-of-way. The remaining 1,721.3 acres would be used as temporary workspace.

2.2.1.1 Adjacent Existing Rights-of-Way and Utility Crossings

The proposed pipelines would be collocated with or adjacent to existing pipelines and/or electric transmission utility rights-of-way for 53.6 miles (27 percent). Additionally, the proposed route crosses multiple existing pipelines and/or electric transmission utility (i.e. powerline) rights-of-way; however, these crossings are not considered collocation. A summary of the locations where the pipeline would be collocated with or adjacent to existing rights-of-way is presented in table 2.2.1-1.

[4] Also includes workspace required for cathodic protection facilities.



LEGEND

- METER / REGULATOR STATIONS
- PROPOSED 30" CENTRAL PENN LINE NORTH
- PROPOSED 42" CENTRAL PENN LINE SOUTH
- PROPOSED 42" UNITY LOOP
- EXISTING TRANSCO LINES
- COUNTY BOUNDARY
- STATE BOUNDARY

0 12 24 36
SCALE IN MILES

Figure 2.1.2-1
Atlantic Sunrise Project
Modifications to Existing Metering and Regulating Stations

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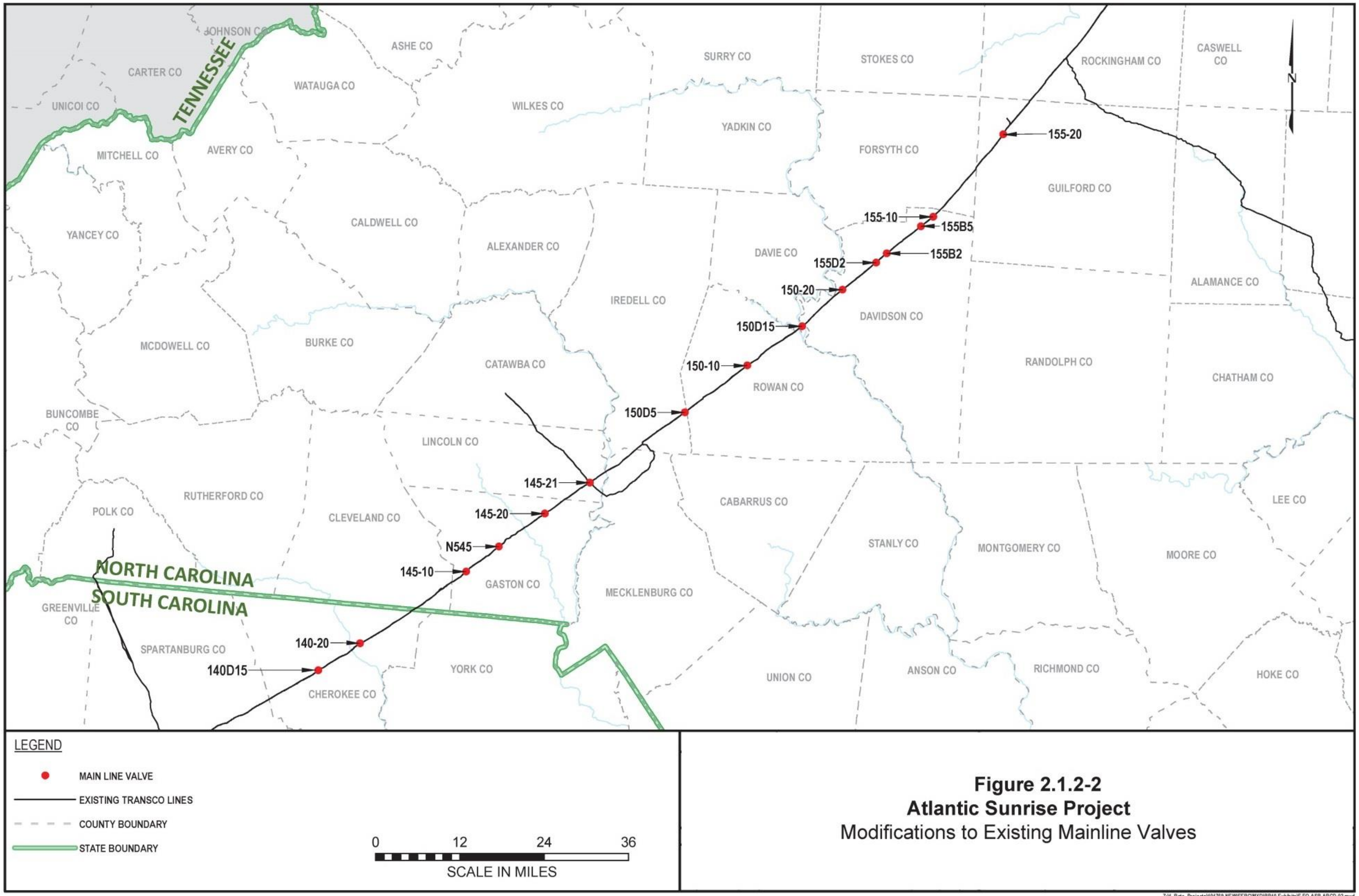

Figure 2.1.2-2
Atlantic Sunrise Project
Modifications to Existing Mainline Valves

TABLE 2.2-1

Summary of Land Requirements for the Atlantic Sunrise Project [a]

Facility	County, State	Land Affected During Construction (acres) [b]	Land Affected During Operation (acres) [c]
PIPELINE FACILITIES [d]			
CPL North	Columbia, Luzerne, Wyoming, and Susquehanna Counties, PA	725.7	295.6
CPL South	Lancaster, Lebanon, Schuylkill, Northumberland, and Columbia Counties, PA	1,920.4	770.7
Chapman Loop	Clinton County, PA	28.6	8.6
Unity Loop	Lycoming County, PA	118.3	26.0
Mainline A and B Replacements	Prince William County, VA	29.2	0.2
PIPELINE FACILITIES SUBTOTAL		**2,822.2**	**1,100.9**
ABOVEGROUND FACILITIES			
New Compressor Stations			
Compressor Station 605	Wyoming County, PA	50.1	39.2
Compressor Station 610	Columbia County, PA	33.5	33.5
Subtotal		**83.6**	**72.7**
Existing Compressor Station Modifications			
Compressor Station 517	Columbia County, PA	32.0	1.4
Compressor Station 520	Lycoming County, PA	36.1	15.5
Compressor Station 190	Howard County, MD	30.0	3.5
Compressor Station 185	Prince William County, VA	13.7	0.0
Compressor Station 170	Appomattox County, VA	10.7	0.0
Compressor Station 160	Rockingham County, NC	10.5	0.0
Compressor Station 155	Davidson County, NC	17.7	0.0
Compressor Station 150	Iredell County, NC	11.2	0.0
Compressor Station 145	Cleveland County, NC	9.0	0.0
Subtotal		**170.9**	**20.4**
New M&R Stations			
Zick Meter Station with pig launcher and receiver	Wyoming County, PA	9.1	4.1
Springville Meter Station	Columbia County, PA	4.8	3.1
North Diamond Regulator Station with CPL North tie-in assembly	Susquehanna County, PA	2.3	1.8
West Diamond Regulator Station with CPL North and South tie-in assemblies and pig launcher and receiver	Wyoming County, PA	4.8	4.4
River Road Regulator Station with CPL South tie-in assembly and pig receiver	Luzerne County, PA	2.4	2.4
Subtotal		**23.4**	**15.8**
Existing M&R Station Modifications			
Puddlefield Meter Station	Wyoming County, PA	0.8	0.0
Grover Meter Station	Cleveland County, NC	0.1	0.0
Shelby M&R Station	Cleveland County, NC	0.2	0.1
Cleveland County Meter Station	Cleveland County, NC	0.7	0.0
Asheville M&R Station	Cleveland County, NC	0.2	<0.1
Foote Mineral M&R Station	Cleveland County, NC	0.2	<0.1
Kings Mountain M&R Station	Cleveland County, NC	0.2	<0.1
Lithium Meter Station	Gaston County, NC	0.2	0.0
Gastonia/Bessemer City M&R Stations	Gaston County, NC	0.3	<0.1
Stanley/Hickory Meter Stations	Gaston County, NC	0.4	0.0
Duke Lincoln Meter Station	Lincoln County, NC	0.7	0.0
Lowesville Meter Station	Lincoln County, NC	0.3	0.1
Charlotte/Davidson/NC Natural Tidewater Meter Stations	Iredell County, NC	1.7	<0.1
Iredell Meter Station	Iredell County, NC	0.6	0.0
Hicks Crossroads Meter Station	Mecklenburg County, NC	1.1	<0.1

TABLE 2.2-1 (cont'd)

Summary of Land Requirements for the Atlantic Sunrise Project [a]

Facility	County, State	Land Affected During Construction (acres) [b]	Land Affected During Operation (acres) [c]
Mooresville Meter Station	Iredell County, NC	0.3	0.1
Linwood Road Meter Station	Iredell County, NC	0.5	0.0
Statesville Meter Station	Rowen County, NC	0.6	0.1
Park Road Power Plant Meter Station	Rowen County, NC	0.6	<0.1
Salisbury M&R/Frontier Appalachian Meter Stations	Rowen County, NC	0.5	0.0
Spencer Buck Meter Station	Rowen County, NC	0.5	<0.1
West Lexington M&R Station	Davidson County, NC	0.5	<0.1
Lexington M&R Station	Davidson County, NC	0.3	<0.1
Winston Salem M&R Station	Davidson County, NC	0.3	<0.1
Kernersville Meter Station	Forsyth County, NC	0.4	<0.1
Greensboro M&R station	Guilford County, NC	0.4	<0.1
Stokesdale Meter Station	Guilford County, NC	0.2	<0.1
Bethany M&R Station	Rockingham County, NC	0.3	<0.1
Rockingham Meter Station	Rockingham County, NC	0.3	0.0
Timken M&R Station	Cherokee County, SC	0.3	<0.1
Gaffney M&R Station	Cherokee County, SC	0.2	<0.1
Cherokee Co-Gen Meter Station	Cherokee County, SC	0.3	<0.1
Skygen Co-Gen Meter Station	Cherokee County, SC	0.4	0.0
Deering Milliken M&R Station	Cherokee County, SC	0.2	0.0
Blacksburg M&R Station	Cherokee County, SC	0.2	<0.1
Broad River Meter Station	Cherokee County, SC	0.3	<0.1
York Road Meter Station	Cherokee County, SC	0.8	0.0
Mill Creek Meter Station	Cherokee County, SC	0.7	0.0
Subtotal		**16.8**	**0.5**
Existing MLV Modifications			
MLV 145-10	Cleveland County, NC	1.0	0.0
MLV N545	Gaston County, NC	0.8	0.0
MLV 145-20	Gaston County, NC	0.9	0.0
MLV 145-21	Lincoln County, NC	1.1	0.0
MLV 150-D5	Iredell County, NC	0.8	0.0
MLV 150-10	Rowen County, NC	0.6	0.0
MLV 150-D15	Davie County, NC	1.0	0.0
MLV 150-20	Davidson County, NC	0.9	0.0
MLV 155-D2	Davidson County, NC	0.7	0.0
MLV 155-B2	Davidson County, NC	0.5	0.0
MLV 155-B5	Davidson County, NC	0.3	0.0
MLV 155-10	Davidson County, NC	0.6	0.0
MLV 155-20	Guilford County, NC	0.9	0.0
MLV 140-D15	Cherokee County, SC	<0.1	0.0
MLV 140-20	Cherokee County, SC	1.3	0.0
Subtotal		**11.4**	**0.0**
ABOVEGROUND FACILITIES SUBTOTAL		**306.1**	**109.4**
PIPE AND CONTRACTOR WARE YARDS		**248.7**	**0.0**
CONTRACTOR STAGING AREAS		**153.9**	**0.0**
ACCESS ROADS		**210.1**	**25.1**
PROJECT TOTAL		**3,741.0**	**1,235.4**

[a] The total(s) may not match the sum of addends due to rounding.

[b] The acreage shown for the land affected during construction includes all construction workspace, including the existing permanent right-of-way and the new land area that would be permanently affected during operation.

[c] The acreage shown for the land affected during operation includes only the new permanent right-of-way, not Transco's existing permanent easement.

[d] The acreage shown for the pipeline facilities includes the pipeline right-of-way, additional temporary workspace, and any MLV and tie-in assemblies located within the pipeline right-of-way (also includes cathodic protection facilities).

TABLE 2.2.1-1

Summary of Existing Rights-of-Way Collocated With the Atlantic Sunrise Project Pipelines

Pipeline/Collocated Existing Utility	Begin Milepost	End Milepost	Direction to Existing Right-of-Way	Paralleled Length (miles)	Width of Existing Maintained Right-of-Way (feet)	Width of Existing Maintained Right-of-Way That Would Be Used During Construction (feet)	Width of Existing Maintained Right-of-Way That Would Be Used During Operation (feet)
CPL North							
Transco Leidy Line A	0.0	1.1	South	1.1	30 to 145	30	25
Transco Leidy Line A	1.1	4.9	North	3.6	30 to 145	30	25
Transco Leidy Line A	4.9	5.7	South	0.5	30 to 145	30	25
Transco Leidy Line A	5.7	M-0056 0.0	North	2.4	30 to 145	30	25
Transco Leidy Line A	M-0056 0.7	9.6	South	0.6	30 to 145	30	25
Transco Leidy Line A	9.6	9.8	North	0.2	30 to 145	30	25
Transco Leidy Line A	9.8	16.4	South	6.6	30 to 145	30	25
Transco Leidy Line A	16.4	17.1	North	0.7	30 to 145	30	25
Transco Leidy Line A	17.1	19.6	South	2.5	30 to 145	30	25
Transco Leidy Line A	19.6	21.2	North	1.6	30 to 145	30	25
Foreign Pipeline (PVR NEPA Gas Gathering, LLC)	25.0	25.2	West	0.2	50 to 60	5	0
Foreign Pipeline (Landview Property, Inc.)	26.1	26.2	North	0.1	30 to 100	5	0
Williams Field Services (midstream) Pipeline	30.5	M-0071 3.7	East	3.6	50	5	0
Powerline (PPL Electric Utilities)	37.6	37.8	East	0.2	30	5	0
Powerline (PPL Electric Utilities)	40.9	41.0	East	0.1	30	5	0
Williams Field Services (midstream) Pipeline	51.5	51.9	East	0.4	30 to 50	5	0
Williams Field Services (midstream) Pipeline	51.9	52.0	West	0.1	30 to 50	5	0
Williams Field Services (midstream) Pipeline	52.0	52.9	East	0.7	30 to 110	5	0
Total CPL North				**25.3**			
CPL South							
Power line (PPL Electric Utilities)	6.9	7.3	East	0.4	90 to 105	10	0
Power line (PPL Electric Utilities)	M-0206 0.0	M-0206 0.1	West	0.1	80 to 105	10	0
Power line (PPL Electric Utilities)	14.7	15.1	East	0.4	80 to 105	10	0
Power line (PPL Electric Utilities)	15.5	15.7	East	0.2	80 to 105	10	0
Power line (PPL Electric Utilities)	16.9	17.4	West	0.5	80 to 130	10	0
Power line (PPL Electric Utilities)	17.4	17.7	East	0.3	80 to 130	10	0
Power line (PPL Electric Utilities)	17.7	19.6	West	1.9	80 to 145	10	0
Power line (PPL Electric Utilities)	M-0396 0.3	22.0	East	0.5	80 to 105	10	0
Power Line (PPL Electric Utilities)	22.2	22.5	East	0.3	145 to 175	10	0

TABLE 2.2.1-1 (cont'd)

Summary of Existing Rights-of-Way Collocated With the Atlantic Sunrise Project Pipelines

Pipeline/Collocated Existing Utility	Begin Milepost	End Milepost	Direction to Existing Right-of-Way	Paralleled Length (miles) [a]	Width of Existing Maintained Right-of-Way (feet)	Width of Existing Maintained Right-of-Way That Would Be Used During Construction (feet)	Width of Existing Maintained Right-of-Way That Would Be Used During Operation (feet)
Power Line (PPL Electric Utilities)	22.5	23.0	West	0.5	120 to 165	10	0
Power Line (PPL Electric Utilities)	M-0162 0.7	M-0162 1.1	West	0.3	145 to 175	10	0
Foreign Pipeline (Keystone Pipeline Company)	58.4	58.7	West	0.3	50	10	0
Foreign Pipeline (Keystone Pipeline Company)	58.7	58.9	East	0.2	50	10	0
Foreign Pipeline (Sunoco Logistics Partners L.P.)	77.8	80.4	East	2.6	35 to 50	10	0
Power line (PPL Electric Utilities)	M-0247 0.1	M-0247 0.4	West	0.3	50	10	0
Power line (PPL Electric Utilities)	M-0194 1.2	83.3	East	0.6	120 to 165	10	0
Power line (PPL Electric Utilities)	96.8	97.1	East	0.3	145 to 175	10	0
Power line (PPL Electric Utilities)	98.0	98.1	East	0.1	100 to 200	100	50
Power line (PPL Electric Utilities)	M-0174 0.7	M-0179 0.0	East	2.5	180 to 220	10	0
Power line (PPL Electric Utilities)	M-0390 0.0	102.1	East	0.7	180 to 220	10	0
Power line (PPL Electric Utilities)	102.1	M-0423 0.2	East	0.3	205 to 220	10	0
Power line (PPL Electric Utilities)	M-0423 0.2	M-0423 1.1	West	0.9	205 to 220	10	0
Power line (PPL Electric Utilities)	M-0423 1.1	M-0423 1.3	South	0.1	205 to 220	10	0
Power line (PPL Electric Utilities)	M-0423 1.9	M-0423 2.4	South	0.5	205 to 220	10	0
Total CPL South				**14.8**			
Chapman Loop							
Transco Leidy Line System	L186.0	L188.6	South	2.5	50 to 145	30	25
Total Chapman Loop				**2.5**			
Unity Loop							
Transco Leidy Line System	L120.3	L126.8	South	6.5	50 to 145	35	25
Transco Leidy Line System	L126.8	L128.9	North	2.1	50 to 145	35	25
Total Unity Loop				**8.5**			
Mainline A and B Replacements							
Transco Mainline System	1578.7	1581.0	Within	2.5	150	150	150
Total Mainline A and B Replacements				**2.5**			
PROJECT TOTAL				**53.6**			

[a] The total(s) may not match the sum of addends due to rounding.

2.2.2 Right-of-Way Configurations

Transco proposes to use the following right-of-way widths during construction of the pipeline facilities:

- a 90-foot-wide construction right-of-way for the 30-inch-diameter CPL North and Chapman Loop pipelines;

- a 100-foot-wide construction right-of-way for the 42-inch-diameter CPL South and Unity Loop pipelines; and

- a 150-foot-wide construction right-of-way for the 30-inch-diameter Mainline A and B Replacements, which would comprise the entire width of Transco's existing maintained mainline system easements.

The right-of-way widths proposed by Transco are consistent with FERC guidelines. Actual right-of-way configurations and widths would vary based on site-specific conditions including road and railroad crossings, waterbodies, wetland crossings, the need for additional spoil storage, steep topography, the presence or absence of an existing right-of-way, and proximity to adjacent utilities. Transco proposes to use a 75-foot-wide construction right-of-way in most wetlands, except where we have approved additional workspace on a site-specific basis. Transco has submitted drawings that depict right-of-way configurations for the proposed pipelines, which are included in appendix B. Reductions of the construction rights-of-way have been made, where practicable, at various locations to address specific environmental or residential issues along the proposed pipelines. The construction procedures that would be followed are described in detail in section 2.3.

Transco proposes to maintain a 50-foot-wide permanent right-of-way along the non-collocated greenfield segments of CPL North and CPL South, and where CPL North is collocated with Williams Field Service (midstream) pipelines and other existing utility rights-of-way. At MLVs, the permanent right-of-way width would be expanded to 92 feet for greenfield segments to allow for access to and around the facility during operations. Transco proposes to maintain an additional 25 feet of permanent right-of-way along the proposed Chapman and Unity Loops, and the portions of CPL North that would be collocated with the Transco Leidy Line system.

Areas disturbed by construction that are not part of the permanent rights-of-way would be restored to preconstruction contours, stabilized, and vegetated following the completion of construction activities per landowner and applicable agency requests. Permanent rights-of-way would be maintained in an herbaceous state for the operational life of the pipelines, with the exception of forested wetlands in which partial regrowth of woody vegetation would be allowed. See section 4.4.4 for more details about right-of-way maintenance in wetlands.

2.2.3 Extra Workspace

In addition to the various construction right-of-way configurations described above, Transco has requested a wider construction right-of-way in several locations due to the presence of constraints or for site-specific construction-related reasons. Appendix C identifies where Transco has requested ATWS for staging areas and resource crossings, including the acreage of impact, associated land use, and the justification for their use. A detailed explanation and evaluation of Transco's requests for extra workspace is provided in sections 4.3.2.6 and 4.4.5.

ATWSs beyond those currently identified could be required during construction of the pipeline. Prior to construction, Transco would be required to file a complete and updated list of all extra work areas, including any requested additional contractor yards for review and approval (see Post-Approval Variance Process in section 2.5.4).

2.2.4 Aboveground Facilities

Construction of the new aboveground facilities and modifications to the existing aboveground facilities would require the use of 306.1 acres of land, including 196.7 acres of temporary workspace and 109.4 acres that would be permanently used for operation of the aboveground facilities (see table 2.2-1).

The new aboveground facilities proposed for the Project include two new compressor stations, two new meter stations, three new regulator stations, and ancillary facilities (e.g., MLVs, communication facilities, and pig launchers/receivers) (see table 2.1-2). Transco has secured options to purchase in fee 66.9 and 38.5 acres of land for Compressor Stations 605 and 610, respectively. About 50.1 and 33.5 acres would be used during construction, and 39.2 and 33.5 acres retained for operation of Compressor Stations 605 and 610. Transco is not planning to purchase land for the new M&R stations, but is in the process of pursuing exclusive easement agreements with landowners for the construction and operation of the facilities. About 23.4 acres of land would be required for construction of the new M&R stations, 15.8 acres of which would be retained for operations. The land required for construction and operation of the proposed new MLV and tie-in assemblies is already reflected in the proposed pipeline right-of-way acreage totals above (see table 2.2-1 and section 2.2.1). Communication towers would be contained within previously proposed compressor station, M&R station, and MLV sites (see section 2.1.2).

The Project includes additional compression and modifications to existing aboveground facilities to allow for bi-directional flow and the addition of odor detection and odor masking/deodorization. About 170.9 acres would be used during modifications to the existing compressor stations, including 150.5 acres of temporary workspace and 20.4 acres that would be retained for operations. Modifications to the existing M&R stations would require 16.8 acres of land, 0.5 acre of which would be retained for operations. About 11.4 acres of land would be required for the modifications to the existing MLVs; however, no new land would be required during operations.

2.2.5 Contractor Yards and Staging Areas

To support construction activities, Transco proposes to use 14 contractor yards and 48 staging areas on a temporary basis. The contractor yards would be used for equipment, pipe sections, and construction material and supply storage, as well as temporary field offices, parking, and pipe preparation and pre-assembly. The staging areas would typically be used for parking, equipment turn-arounds, and temporary storage of equipment. The use of the contractor yards and staging areas would temporarily affect about 248.7 and 153.9 acres of land, respectively. These sites are classified as having predominately commercial/industrial, open land, and agricultural land uses (see tables 2.2.5-1 and 2.2.5-2). These yards and staging areas are depicted on the maps in appendix B.

TABLE 2.2.5-1

Contractor Yards Associated with the Atlantic Sunrise Project

State/Facility/Yard	County	Size (acres) [a]	Current Land Use
PENNSYLVANIA			
CPL North			
CN-CY-LU-1-11	Luzerne	9.7	Agricultural
CN-CY/PY-WY-2-01	Wyoming	14.5	Industrial
CN-CY-LU-2-05	Luzerne	33.9	Commercial/Industrial
Subtotal		**58.1**	
CPL South			
CS-CY-LA-1-04	Lancaster	23.0	Industrial
CS-CY-LE-2-10	Lebanon	15.4	Agricultural
CS-CY-LE-2-10A	Lebanon	9.9	Agricultural
CS-CY-LE-2-12	Lebanon	24.9	Agricultural
CS-CY-SC-3-07	Schuylkill	22.0	Commercial/Industrial
CS-CY-CO-4-10	Columbia	27.9	Agricultural
CS-CY/PY-SC-3-11	Schuylkill	23.7	Commercial/Industrial
Subtotal		**146.8**	
Chapman Loop			
LFC-CY-CL-1-03	Clinton	11.4	Commercial/Industrial
Subtotal		**11.4**	
Unity Loop			
LFU-CY-LY-1-06	Lycoming	13.2	Agricultural
LFU-CY/PY-LY-1-01	Lycoming	17.8	Agricultural
Subtotal		**31.0**	
Pennsylvania Total		**247.3**	
VIRGINIA			
Mainline A and B Replacements			
RP-CY/PY-PW-1-07	Prince William	1.6	Commercial/Industrial
Subtotal		**1.6**	
Virginia Total		**1.6**	
PROJECT TOTAL		**248.7**	

[a] The total may not match the sum of addends due to rounding.

TABLE 2.2.5-2			
Contractor Staging Areas Associated with the Atlantic Sunrise Project			
State/Facility/Staging Area	County	Size (acres) [a]	Current Land Use
PENNSYLVANIA			
CPL North			
CN-CSA-CO-4-009	Columbia	4.8	Agricultural
CN-CSA-CO-1-003	Columbia	0.5	Residential
CN-CSA-CO-1-003.1	Luzerne	2.2	Agricultural
CN-CSA-CO-1-004	Columbia	0.4	Agricultural
CN-CSA-LU-1-003	Luzerne	8.2	Agricultural and Upland Forest/Woodland
CN-CSA-WY-1-004	Wyoming	0.3	Agricultural
CN-CSA-WY-1-005	Wyoming	0.3	Agricultural
CN-CSA-WY-1-006	Wyoming	4.2	Agricultural
CN-CSA-SU-1-007	Susquehanna	3.2	Agricultural
CN-CAS-SU-1-008	Susquehanna	5.6	Agricultural
Subtotal		**29.7**	
CPL South			
CS-CSA-LA-1-001	Lancaster	9.9	Agricultural, Open Land, and Upland Forest/Woodland
CS-CSA-LA-1-002	Lancaster	3.9	Agricultural
CS-CSA-LA-1-03	Lancaster	3.1	Agricultural
CS-CSA-LA-1-005.1	Lancaster	7.1	Agricultural
CS-CSA-LA-1-006	Lancaster	7.1	Agricultural
CS-CSA-LA-1-006.3	Lancaster	1.2	Open Land
CS-CSA-LA-1-007	Lancaster	3.0	Agricultural
CS-CSA-LA-1-007.2	Lancaster	2.0	Agricultural
CS-CSA-LA-1-007.1	Lancaster	0.9	Agricultural
CS-CSA-LA-1-008	Lancaster	2.0	Agricultural
CS-CSA-LE-2-009	Lebanon	15.4	Agricultural
CS-CSA-LE-2-011	Lebanon	2.1	Agricultural
CS-CSA-LE-2-011.1	Lebanon	7.9	Agricultural
CS-CSA-LE-2-012	Lebanon	0.8	Agricultural
CS-CSA-LE-2-012.1	Lebanon	0.4	Agricultural
CS-CSA-LE-2-013	Lebanon	0.5	Agricultural
CS-CSA-SC-3-014.1	Schuylkill	8.5	Agricultural
CS-CSA-SC-3-015	Schuylkill	3.1	Agricultural
CS-CSA-SC-3-016	Schuylkill	5.9	Agricultural
CS-CSA-SC-3-17	Schuylkill	4.4	Agricultural
CS-CSA-NO-4-001	Northumberland	0.4	Residential
CS-CSA-CO-4-001	Columbia	1.1	Open Land
CS-CSA-CO-4-002	Columbia	4.0	Open Land and Upland Forest/Woodland
CS-CSA-CO-4-002.2	Columbia	1.9	Agricultural
CS-CSA-CO-4-002.1	Columbia	4.1	Agricultural
CS-CSA-CO-4-003	Columbia	1.3	Industrial and Residential
CS-CSA-CO-4-004	Columbia	0.7	Industrial
CS-CSA-CO-4-13	Columbia	1.9	Agricultural
CS-CSA-CO-4-05	Columbia	1.4	Agricultural

TABLE 2.2.5-2 (cont'd) **Contractor Staging Areas Associated with the Atlantic Sunrise Project**			
State/Facility/Staging Area	County	Size (acres)	Current Land Use
CS-CSA-CO-4-06	Columbia	1.4	Agricultural
CS-CSA-CO-4-007	Columbia	0.4	Agricultural
CS-CSA-CO-4-008	Columbia	4.6	Agricultural, Open Land, and Upland Forest/Woodland
Subtotal		**112.4**	
Chapman Loop			
LFC-CSA-CL-001	Clinton	0.6	Open Land
LFC-CSA-CL-002	Clinton	1.3	Open Land and Upland Forest/Woodland
LFC-CSA-CL-003	Clinton	1.0	Open Land and Upland Forest/Woodland
LFC-CSA-CL-004	Clinton	1.1	Open Land and Upland Forest/Woodland
Subtotal		**4.0**	
Unity Loop			
LFU-CSA-LY-001	Lycoming	3.5	Agricultural and Open Land
LFU-CSA-LY-002	Lycoming	4.5	Open Land
Subtotal		**8.0**	
Pennsylvania Total		**153.9**	
VIRGINIA			
Virginia Mainline A and B Replacements			
None			
Virginia Total		**0.0**	
PROJECT TOTAL		**153.9**	

[a] The total(s) may not match the sum of addends due to rounding.

2.2.6 Access Roads

In addition to public roads, Transco proposes to use 157 access roads (154 in Pennsylvania and 3 in Virginia) to construct the Project (see maps in appendix B). Of these 157 roads, 42 roads would be permanently maintained for operations, and the remaining 115 would be restored to preconstruction conditions following completion of the Project. Transco has proposed a standard access road width of 20 feet. Modifications to existing roads could include tree, brush, or structure removal; widening; grading; installation or replacement of culverts; and addition of gravel. The location, description, length, land use, and type of improvement required (if any) for each of the access roads are listed in appendix D.

2.3 CONSTRUCTION PROCEDURES

The Project would be designed, constructed, tested, and operated in accordance with all applicable requirements included in the U.S. Department of Transportation (DOT) regulations in 49 CFR 192,[5] *Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards*; and

[5] Pipe design regulations for steel pipe are contained in subpart C, Part 192. Section 192.105 contains a design formula for the pipeline's design pressure. Sections 192.107 through 192.115 contain the components of the design formula, including yield strength, wall thickness, design factor, longitudinal joint factor, and temperature derating factor, which are adjusted according to the project design conditions, such as pipe manufacturing specifications, steel specifications, class location, and operating conditions. Pipeline operating regulations are contained in subpart L, Part 192.

other applicable federal and state regulations, including the Commission's regulations in 18 CFR 380.15, *Siting and Maintenance Requirements*. These regulations are intended to ensure adequate protection for the public. Among other design standards, Part 192 specifies pipeline material and qualification, minimum design requirements, and protection from internal, external, and atmospheric corrosion.

To reduce construction impacts, Transco would implement its Environmental Construction Plan (ECP), which was included as Volume 3 of its application filed on March 31, 2015 (Accession No. 20150331-5153).[6] The ECP includes Transco's *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures), also included as appendix E, which are based on FERC's Plan and Procedures.[7] The intent of Transco's Plan and Procedures is to identify baseline mitigation measures and construction techniques that incorporate guidelines recommended by various resource agencies, as well as other guidelines and plans tailored to project-specific issues. The ECP contains numerous measures that would prevent or minimize potential impacts on resources. Transco's ECP includes some alternative measures that differ from the FERC Procedures, such as the use of a wider right-of-way and extra workspaces in certain areas. These alternative measures are described and evaluated in more detail in sections 4.3.2.6 and 4.4.5, which also include our recommendations for the appropriateness of these modifications.

Transco's Procedures propose modifications from the standard FERC Procedures. These modifications, their descriptions, and status are listed below in table 2.3-1.

TABLE 2.3-1

Summary of Proposed Modifications to the FERC Procedures

Plan or Procedures/ Section No.	Measure	Proposed Modification	Justification for Proposed Modification	FERC's Recommendation
Procedures				
V.B.3.c	Where pipelines parallel a waterbody, maintain at least 15 feet of undisturbed vegetation between the waterbody (and any adjacent wetland) and the construction right-of-way.	At specific identified locations where the pipeline would be installed, Transco claims that a 15-foot vegetated buffer cannot be maintained.	Maintaining the undisturbed vegetation buffer is not practical due to construction limitations. Transco would ensure each waterbody is adequately protected.	Request appears justified at most locations. Additional site-specific information or mitigation measures are being requested at several sites (see EIS section 4.3.2.6).
VI.A.3	Limit the width of the construction right-of-way to 75 feet or less in wetlands. Prior written approval of the Director is required where topographic conditions or soil limitations require that the construction right-of-way width within the boundaries of a federally delineated wetland be expanded beyond 75 feet.	At specific identified locations, Transco requests an additional 15 feet of workspace where the pipeline would be installed within some wetlands.	The additional right-of-way width is needed to provide soil storage for crossings of saturated wetlands with unconsolidated soils.	Request appears justified at most locations. Additional site-specific information or mitigation measures are being requested at several sites (see EIS section 4.4.5).

6 The ECP can be viewed on the FERC website at http://www.ferc.gov. Using the "eLibrary" link under Documents & Filings, select "Advanced Search" from the eLibrary menu and enter 20150331-5153 in the "Numbers: Accession Number" field.

7 The FERC Plan and Procedures are a set of construction and mitigation measures that were developed in collaboration with other federal and state agencies and the natural gas pipeline industry to minimize the potential environmental impacts of the construction of pipeline projects in general. The FERC Plan and Procedures can be viewed on the FERC website at http://www.ferc.gov/industries/gas/enviro/plan.pdf and http://www.ferc.gov/industries/gas/enviro/procedures.pdf, respectively.

To avoid or minimize the potential for harmful spills and leaks during construction, Transco has developed a *Spill Plan for Oil and Hazardous Materials* (Spill Plan). Transco's Spill Plan describes spill and leak preparedness and prevention practices, procedures for emergency preparedness and incident response, reporting protocols, and training requirements. Additional information about Transco's Spill Plan is presented in sections 4.2.2 and 4.3.1. Other resource-specific plans have also been developed for the Project and are included in Transco's ECP. These plans are introduced below and are evaluated in more detail in section 4.0.

2.3.1 General Pipeline Construction Procedures

This section describes the general procedures proposed by Transco for construction of the Project. Transco's primary pipeline construction technique in upland areas would be standard, sequential assembly line installation as described below (see figure 2.3.1-1). Transco proposes to have eight of these assembly lines or "spreads" that would each be simultaneously completing construction activities at different locations along the route.

Other specialized construction methods, such as the two-tone construction techniques used on steep side-slopes, conventional horizontal bore and horizontal directional drill (HDD) methods used to cross under sensitive resources, residential-specific methods, and procedures for crossing of waterbodies and wetlands would also be employed. These specialized construction methods are also described below.

Construction procedures for aboveground facilities are described in section 2.3.3.

2.3.1.1 Surveying and Staking

After Transco completes land or easement acquisition and before the start of construction, crews would mark the limits of the approved work areas (i.e., the construction right-of-way boundaries and extra workspace, the pipeline centerline, approved access roads, drainages, highway and railroad crossings). Property owners would be notified prior to surveying and staking activities. Wetland boundaries and other environmentally sensitive areas (e.g., cultural resource sites, rare species habitat) identified in easement agreements, environmental permit conditions, by federal and state agencies, or during surveys would be clearly marked with visible signage, flagging, and/or fencing for protection. In addition, existing utility lines (e.g., cables, conduits, pipelines) would be marked with flags, stakes, or other devices to prevent accidental damage during construction.

2.3.1.2 Erosion and Sediment Control

After Transco completes clearing and prior to the start of grading activities, crews would install temporary soil erosion and sediment control measures along the proposed construction rights-of-way, ATWS areas, access roads, and other work areas, as applicable, in accordance with Transco's ECP. The best management practices (BMPs) included in the ECP would be implemented to minimize erosion of disturbed soils and prevent the transportation of sediment outside of the work area and into environmentally sensitive areas, such as wetlands and waterbodies.

To ensure that appropriate erosion and sediment control measures are maintained until the construction workspace is fully stabilized, an Environmental Inspector (EI) would inspect areas disturbed by construction (e.g., right-of-way, contractor staging areas, temporary contractor yards) that have not been stabilized based on the following schedule:

- on a daily basis in areas of active construction;
- on a weekly basis in areas with no construction or equipment operation; or
- within 24 hours of a storm event that has 0.5 inch or more of rain.

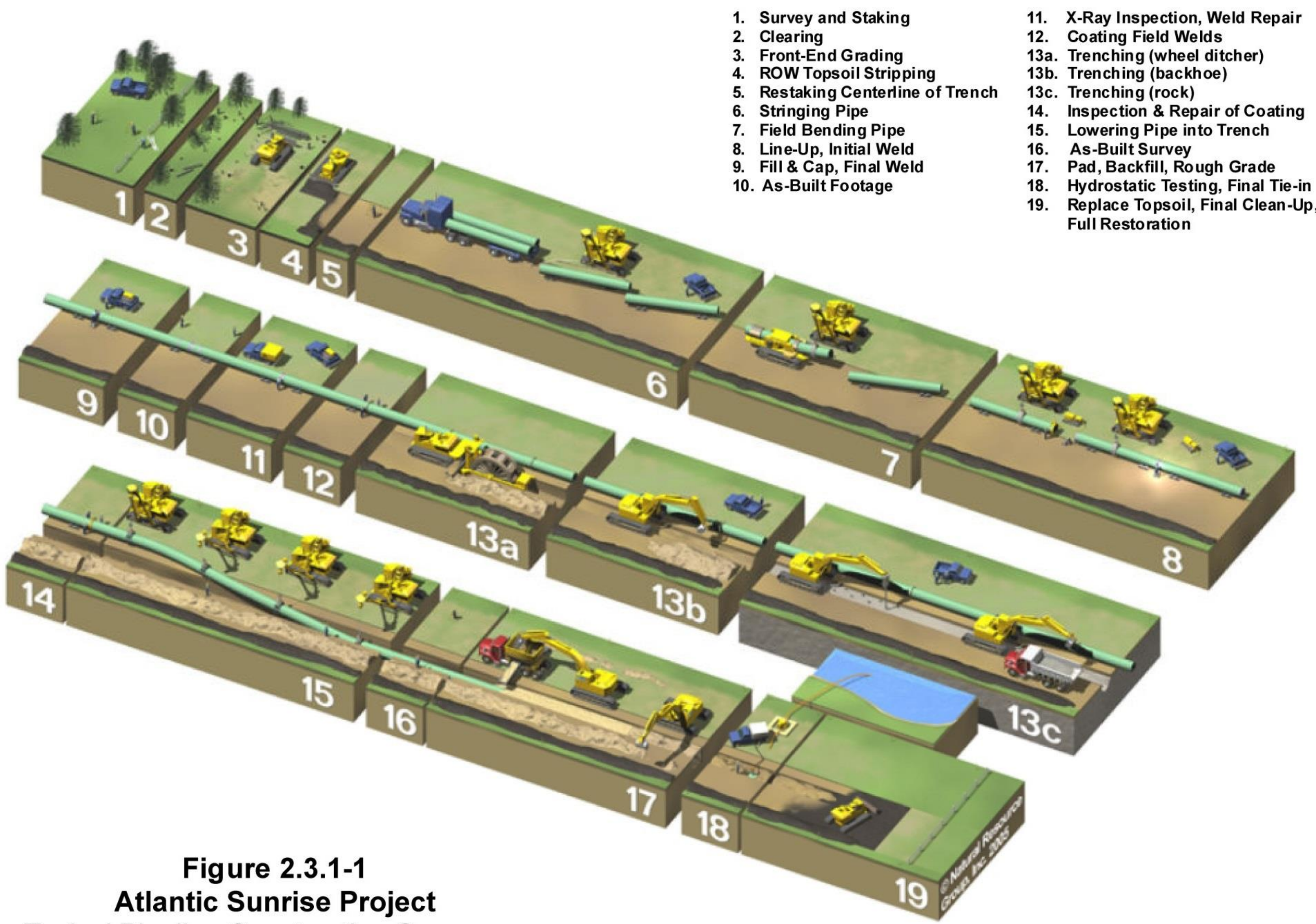

Figure 2.3.1-1
Atlantic Sunrise Project
Typical Pipeline Construction Sequence

2.3.1.3 Clearing

Transco would remove trees, brush, and other existing vegetation from approved work areas via mechanical means using feller-bunchers, hydroaxes, forwarders, skidders, and other appropriate equipment. Hand-cutting with chain saws may also be used in specific areas where warranted by safety or environmental concerns. Trees would be removed from the right-of-way and used as timber if applicable, disposed of at an appropriate disposal facility, chipped on site and removed, or chipped and spread across the right-of-way in upland and non-agricultural areas in a manner that does not inhibit vegetation growth.[8] Transco would not place wood chips in wetlands, waterbodies, or agricultural areas. Timber may be cut and stacked at the edge of the right-of-way in an accessible area if requested by the landowner.

In uplands, Transco would remove tree stumps and rootstock from the entire width of the permanent right-of-way, and may conduct additional stump pulling in upland extra workspaces if deemed necessary for safety reasons. In wetlands, Transco would limit stump pulling to the trench line and other areas where it is deemed necessary for safety reasons. Elsewhere in wetlands, stumps and rootstock would be left intact to promote revegetation following construction.

2.3.1.4 Grading

Transco would schedule grading of the construction right-of-way to limit the amount of time between clearing and the installation of the pipeline. Based on site-specific topography and where necessary, the entire width of the construction right-of-way, including the temporary construction workspace, would be rough graded with bulldozers to allow for safe passage of equipment and to prepare the work surface for pipeline installation activities. Grading would be limited in wetland areas to the extent practicable. Backhoes may be used in conjunction with bulldozers in areas where tree stumps, rock outcrops, and uneven topographic features need to be removed. Generally, machinery would operate on one side of the trench (working side), and excavated materials would be stockpiled on the other (non-working side).

Topsoil stripping would occur in agricultural and residential lands, and in other areas as requested by landowners. Up to 12 inches of topsoil would be removed and kept segregated from subsoil until replacement. Transco would strip topsoil from the full right-of-way in agricultural lands in accordance with its ECP (see section 2.3.2.5).

2.3.1.5 Trenching

Transco would excavate the trench with a track-mounted excavator to provide at least the minimum depth of cover as required by 49 CFR 192. The trench depth would vary, as required, to provide sufficient depth of cover consistent with Transco's standard minimum specifications, which are either consistent with or exceed the federal regulations. Generally, the pipeline would be installed with a minimum of 3 feet of cover, except where consolidated rock prevents this depth of cover from being achieved. In certain areas, such as at crossings of foreign pipelines and utilities, deeper burial would be required resulting in an increased trench depth. Transco's proposed minimum specifications for depth of cover over the pipeline are listed in table 2.3.1-1.

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[8] Wood chips would be spread across the right-of-way in a manner that does not inhibit revegetation.

TABLE 2.3.1-1 **Transco's Proposed Minimum Specifications for Pipeline Depth of Cover (inches)**		
Location [a]	Soil	Consolidated Rock
Class 1	36	24
Class 2, 3, and 4	36	24
Active agriculture lands (e.g., corn, soybeans)	48[b]	Not applicable
Other agriculture lands (e.g., hayfield, pasture)	36[b]	Not applicable
DOT public roads	60	Not applicable
Railroad crossings (in agreement with railroad company)	60	Not applicable
Waterbody crossings	60	Not applicable

[a] As defined by the DOT's Pipeline and Hazardous Materials Safety Administration in 49 CFR 192.5.
- Class 1: offshore areas and areas within 220 yards of a pipeline with less than or equal to10 buildings intended for human occupancy.
- Class 2: areas within 220 yards of a pipeline with greater than10 but less than 46 buildings intended for human occupancy.
- Class 3: areas within 220 yards of a pipeline with greater than or equal to 46 buildings intended for human occupancy and areas within 100 yards of either a building or a small, well defined outside area (such as a playground, recreation area, outdoor theater, or other place of public assembly) that is occupied by 20 or more persons on at least 5 days per week for 10 weeks in any 12-month period.
- Class 4: areas within 220 yards of a pipeline where buildings with four or more stories are prevalent.

[b] Depending on landowner agreements.

The Project would cross underground utilities in numerous locations. Prior to construction, Transco would contact the appropriate state's "Call Before You Dig" or "One Call" system and the national "811" call system to identify and mark all underground utilities (e.g., cables, conduits, and pipelines) to minimize the potential for accidental damage during construction. The location of buried utility lines would also be confirmed by potholing[9] or other methods prior to construction. Transco has designed and would construct the Project to avoid or minimize effects on existing utility lines to the extent possible; however, relocation of utilities may be necessary in some circumstances. Transco would coordinate all required utility relocations with the appropriate owner.

Transco would temporarily pile soil excavated from the trench to one side of the right-of-way, adjacent to the trench. Subsoil would not be allowed to mix with the previously stockpiled topsoil. Where trench dewatering is needed, Transco would discharge the water to an energy-dissipating dewatering device located downgradient of the trench. A filter bag would be used for heavily silt-laden water. Any contaminated soil or groundwater encountered would be managed in accordance with Transco's *Unanticipated Discovery of Contamination Plan* (see attachment 8 of Transco's ECP). See sections 4.2.2.6 and 4.3.1.7 for additional information.

Additionally, Transco has developed an *Unanticipated Discovery Plan for Cultural Resources* and an *Unanticipated Discovery Plan for Paleontological Resources* (collectively referred to as the Unanticipated Discovery Plans) should those features be discovered during trenching or construction (see attachments 4 and 5 of Transco's ECP). See section 4.10.4 for additional information.

2.3.1.6 Pipe Stringing, Bending, and Welding

Once the trench is excavated, the next process in conventional pipeline construction is stringing the pipe along the trench. Stringing involves initially hauling the pipe, generally in 40- or 60-foot lengths (referred to as joints), from the pipe/contractor yard onto the right-of-way. The pipe would be off-loaded from trucks and placed next to the trench using a sideboom tractor. Typically, several pipe joints are lined up end-to-end (or "strung") to allow for welding into continuous lengths known as strings.

[9] Potholing is the practice of digging a test hole to expose an underground utility to ascertain its horizontal and vertical location.

Individual joints would be strung along the right-of-way parallel to the centerline so they are easily accessible to construction personnel.

Transco would deliver the pipe to the contractor yards and work areas in straight sections. Some bending of the pipe would be required to enable the pipeline to follow the natural grade and direction changes of the right-of-way. Selected joints would be field-bent by track-mounted hydraulic bending machines as necessary prior to line-up and welding. For larger changes in direction, manufacturer-supplied induction bends and pre-fabricated elbow fittings may be used. Following stringing and bending, the individual pipe joints would be aligned and welded together using multiple passes for a full penetration weld. Transco would perform all welding according to applicable American National Standards Institute, American Society of Mechanical Engineers, and American Petroleum Institute standards as well as Transco's specifications. Only welders qualified to meet the standards of these organizations would be used during construction.

Transco would visually examine and non-destructively test every completed weld to determine its quality using radiographic or other approved methods as outlined in 49 CFR 192. Radiographic examination is a non-destructive method of inspecting the inner structure of welds and determining the presence of defects. Transco would repair or remove any welds that do not meet the regulatory standards and established specifications. After a weld is approved, the joint would be cleaned and coated with a Transco- and industry-approved anti-corrosion coating. The coating on the entire pipe section would be inspected and any damaged areas repaired.

2.3.1.7 Tie-ins

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

2.3.1.8 Lowering-In and Backfilling

Before the pipeline is lowered-in, Transco would inspect the trench to ensure that it is free of rocks and other debris that could damage the pipe or protective coating. Typically, any water present in the trench would be removed. Trench dewatering would be performed in accordance with applicable permits and Transco's ECP. Transco would implement measures to protect the pipe as needed, including use of sandbags or support pillows at designated intervals along the trench.

After the pipe is lowered into the trench, final tie-in welds would be made and inspected, and then the trench would be backfilled. Transco would use conventional backfill methods, a padding machine, or another equivalent backfill method depending on site conditions to ensure that rocks mixed with subsoil do not damage the pipe. Typically, the pipeline would be padded with 6 inches of screened subsoil below and along the sides of the pipeline and 12 inches of screened subsoil cover above the pipeline. Once the pipeline is adequately protected, conventional backfilling operations would be performed.

The backfill would typically consist of the original material excavated from the trench; however, where there is not sufficient padding material on site or when the native material that was excavated from the trench is not suitable backfill material (i.e., rocky), Transco would acquire backfill from other sources as necessary. In areas where topsoil has been segregated, Transco would place the subsoil in the trench first and would place the topsoil over the subsoil. Backfilling would occur to approximate grade; however, the top of the trench may be slightly crowned to compensate for settling.

2.3.1.9 Hydrostatic Testing

After burial, Transco would clean the inside of the pipeline to remove any dirt, water, or debris inadvertently collected in the pipe during installation. A manifold would be installed on one end of the pipeline section and a cleaning "pig" (typically a large soft plug used to swab the inside of the pipeline) would be propelled by compressed air through the pipeline.

After cleaning, Transco would hydrostatically test the pipe to ensure that the system is capable of withstanding the operating pressure for which it was designed. Hydrostatic testing involves filling the pipeline with water and pressurizing the water in the pipeline for several hours to confirm the pipeline's integrity. The testing would be done in segments according to Transco's requirements and the DOT's specifications in 49 CFR 192. The exact sequence and timing of hydrostatic testing would depend on the final schedule for construction (section 2.4).

Hydrostatic test water withdrawal locations and rates would be determined in accordance with applicable permits. Following satisfactory completion of hydrostatic testing, Transco would discharge the water in vegetated upland areas through a dewatering structure designed to slow the flow of water.[10] If discharging directly to receiving waters, Transco would use diffusers (energy diverters) to minimize the potential for stream scour. All testing activities would be conducted within the parameters of the applicable water withdrawal and discharge permits.

2.3.1.10 Cleanup and Restoration

For non-residential areas, Transco would final grade and restore all work areas to preconstruction contours and natural drainage patterns as closely as possible within 20 days of backfilling the trench, weather permitting (10 days for residential areas). Permanent slope breakers or diversion berms would be constructed and maintained as needed in accordance with Transco's ECP. Fences, sidewalks, driveways, and other structures would be restored or repaired as necessary. If seasonal or other weather conditions prevent compliance with these timeframes, Transco would maintain temporary erosion controls until conditions allow completion of final cleanup.

Transco would conduct cleanup and restoration activities in accordance with state and municipal permit requirements, its Plan and Procedures, and other project-specific plans provided in its ECP. Soils that supported vegetation prior to construction would be revegetated using seed mixes, application rates, and timing windows recommended by local soil conservation authorities or other duly authorized agencies (such as the NRCS), landowner requests, and in accordance with Transco's ECP. Additionally, Transco would monitor revegetation after construction to evaluate and correct areas requiring remediation.

2.3.1.11 Cathodic Protection and Alternating Current Mitigation

Transco would install cathodic protection equipment along the pipeline to prevent the corrosion of metal surfaces over time. Cathodic protection equipment could consist of underground negative connection cables, linear anode cable systems, aboveground junction boxes, and rectifiers. The cathodic protection workspace configurations are shown on the project alignment sheets (FERC accession number 20160920-5019).

2.3.2 Specialized Construction Procedures

Construction through areas containing sensitive resources (e.g., wetlands, waterbodies) or in areas with construction constraints (e.g., residential, road/railroad/utility crossings, steep or side slopes, rocky

[10] If discharging directly to receiving waters, Transco would use diffusers (energy diverters) to minimize the potential for stream scour.

areas) would require construction techniques that differ from the standard measures described above. Transco's special construction techniques are summarized below.

2.3.2.1 Wetland Crossings

The proposed pipeline would cross palustrine forested, palustrine scrub-shrub, and palustrine emergent wetlands. Wetland resources are described and evaluated in detail in section 4.4. Construction within, and restoration of wetlands would be performed in accordance with the wetland construction and mitigation measures contained in Transco's ECP and Procedures.

Transco would limit the clearing of vegetation in wetlands to trees and shrubs, which would be cut flush with the surface of the ground and removed from the wetland. Stump removal, grading, topsoil segregation, and excavation would be limited to the area immediately over the trenchline in order to avoid excessive disruption of wetland soils and the native seed and rootstock within the wetland. A limited amount of stump removal and grading may also be conducted in other areas if dictated by safety-related concerns.

During clearing, Transco would install and maintain sediment barriers, such as silt fence and staked straw bales, adjacent to wetlands and within temporary extra workspaces as necessary to minimize the potential for sediment runoff. Sediment barriers would be installed across the full width of the construction right-of-way at the base of slopes adjacent to wetland boundaries. If trench dewatering is necessary in wetlands, Transco would discharge the trench water into stable, vegetated, upland areas and/or filter it through a filter bag or siltation barrier in accordance with Transco's ECP. No heavily silt-laden water would be allowed to flow into a wetland.

Construction equipment working in wetlands would be limited to that essential to clear the right-of-way, excavate the trench, fabricate and install the pipeline, backfill the trench, and restore the right-of-way. The specific method of construction used in wetlands would depend on the stability of the soils at the time of construction.

Standard pipeline construction, similar to construction methods described for uplands, may be conducted in non-saturated wetlands. In areas of saturated soils or standing water, Transco would use low-ground-weight construction equipment and/or wooden mats to reduce rutting and the mixing of topsoil and subsoil. In unsaturated wetlands and unfrozen wetlands, the top 12 inches of topsoil from the trenchline would be stripped and stored separately from the subsoil.

Where wetland soils are saturated and/or inundated, the pipeline may be installed using the push-pull technique. The push-pull technique involves stringing and welding the pipeline outside of the wetland and excavating the trench through the wetland using a backhoe supported by equipment mats. The water that seeps into the trench is used to "float" the pipeline into place together with a winch and flotation devices attached to the pipe. After the pipeline is floated into place, the floats are removed allowing the pipeline to sink into place. Pipe installed in saturated wetlands is typically coated with concrete or equipped with set-on weights to provide negative buoyancy. After the pipeline sinks to the bottom of the trench, a trackhoe working on equipment mats backfills the trench and completes cleanup. Trenchless construction techniques, such as conventional bore or HDD, would also be used to cross under certain wetlands (see section 2.3.2.2).

Because little or no grading would occur in wetlands, restoration of contours would be accomplished during backfilling. Prior to backfilling, Transco would install trench breakers where necessary to prevent the subsurface drainage of water from wetlands. Where topsoil has been segregated from subsoil, Transco would backfill the subsoil first, followed by the topsoil. Equipment mats, terra mats, and timber riprap used for equipment support would be removed from wetlands following backfilling.

For wetlands at the base of slopes, Transco would install permanent interceptor dikes and trench plugs in upland areas adjacent to the wetland boundary. Temporary sediment barriers would be installed where necessary until revegetation of adjacent upland areas is successful. Once revegetation is successful, sediment barriers would be removed from the right-of-way and properly disposed.

2.3.2.2 Waterbody Crossings

Transco would construct waterbody crossings in accordance with federal, state, and local permits, its ECP, and its Procedures. Surface water resources are addressed further in section 4.3.2, and aquatic resources are addressed in section 4.6.2. Potential impacts on fisheries resources, including agency consultations regarding construction timing restrictions, are also included in section 4.6.2. Transco would cross waterbodies using dry crossing techniques (e.g., flume pipe or dam-and-pump), or trenchless methods (conventional bore or HDD). Most waterbodies would be crossed via a dry crossing method (flume pipe or dam-and-pump) to allow for construction under dry conditions.

The pipeline crossings would typically require extra workspaces on each side of the waterbody to stage construction, fabricate the pipeline, and store materials. These extra workspaces would be located a minimum of 50 feet from the waterbody edge, except where site-specific conditions require a reduced setback (see section 4.3.2.6).

Transco would install temporary equipment bridges over waterbodies. Bridges may include clean rock fill over culverts, equipment pads supported by flumes, railcar flatbeds, flexi-float apparatus, and other types of spans. These bridges would remain in place throughout construction until they are no longer needed. Each bridge would be designed to accommodate normal to high stream flows and would be maintained to prevent soil from entering the waterbody. All construction equipment would be required to use the bridges, except for the clearing equipment needed for installation of the equipment bridges. The number of clearing equipment crossings of each waterbody would be limited to one piece of equipment as specified in Transco's Procedures. Transco would install sediment barriers immediately after initial disturbance of the waterbody or adjacent upland. Sediment barriers would be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls, or restoration of adjacent upland areas is complete and revegetation has stabilized the disturbed area.

Dry Crossing Construction Methods

Dry open-cut crossings of waterbodies involve conventional trenching of channels that are dry or frozen at the time of crossing (contain no discernible flow). This construction technique is similar to the standard pipeline installation process described above for uplands. However, Transco indicated it would complete construction and backfill within 24 hours for minor waterbodies (less than 10 feet wide) and within 48 hours for intermediate waterbodies (10 to 100 feet wide). Transco has committed to keep temporary diversion structures available on site in the event that unexpected rainfall causes any waterbody being crossed by the dry open-cut method to begin flowing prior to completion of the crossing. In that case, a flume crossing or dam-and-pump method would then be employed.

The flume method is a standard dry waterbody crossing method that involves diverting the flow of water across the construction work area through one or more flume pipes placed in the waterbody. The first step involves placing a sufficient number of adequately sized flume pipes in the waterbody to accommodate the highest anticipated flow during construction. After the flume pipe(s) are placed in the waterbody, sand bags or equivalent dam diversion structures are installed in the waterbody upstream and downstream of the trench area. These devices serve to dam the stream and divert the water flow through the flume pipe(s), thereby isolating the water flow from the construction area between the dams. The flume pipe(s) and dams typically remain in place during pipeline installation and until the final cleanup of the stream bed and bank is completed.

The dam-and-pump method is another standard dry waterbody crossing construction method that may be used. This method is similar to the flume crossing method except that pumps and hoses are used instead of flumes to move water across or around the construction work area. The technique involves installing a pump upstream of the crossing and running a discharge hose from the pump across the construction area to a discharge point downstream of the construction area. After the pump is installed and operational, sandbags or equivalent dam diversion structures are installed upstream and downstream of the trench area to isolate the water flow from the construction area between the dams. An energy dissipation device is typically used to prevent scouring of the stream bed at the discharge location. Water flow is maintained throughout the dam-and-pump operation until the pipeline is installed and banks are restored and stabilized.

The feasibility of using the flume and dam-and-pump crossing methods is dependent on the size of the waterbody, flow characteristics, and channel morphology. The flume construction method is favorable for use on streams where there is a relatively straight channel that allows the placement of sufficiently-sized pipes to convey water across the crossing location. The dam-and-pump method is typically used at smaller waterbody crossings with lower flow rates that can be conveyed from the upstream side of the crossing location to the downstream side of the crossing via portable pumps. Both of these methods would isolate the in-stream trenching activities from the stream flow to minimize turbidity and downstream sedimentation.

Trenchless Crossing Methods

Conventional Horizontal Bore

Conventional bore crossings consist of creating a tunnel-like shaft for a pipeline to be installed below roads, waterbodies, wetlands, or other sensitive resources without affecting the surface of the resource. Bore pits are excavated on both sides of the resource to the depth of the adjacent trench and graded to match the proposed slope of the pipeline. A bore machine is then used within the bore pit to tunnel under the resource or wetland by using a cutting head mounted on an auger. The auger rotates and is advanced forward as the hole is bored. The pipeline is then pushed through the bore hole and welded to the adjacent section of pipeline.

Horizontal Directional Drill

Transco proposes seven waterbody crossings using the HDD construction method (the Susquehanna River and two unnamed tributaries near MPs 35.0 to 35.1 of CPL North; the Conestoga River and one unnamed tributary near MPs 12.3 to 12.4 of CPL South; a second crossing of the Susquehanna River at MP 99.7 of CPL South; and Little Fishing Creek at MP M-0423 3.3 of CPL South).[11] Transco has prepared site-specific crossing plans for the HDD crossings. These plans are described in more detail in section 4.3.2.

The HDD method involves establishing land-based staging areas along both sides of the proposed crossing. The process commences with the boring of a pilot hole beneath the waterbody and then enlarging the hole with one or more passes of a reamer until the hole is the necessary diameter to facilitate the pull-back (installation) of the pipeline. Once the reaming passes are completed, a prefabricated pipe

[11] Transco proposes four HDD crossings, two of which would cross more than one waterbody. The Susquehanna River would be crossed twice via the HDD crossing method.

segment is then pulled through the hole to complete the crossing. The USACE received a comment regarding the feasibility of using the HDD construction method to cross waterbodies. The feasibility of using the HDD method is based on a number of factors, including length of the HDD, pipeline diameter, geologic conditions, topography, and available workspace on the entry and exit sides of the HDD to stage the equipment and assemble the length of pipeline necessary to complete the installation. Based on our experience, the minimum length of pipeline that can be installed using this construction method is between 1,150 and 1,500 feet.

Unless unforeseen events occur, such as inadvertent releases of drilling mud, Transco's use of the HDD method would avoid disturbing surface and shallow subsurface features (e.g., waterbodies, wetlands, vegetation) between the HDD entry and exit holes. The only planned activity between the HDD entry and exit points would be foot traffic to place electric guide wires that would be used to track the progress of the drilling operation.

Throughout the drilling process, a slurry of non-toxic, bentonite clay and water would be pressurized and pumped through the drilling head to lubricate the drill bit, remove drill cuttings, and hold the hole open. This slurry, referred to as drilling mud or drilling fluid, has the potential to be inadvertently released to the surface if fractures, fissures, or other conduits to the surface are encountered. The potential for an inadvertent release is generally greatest during the drilling of the pilot hole when the pressurized drilling mud is seeking the path of least resistance. The path of least resistance is typically back along the path of the drilled pilot hole. However, if the drill path becomes temporarily blocked or large fractures or fissures that lead to the surface are crossed, then an inadvertent release could occur. Transco would monitor the pipeline route and the circulation of drilling mud throughout the HDD operation for indications of an inadvertent drilling mud release and would immediately implement corrective actions if a release is observed or suspected. The corrective actions that Transco would implement, including the agencies it would notify and the steps it would take to clean up and dispose of a release, are outlined in Transco's *Horizontal Directional Drilling Contingency Plan* (HDD Contingency Plan).[12] The HDD Contingency Plan also includes measures Transco would implement in the event of an unsuccessful HDD.

2.3.2.3 Drag-Section or Stove-Pipe Specialized Construction Methods

The drag-section and stove-pipe methods may be used to reduce the amount of workspace and the duration of construction activity in the immediate vicinity of residences and other areas where workspace may be limited. The drag-section method first involves excavating a trench long enough to accommodate several pipe sections. Then, a section of pipe fabricated at either end of the trench is carried along the travel lane, lowered into the ditch, and welded into place. Immediately after, the trench is backfilled, covered with steel plates or equipment mats, and/or protected by fencing, as necessary, to ensure safety. At any given time with this method, the excavation of the trench is typically limited to the length of the prefabricated pipe segment being installed. The steps for the stove pipe method are similar except that only one pipe section is installed at a time (typically 40 feet).

2.3.2.4 Typical Road and Railroad Construction Methods

The Project would cross numerous public or private roads and railroads. A summary of the public and private roadway crossings is included in table 2.3.2-1. More detailed lists of the road and railroad crossings and the proposed crossing methods are provided in tables F-1 and F-2 of appendix F.

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[12] Transco's revised HDD Contingency Plan is available on the FERC website at http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20160818-5320.

TABLE 2.3.2-1 **Summary of Public and Private Roadways Crossed by the Atlantic Sunrise Project Facilities**					
Facility/County, State	Number of Interstate and U.S. Highways	Number of State Routes and Highways	Number of County and Municipal Roads	Number of Private Roads	Total
CPL North					
Columbia County, PA	0	2	6	0	8
Luzerne County, PA	0	14	21	1	36
Wyoming County, PA	2	13	9	2	26
Susquehanna County, PA	0	2	5	0	7
CPL North Total	**2**	**31**	**41**	**3**	**77**
CPL South					
Lancaster County, PA	1	22	35	12	70
Lebanon County, PA	2	13	15	23	53
Schuylkill County, PA	0	5	14	14	33
Northumberland County, PA	0	6	1	13	20
Columbia County, PA	1	16	46	40	103
CPL South Total	**4**	**62**	**111**	**102**	**279**
Chapman Loop					
Clinton County, PA	0	0	1	5	6
Unity Loop					
Lycoming County, PA	0	4	10	23	37
Mainline A and B Replacements					
Prince William County, VA	0	0	2	0	2
PROJECT TOTAL	**6**	**97**	**165**	**133**	**401**

Transco would cross roads via the open-cut, conventional bore, or HDD methods. Typical construction drawings for public roadway crossings are provided in appendix B. Of the 11 proposed railroad crossings (10 existing and 1 abandoned), 8 would be crossed by the conventional bore method and 3 by the HDD method. Descriptions of the conventional bore and HDD construction techniques are provided in section 2.3.2.2. Open-cut road crossing methods are described below. The use of conventional bore and HDD methods would avoid road and rail surface impacts, but the use of the open-cut crossing method would not. Road crossing permits would be obtained from applicable federal, state, and local agencies. These permits would dictate the specific requirements for the day-to-day construction activities and methods at each crossing. Prior to road and railroad crossing construction, Transco would locate all existing underground utilities and make provisions for traffic management in work areas, as necessary. Safe and accessible conditions would be maintained during construction at road and railroad crossings in accordance with Transco's BMPs and *Traffic and Transportation Management Plan* (see attachments 2 and 16 of the ECP).

Where paved road crossings are open cut, the pavement over the trench would be cut and removed. This would be followed by the excavation of the trench and installation of the pipeline. Trenching would typically be accomplished using a backhoe or trackhoe augmented by hand-shoveling where necessary to expose and protect existing utilities. Any existing utilities that are exposed during the excavation would be supported at their existing elevations. This support would be maintained throughout the crossing operation until the backfilling is completed. If the roadway surface is paved, the pavement would be restored in accordance with the road crossing permit requirements. Gravel surfaces would also be repaired to as good or better conditions following restoration, unless otherwise approved in writing by applicable regulatory agencies and/or landowner agreements.

Transco would use appropriate measures to ensure that road construction activities do not prevent passage by emergency and other vehicles. Measures could include the use of temporary travel lanes during construction or the installation of steel plate bridges over the work area to allow traffic flow during open trenching. Traffic flow and access to homes would be maintained, except for the temporary periods when road blockage is unavoidable due to actual pipeline installation.

2.3.2.5 Agricultural Areas

The Project would cross numerous agricultural lands in Pennsylvania including specialty crops (orchard and tree farms) and organic and no-till farms. These resources are described and evaluated in detail in section 4.8.4. No agricultural lands would be affected in Virginia, Maryland, North Carolina, or South Carolina. Measures that would be used by Transco to prevent or minimize impacts on agricultural lands would include:

- preservation, segregation, and replacement of up to 12 inches of topsoil across the full construction right-of-way;
- removal of rock (4 inches in size or larger) to a depth of 12 inches or to the subsoil horizon;
- repair or replacement of drain tiles or irrigation systems damaged during construction; and
- initiation of a monitoring program to assess the yields of restored areas post-construction.

Transco has developed a *Draft Agricultural Construction and Monitoring Plan* (Agricultural Plan), which contains additional mitigation measures that would be implemented to prevent or minimize impacts on agricultural lands (see attachment 6 of Transco's ECP). See section 4.8.4 for more information about the Agricultural Plan.

2.3.2.6 Residential Areas

The proposed pipeline route crosses numerous residential properties and passes within 50 feet of about 138 residential[13] structures, including 83 houses, townhomes, or mobile homes and 55 garages, sheds, barns, grain-loading structures, or pools. Residential structures within 50 feet of construction work areas are addressed in more detail in section 4.8.3; Transco has developed site-specific residential construction plans for these residences (see appendix G). Special care would be taken when residential areas are adjacent to construction activities to minimize neighborhood and traffic disruption and to control noise and dust to the extent practicable.

In general, Transco has indicated that when working near or adjacent to residential areas, it would:

- maintain at least a 25-foot-wide buffer from any residence and the construction work area, where feasible;
- install safety fencing along the edge of the construction work area for 100 feet on either side of a residence;
- segregate topsoil in residential areas;
- preserve mature trees and landscaping, where possible;

[13] The proposed pipeline route also passes within 50 feet of 14 other unidentified or commercial buildings or structures.

- restore affected structures such as fences, mailboxes, and gates in accordance with landowner agreements; and
- complete final cleanup, grading, and installation of permanent erosion control measures within 10 days after backfilling the trench, weather permitting.

Additional mitigation measures and landowner concurrence would be required in areas where the proposed pipeline route passes within 10 feet of a residential structure, which is discussed in more detail in section 4.8.3.

2.3.2.7 Rugged Topography

Rugged topography, such as steep, vertical slopes and steep side slopes (i.e., slopes running parallel to the proposed route), is present in numerous areas along the proposed pipeline route. These areas are listed in tables 2.3.2-2 and 2.3.2-3. In the steepest areas (areas where the slope exceeds 30 percent), Transco may employ a technique called "winching" that involves placing heavy equipment at the top of the slope to serve as an anchor point, and then connecting one or more additional pieces of equipment together with a cable. This provides stability and safety to the equipment operators as work proceeds up and down the steep slope.

TABLE 2.3.2-2

Steep Slopes Crossed by the Pipeline Facilities Associated with the Atlantic Sunrise Project

Facility	Slope 15 to 30 Percent (miles)	Slopes Greater Than 30 Percent (miles)	Total Distance (miles)
Pennsylvania			
CPL North	11.1	4.3	15.4
CPL South	26.1	14.5	40.6
Chapman Loop	0.1	0.0	0.1
Unity Loop	1.9	0.2	2.1
Virginia			
Mainline A and B Replacements	0.0	0.0	0.0
Project Total	**39.2**	**19.0**	**58.2**

TABLE 2.3.2-3

Side Slopes Crossed by the Pipeline Facilities Associated with the Atlantic Sunrise Project

Facility	Slope 15 to 30 Percent (miles)	Slopes Greater Than 30 Percent (miles)	Total Distance (miles)
Pennsylvania			
CPL North	3.3	0.1	3.4
CPL South	4.1	0.3	4.4
Chapman Loop	0.2	0.0	0.2
Unity Loop	1.4	0.1	1.5
Virginia			
Mainline A and B Replacements	0.0	0.0	0.0
Project Total	**9.0**	**0.5**	**9.5**

Another construction method used in areas with steep side slopes is called the "two-tone" cut and fill method. Typically, the up-slope side of the construction right-of-way is cut during grading, and the soil excavated from the cut is then used to fill the down-slope edge of the construction right-of-way to provide a safe and level working surface for heavy equipment. Pipeline construction then occurs on the level surface as it would in typical construction. Then, during restoration, the spoil material is placed back into the cut and compacted to match the original topography and contours. Transco would require extra workspace in these areas for storage of excavated material from the temporary cut and fill areas, as well as for temporary storage of material such as trench spoil, excess rock, and felled timber.

Permanent trench breakers would be installed in the trench surrounding the pipeline in areas of steep slopes with high erosion potential and to prevent the high velocity channeling of water along the trench line. Methods such as sediment barriers, waterbars, or mulching and crimping may be used as necessary to control erosion until vegetation can be reestablished.

2.3.2.8 Winter Construction

Transco would seek approval to begin construction as soon as all necessary federal, state, and local approvals can be obtained. Construction of the project pipeline facilities, new aboveground facilities, and modifications to existing aboveground and other facilities would occur over an approximately 1-year period, which would require winter construction. Therefore, Transco developed a Project-specific *Winter Construction Plan* to address specialized methods and procedures that would be used to protect resources during the winter season (included as attachment 12 of Transco's ECP). Key elements of the *Winter Construction Plan* include:

- winter construction procedures (e.g., snow handling and removal, access road construction and maintenance, soil handling under saturated or frozen conditions, topsoil stripping);

- stabilization and monitoring procedures if ground conditions would delay restoration until the following spring (e.g., mulching and erosion controls, inspection and reporting, stormwater control during spring thaw conditions); and

- final restoration procedures (e.g., subsidence and compaction repair, topsoil replacement, seeding).

We have reviewed the *Winter Construction Plan* and find it acceptable.

2.3.3 Aboveground Facility Construction Procedures

Transco proposes to construct new aboveground facilities for the Project (see table 2.1-2), including two new compressor stations; two new meter stations; three new regulator stations; and ancillary facilities (e.g., MLVs, communication facilities, and pig launchers/receivers). The Project also includes additional compression and modifications to existing aboveground facilities to allow for bi-directional flow and the addition of odor detection and odor masking/deodorization.

Construction activities associated with these facilities would include installation of erosion controls; clearing; grading; installation of concrete foundations; construction of buildings, appurtenances, and auxiliary equipment; pressure testing; and restoration grading and landscaping. Initial work at the aboveground facilities would focus on preparing the sites for equipment staging, fabrication, and construction. Foundation holes and pipe trenches would be excavated with standard construction earthmoving equipment, unless blasting is required. Following foundation work, station equipment and structures would be brought to the site and installed, using any necessary trailers or cranes for delivery and installation. Following installation of the facilities, associated equipment, piping, and electrical systems would be installed, and the sites would be graveled, as necessary, and fenced. Necessary equipment testing and start-up activities would occur on a concurrent basis. Final grading and landscaping would be performed in accordance with Transco's Plan and Procedures. Consistent with state-specific erosion and sediment control guidelines, a post-construction stormwater management plan would be developed for the new and existing compressor stations in Pennsylvania and Maryland.

2.4 CONSTRUCTION SCHEDULE

Construction of the project pipeline facilities, new aboveground facilities, and modifications to existing aboveground and other facilities would occur over an approximately 1-year period. Construction would begin as soon as possible after receiving all necessary federal authorizations with an estimated in-service date in February or March 2018.

2.5 ENVIRONMENTAL COMPLIANCE INSPECTION AND MITIGATION MONITORING

2.5.1 Coordination and Training

Transco would incorporate the mitigation measures identified in its permit applications as well as additional requirements of federal, state, and local agencies into its construction drawings and specifications. Transco would also provide copies of applicable environmental permits and construction drawings and specifications to its construction contractors.

Transco would develop an environmental training program tailored to the proposed Project and its requirements. The program would be designed to ensure that:

- qualified environmental training personnel provide thorough and focused training sessions regarding the environmental requirements applicable to the trainees' activities;
- all individuals receive environmental training before they begin work on any construction workspaces;
- adequate training records are kept; and
- refresher training is provided as needed to maintain high awareness of environmental requirements.

Transco would also conduct training for construction personnel regarding proper field implementation of its ECP and other project-specific plans and mitigation measures.

2.5.2 Environmental Inspection

Commentors questioned who would be responsible for ensuring that Transco complies with environmental requirements during construction. Transco would be represented during construction by an environmental compliance manager, hired by and reporting to Transco, who would have overall authority for quality assurance and compliance with mitigation measures, other applicable regulatory requirements, and company specifications. The environmental compliance manager would be assisted by lead EIs, who would report directly to the manager. Transco would employ two to four EIs per construction spread based on the environmental and/or cultural resources present on each spread. The EIs would be on site during active construction and would have peer status with all other activity inspectors. The EI, as well as all project contractors and company personnel, would have authority to stop construction activities that violate the measures set forth in the documents and permit authorizations for the Project. The environmental inspection program weekly reports would be sent to FERC for review and placed into the public record. Based on these reports, FERC may opt to conduct its own inspection, or even refer certain violations to the FERC's Enforcement division.

The EIs' duties are described in detail in paragraph III.B of Transco's Plan (see appendix E). At a minimum, the EI would be responsible for:

- ensuring compliance with the measures set forth in the ECP and all other environmental permits and approvals, as well as environmental requirements in landowner agreements;
- identifying, documenting, and overseeing corrective actions as necessary to bring an activity back into compliance;
- verifying that the limits of authorized construction work areas and locations of access roads are properly marked before clearing, and maintained throughout construction;
- verifying the location of signs and highly visible flagging marking the boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along the construction work area;
- identifying erosion/sediment control and stabilization needs in all areas;
- locating dewatering structures and slope breakers to ensure they would not direct water into sensitive areas such as known cultural resource sites, wetlands, waterbodies, and sensitive species habitats;
- verifying that trench dewatering activities do not result in the deposition of sand, silt, and/or sediment near the point of discharge in a wetland or waterbody. If such deposition is occurring, the EI would stop the dewatering activity and take corrective action to prevent a reoccurrence;
- advising the environmental compliance manager and/or Chief Construction Inspector when conditions (such as wet weather) make it advisable to restrict construction activities to avoid excessive rutting, topsoil/subsoil mixing, or excessive compaction;
- approving imported soils and verifying that the soil is certified free of noxious weeds and soil pests, unless otherwise specified by the landowner;
- ensuring that erosion controls are properly installed, as necessary, to prevent sediment flow into wetlands, waterbodies, sensitive areas, and onto roads;
- inspecting and ensuring the maintenance of temporary erosion control measures at least daily in areas of active construction or equipment operation, on a weekly basis in areas with no construction or equipment operation; and within 24 hours of each 0.5 inch or greater of rainfall;

- ensuring restoration of contours and topsoil;
- ensuring the repair of all ineffective temporary erosion control measures as soon as possible but not longer than 24 hours after identification, or as soon as conditions allow if compliance with this time frame would result in greater environmental impacts;
- keeping records of compliance with conditions of all environmental permits and approvals during active construction and restoration; and
- identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase.

2.5.3 FERC Third-Party Compliance Monitoring

In addition to the monitoring listed above, Transco has committed to funding a FERC third-party compliance monitoring program during the construction phase of the Project. Under this program, a contractor is selected by, managed by, and reports solely to the FERC staff to provide environmental compliance monitoring services. The FERC Third-party Compliance Monitor(s) would provide daily reports to FERC on compliance issues and make recommendations to the FERC Environmental Project Manager on how to deal with compliance issues, variance requests, and other construction changes, should they arise. In addition to this program, FERC staff would also conduct periodic compliance inspections during all phases of construction and continue to coordinate with the appropriate agencies regarding compliance with environmental requirements.

2.5.4 Post-Approval Variance Process

The pipeline alignment and work areas identified in the EIS should be sufficient for construction and operation (including maintenance) of the Project. However, minor route realignments and other workspace refinements sometimes continue after the planning phase and during the construction phase. These changes could involve minor route realignments, shifting or adding new extra workspaces or staging areas, adding additional access roads, or modifying construction methods. We have developed a procedure for assessing impacts on those areas that have not been evaluated in the EIS and for approving or denying their use following any Certificate issuance. In general, biological and cultural resources surveys were conducted using a survey corridor larger than that necessary to construct the facilities. Where survey approvals were denied, Transco would complete the required surveys following a Certificate issuance. If Transco requests to shift an existing workspace or require a new extra workspace subsequent to issuance of a Certificate, these areas would typically be within the previously surveyed area. Such requests would be reviewed by us using a variance request process.

A variance request for route realignments or extra workspace locations along with a copy of the survey results would be documented and forwarded to FERC in the form of a "variance request" in compliance with recommended condition number 5 in section 5.2 of this EIS. After Transco completes any additional surveys, landowner consultation, analyses, and/or resource agency consultations, the new work area and supporting documentation (including a statement of landowner approval) would be forwarded to the compliance monitor or FERC staff, as applicable. Minor variance requests, such as new workspace within the previously surveyed corridor that would not require tree clearing or impacts on sensitive resources, would be reviewed by the third-part compliance monitor and could be approved in the field if deemed necessary and acceptable. For more complex variance requests, FERC would take the lead on reviewing and making a final determination regarding the request.

Typically, no further resource agency consultation would be required if the requested change is within previously surveyed areas and no sensitive environmental resources are affected. The procedures used for assessing impacts on work areas outside the survey corridor and for approving their use are similar to those described above, except that additional surveys, analyses, and resource agency consultations would be performed to assess the extent of any impacts on biological, cultural, and other sensitive resources and identify any avoidance or minimization measures that may be necessary. All variance requests for the Project and their approval status would be documented according to FERC's compliance monitoring program as described above. Any variance activity by Transco (whether submitted through the third-party compliance monitoring program or directly to FERC) and subsequent FERC action would be available on FERC's e-Library webpage under the docket number for the Project (CP15-138-000).

2.5.5 Post-Construction Monitoring

After construction, Transco would conduct follow-up inspections of all disturbed upland areas after the first and second growing seasons to determine the success of restoration. Restoration of upland areas would be considered successful if, upon visual survey, the right-of-way vegetation is similar in density and cover to the adjacent undisturbed lands, construction debris is removed, and proper drainage has been restored. For at least 2 years following construction, Transco would submit quarterly reports to FERC that document any problems identified by Transco or landowners and describe the corrective actions taken to remedy those problems.

In accordance with its ECP, Transco would monitor the success of wetland revegetation annually for the first 3 years after construction (or as required by permit) or until wetland revegetation is successful. Wetland revegetation would be considered successful when the cover of herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent undisturbed wetland areas or as compared to documented, pre-project conditions. In accordance with Transco's Procedures, if revegetation is not successful at the end of 3 years, Transco would develop and implement (in consultation with a professional wetland ecologist) a plan to actively revegetate the wetland, continue revegetation efforts as needed, and file a report annually documenting progress until revegetation is deemed successful.

Transco would monitor for invasive plant species concurrent with upland and wetland restoration monitoring (i.e., after the first and second growing seasons for upland areas and for the first 3 years following construction for wetland areas). The monitoring period for invasive species would be extended as needed or as required by permits or regulatory agencies.

Commentors questioned who would ensure that adequate restoration occurs. After construction, FERC, the cooperating agencies, and/or other agencies would continue to conduct oversight inspection and monitoring to assess the success of restoration. If it is determined that the success of any of the restoration activities is not adequate at the end of the respective timeframes, Transco would be required to extend its post-construction monitoring programs to meet the metrics established by the agencies and presented in its ECP.

2.6 OPERATION, MAINTENANCE, AND SAFETY PROCEDURES

Transco would operate and maintain the proposed pipeline and aboveground facilities in compliance with the DOT's regulations provided in 49 CFR 192, the Commission's guidance at 18 CFR 380.15, and the maintenance provisions of Transco's Plan and Procedures. Transco would operate and maintain the newly constructed pipeline facilities in the same manner as it currently operates and maintains its existing system. The pipeline right-of-way would be patrolled by either aerial or ground survey on a schedule as described in table 2.6-1, although additional surveys would be conducted as necessary.

TABLE 2.6-1

Maximum Scheduled Intervals Between Patrols for the Atlantic Sunrise Project

Class Location of Line [a]	At All Highway and Railroad Crossings (inspection interval)	At All Other Locations (inspection interval)
1 and 2	No longer than every 7.5 months, and at least twice each calendar year	No longer than every 15 months, and at least once each calendar year
3	No longer than every 4.5 months, and at least four times each calendar year	No longer than every 7.5 months, and at least twice each calendar year
4	No longer than every 4.5 months, and at least four times each calendar year	No longer than every 4.5 months, and at least four times each calendar year

[a] As defined by the DOT's Pipeline and Hazardous Materials Safety Administration at 49 CFR 192.5:
Class 1: offshore areas and areas within 220 yards of a pipeline with less than or equal to10 buildings intended for human occupancy
Class 2: areas within 220 yards of a pipeline with greater than 10 but less than 46 buildings intended for human occupancy.
Class 3: areas within 220 yards of a pipeline with greater than 46 buildings intended for human occupancy; and areas within 100 yards of either a building or a small, well defined outside area (such as a playground, recreation area, outdoor theater, or other place of public assembly) that is occupied by 20 or more persons on at least 5 days a week for 10 weeks in any 12-month period
Class 4: areas within 220 yards of a pipeline where buildings with four or more stories are prevalent

Transco would patrol the new pipeline to identify:

- erosion concerns occurring along the right-of-way;
- the performance status of water control devices and stormwater structures;
- the condition of the banks at waterbody and wetland crossings;
- third-party activity along the pipeline right-of-way;
- the condition/success of vegetation and plantings;
- the presence of invasive plant species; and
- any other conditions that could threaten the pipeline.

Corrective measures would be performed as needed. Aboveground facilities would also be inspected to ensure proper working conditions. The pipeline cathodic protection system would also be monitored and inspected periodically to ensure proper and adequate corrosion protection.

Maintenance of the proposed pipeline permanent right-of-way in uplands generally would consist of mowing once every 3 years. However, Transco may mow a 10-foot-wide strip centered over the pipeline in both upland and wetland areas, along with selective cutting and removal of trees within 15 feet of the pipeline within wetlands. All workspaces affected temporarily during construction would be stabilized and seeded as applicable, and then allowed to revert back to preconstruction conditions.

The pipeline facilities would be clearly marked at line-of-sight intervals and at crossings of roads, railroads, and other key points. The markers would indicate the presence of the pipeline and provide a telephone number where a company representative could be reached in the event of an emergency or before any third-party excavation in the area of the pipeline. Transco participates in the "Call Before You Dig" and "One Call" programs and other related pre-excavation notification organizations.

3.0 ALTERNATIVES

As required by NEPA, FERC policy, and CWA 404(b)(1) guidelines, we evaluated alternatives to the Project to determine whether an alternative would be environmentally preferable and/or technically and economically feasible to the proposed actions while still meeting the project objectives. We evaluated the no-action alternative, system alternatives, route alternatives and variations, and aboveground facility site alternatives. We compared each alternative to the Project using the following three key criteria:

1. Does the alternative have the ability to meet the objectives of the proposed action?
2. Is the alternative technically and economically feasible and practical?
3. Does the alternative offer a significant environmental advantage over the Project?

With regard to the first criterion, Transco's stated objectives for the Project are to:

- provide an incremental 1.7 MMDth/d of year-round firm transportation capacity from the Marcellus Shale production area in northern Pennsylvania to its existing market areas, extending as far south as its Station 85 Pooling Point in Choctaw County, Alabama; and
- provide its customers and the markets that they serve with greatly enhanced access to Marcellus Shale supplies, including new north-to-south delivery capability.

It is important to note that not all conceivable alternatives are technically feasible or practical. Some alternatives may be incapable of being implemented due to limits on existing technologies, constraints of system capacities, or logistical considerations, while others may be impractical because sites are unavailable or cannot be developed for the proposed use. Additionally, it is necessary to recognize the environmental advantages and disadvantages of the proposed action in order to focus the analysis on reasonable alternatives with the potential to provide a significant environmental advantage over the Project. Some alternatives may reduce impacts on resources that are not relevant to the analysis or do not provide a significant environmental advantage over the proposed action. Other alternatives may reduce impacts on one resource but increase impacts on others, or merely transfer impacts from one location to another.

Our analysis of each alternative as described in the subsections below is based on information provided by Transco and reviewed by FERC staff; our review of aerial photographs, U.S. Geological Survey (USGS) topographic maps, and other publicly available information; input from cooperating and other agencies; public input from scoping; and our site visits, including a flyover of the project area. Unless otherwise noted, we used the same desktop sources of information to standardize comparisons between the Project and each alternative. As a result, some of the information presented in this section relative to the Project may differ from information presented in section 4.0, which is based on project-specific data derived from field surveys and engineered drawings.

Transco participated in our pre-filing process during the preliminary design stage for the Project (see section 1.3). This process emphasized identification of potential stakeholder issues, as well as identification and evaluation of alternatives that could avoid or minimize impacts. During this process, Transco made multiple modifications to its proposed pipeline route to address stakeholder concerns. The majority of route changes were made to avoid conflicts with existing or planned land uses or to increase the distance of the pipeline from residences and commercial businesses, recreation areas, or other infrastructure. These changes were subsequently made part of Transco's proposed route when it filed its FERC application, and are included in the evaluation of the proposed facilities presented in this EIS.

3.1 NO-ACTION ALTERNATIVE

The Commission has two courses of action in processing applications under section 7 of the NGA: 1) deny the requested action (the no-action alternative), or 2) grant the Certificate, with or without conditions. If the no-action alternative is selected by the Commission, the proposed facilities would not be constructed, and the short- and long-term environmental impacts from the Project would not occur. In addition, if the no-action alternative is selected, the stated objectives of the Project would not be met. The no-action alternative would eliminate this new natural gas supply connecting Marcellus Shale supplies from northern Pennsylvania with customers and markets served by Transco on the Atlantic seaboard, causing existing and potential users of natural gas to either pursue other means of natural gas supply, to rely on other fuels (such as heating oil), or to seek other means to meet or curtail their energy needs.

If Transco's proposed facilities are not constructed, the Project Shippers may need to obtain an equivalent supply of natural gas from new or existing pipeline systems. In response, Transco or another natural gas transmission company would likely develop a new project or projects to provide the volume of natural gas contracted through the Project's binding precedent agreements with the Project Shippers. Alternatively, customers of the Project Shippers could seek to use alternative fuel or renewable energy sources, which could require new facilities. While these projects could potentially deliver equivalent amounts of energy, they would not fulfill the purpose and need of the project, which as stated in section 3.0, is to provide enhanced access to Marcellus Shale gas supplies and incremental, firm natural gas transportation capacity between Marcellus Shale producing areas and Transco's existing markets. Additionally, construction of new pipelines or other non-natural gas energy infrastructure would result in environmental impacts that could be equal to or greater than those of the Project. For these reasons, we are not recommending the no-action alternative.

The Commission received numerous comments suggesting that electricity generated from renewable energy sources could eliminate the need for the Project and that the use of these energy sources as well as gains realized from increased energy efficiency and conservation should be considered as alternatives to the Project. The generation of electricity from renewable energy sources is a reasonable alternative for a review of power generating facilities. The siting, construction, and operation of power generating facilities are regulated by state agencies. Authorizations related to how customers in Transco's service area will meet demands for electricity are not part of the application before the Commission and their consideration is outside the scope of this EIS. Therefore, because the purpose of the Project is to transport natural gas, and the generation of electricity from renewable energy sources or the gains realized from increased energy efficiency and conservation are not transportation alternatives, they are not considered or evaluated further in this analysis.

3.2 SYSTEM ALTERNATIVES

System alternatives would utilize existing, modified, or other proposed natural gas pipeline systems to meet the objectives of the Project. Implementation of a system alternative would make it unnecessary to construct all or part of the Project, although modifications or additions to existing or proposed systems could be required. These modifications or additions would result in environmental impacts that could be less than, similar to, or greater than those associated with construction and operation of the Project. The purpose of identifying and evaluating system alternatives is to determine whether the environmental impacts associated with construction and operation of the Project could be avoided or reduced by using another pipeline system, while still meeting the objectives of the proposed action.

A viable system alternative to the Project would have to provide the pipeline capacity necessary to transport an additional 1.7 MMDth/d of natural gas at the contracted volumes from the production areas of northern Pennsylvania to the delivery points required by the precedent agreements signed by the Project Shippers. A viable system alternative would need to provide these services within a timeframe reasonably similar to the Project. We do not believe that evaluating system alternatives that utilize different receipt and end points is warranted because it would not meet the project objectives (criterion 1 above) described in section 1.1 of the EIS.

3.2.1 Status of Existing Systems

There are four interstate pipeline systems that operate in the vicinity of the Project: Tennessee Gas Pipeline; Columbia Gas Transmission; Columbia Gulf Transmission; and Texas Eastern Transmission (see figure 3.2.1-1). Similar to Transco, these pipeline systems were designed to transport natural gas from the Gulf of Mexico to markets in the Mid-Atlantic and northeastern states. However, unlike Transco's system, which follows an alignment along the east coast states before entering Pennsylvania from Maryland, these other pipeline systems are located about 250 miles west and follow an alignment through Mississippi, Tennessee, Kentucky, and parts of Ohio or West Virginia before entering Pennsylvania.

Each of these pipeline systems operate at or near capacity in their current configuration. Moreover, none of the pipeline systems are near the range of delivery points proposed by Transco and based on contracts signed with the Project Shippers and, with the exception of Tennessee Gas Pipeline, none of these existing pipeline systems are in close proximity to the production areas of northern Pennsylvania. As a result, significant expansions of these systems would be required to transport the natural gas to Transco's existing market areas. Therefore, none of these pipeline systems would offer an environmental advantage and we do not consider them as feasible alternatives to the Project.

3.2.2 Proposed Systems

We identified one proposed project which, if modified, could provide additional volumes of natural gas into Transco's mainline system near Pennington, New Jersey. PennEast Pipeline Company, LLC (PennEast) filed an application with FERC in September 2015 requesting authorization to construct and operate facilities to transport 1.1 MMDth/d of year-round transportation service from northern Pennsylvania to markets in New Jersey, eastern and southeastern Pennsylvania, and surrounding states.

The project, referred to as the PennEast Project, proposes to construct about 115.1 miles of 36-inch-diameter pipeline from Luzerne County, Pennsylvania, to Mercer County, New Jersey where it would interconnect with Transco's mainline pipeline system (see figure 3.2.1-1). As discussed in section 1.1, 100 percent of the natural gas transportation capacity for the Atlantic Sunrise Project has already been contracted. PennEast held an Open Season for its project from August 11 to 29, 2014, and has executed long-term, binding precedent agreements with 12 shippers for about 90 percent of the firm transportation capacity (i.e., 990,000 Dth/day). Therefore, demand for both projects exists and the PennEast Project would not have the capacity to transport the volume of natural gas required by Transco's shippers. The PennEast Project could not simply assimilate the volumes proposed for the Atlantic Sunrise Project and would need to be expanded to provide additional capacity and reach the delivery points required by project shippers. This would require constructing certain facilities currently proposed by Transco (i.e., CPL North, Chapman Loop, Unity Loop, and Mainline A and B Replacements), constructing 115.1 miles of loop pipeline adjacent to the PennEast alignment, and constructing about 103.7 miles of loop pipeline adjacent to Transco's existing Leidy and Mainline pipelines. As discussed in section 3.2.3, looping Transco's Mainline pipeline would not be feasible in certain areas due to the amount of commercial, industrial, and residential development that has occurred adjacent to Transco's existing rights-of-way. In order to avoid these developed areas, greenfield alignments would need to be developed, which would add to the overall length of the pipeline. We estimate that at least 263.7 miles of pipeline would need to be constructed, which would result in much greater environmental impact than the Project. Therefore, the PennEast Project would not be preferable or provide an environmental advantage over the Project.

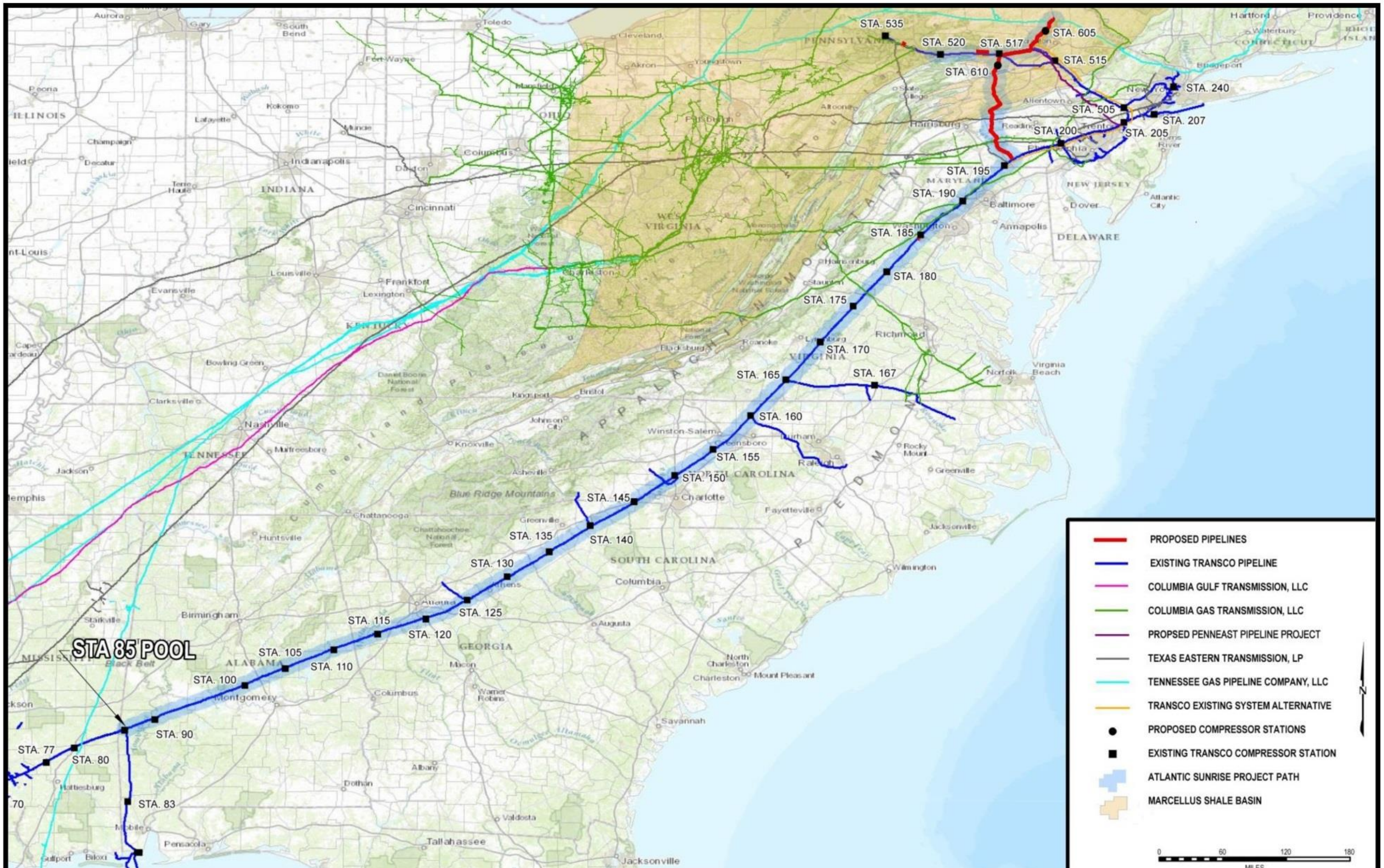

Figure 3.2.1-1
Atlantic Sunrise Project
Interstate Pipeline Systems Operating in the Vicinity of the Atlantic Sunrise Project

3.2.3 Transco System Alternative

We received numerous comments requesting that we evaluate an alternative that would avoid a greenfield pipeline alignment by siting the proposed facilities adjacent to Transco's existing Mainline and Leidy pipelines. Similar to the Project, the Transco System Alternative would require the construction of the Chapman Loop, Unity Loop, CPL North pipeline between the Zick Meter Station and the North Diamond Regulator Station, installation of additional compression at Compressor Stations 520 and 517, and replacement of 2.5 miles of pipeline in Virginia. In addition, the Transco System Alternative would require adding additional compression and constructing 10 pipeline loops along Transco's existing Leidy and Mainline pipelines in Pennsylvania and New Jersey (see figure 3.2.3-1).

An environmental comparison of the Transco System Alternative to the Project is presented in table 3.2.3-1.

TABLE 3.2.3-1

Comparison of the Transco System Alternative to the Proposed Atlantic Sunrise Project Route

Environmental Factor	Unit	Transco System Alternative	Proposed Project
Length	miles	247.6	197.7
Length adjacent to existing rights-of-way	miles (percent)	224.9 (91)	54.6 (28)
Construction right-of-way [a]	acres	3,001	2,396
Compression required	hp	183,000	132,000
Forestland crossed	miles	89.8	80.8
Agricultural land crossed	miles	75.5	95.7
Residences within 50 feet	no.	768	55
Waterbodies crossed	no.	163	160
Waterbody crossings >100 feet wide	no.	11	5
Wetlands crossed	no. (miles)	143 (7.6)	23 (1.1)

[a] Based on a 100-foot-wide construction right-of-way

The Transco System Alternative would be about 49.9 miles longer and affect 605 more acres of land during construction than the Project. While the Transco System Alternative would be collocated with Transco's existing pipelines for about 91 percent of its length, Transco indicated that collocating with the existing pipeline system may not be possible in all instances due to development that has occurred since construction of the original pipelines. Transco estimates that 768 residences would be within 50 feet of the Transco System Alternative compared to 55 residences along the proposed pipeline route. We reviewed the loop segments along the Transco System Alternative and agree that collocation would not be feasible in certain areas due to the amount of commercial, industrial, and residential development that has occurred adjacent to Transco's existing rights-of-way and would require extensive routing away from existing rights-of-way to be viable, hence negating the benefits offered by collocation. Figure 3.2.3-2, which is an aerial photograph depicting the development near Transco's existing system in the vicinity of Warminster, Pennsylvania, illustrates this point.

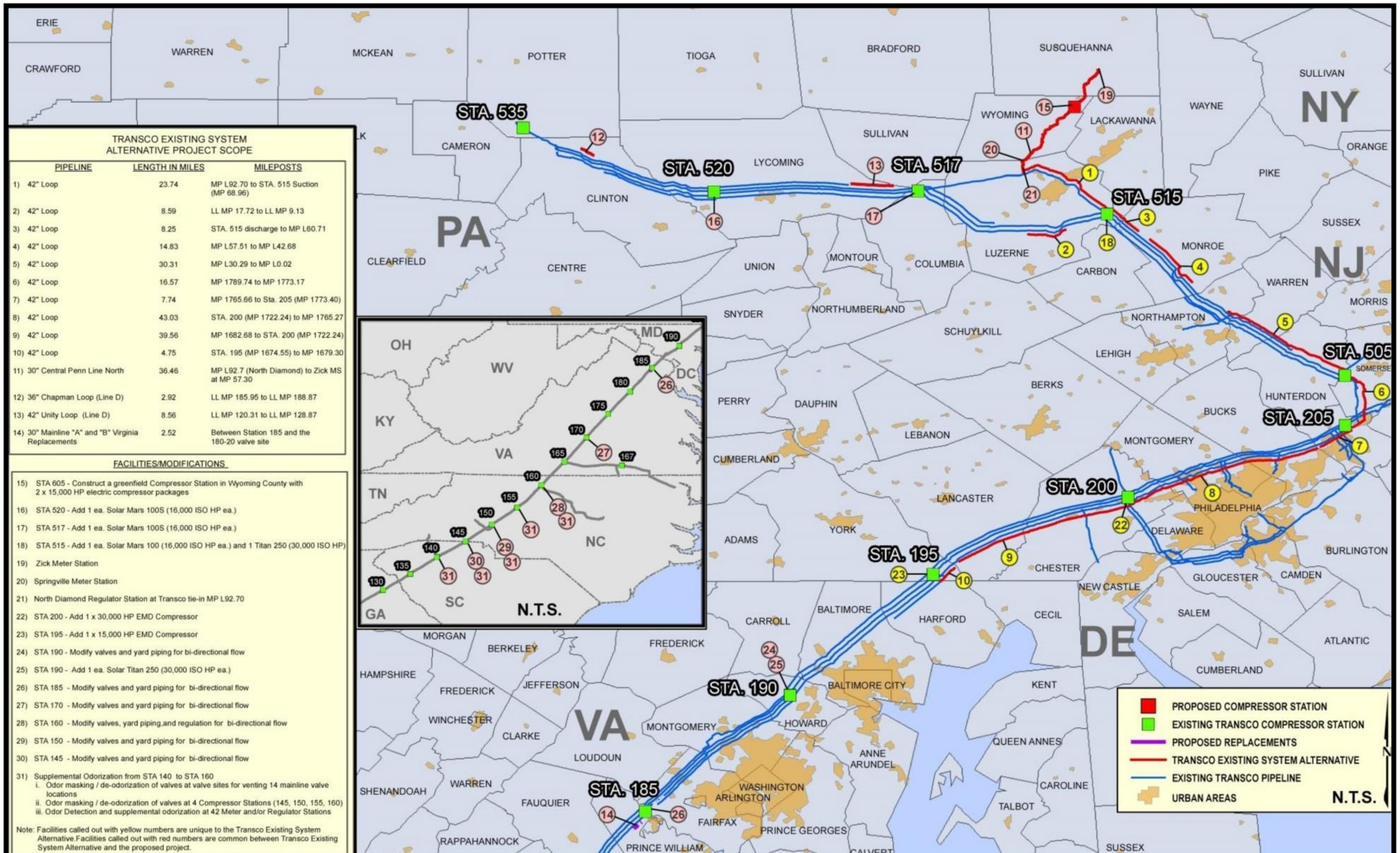

Figure 3.2.3-1
Atlantic Sunrise Project
Transcontinental Gas Pipe Line Company, LLC System Alternatives

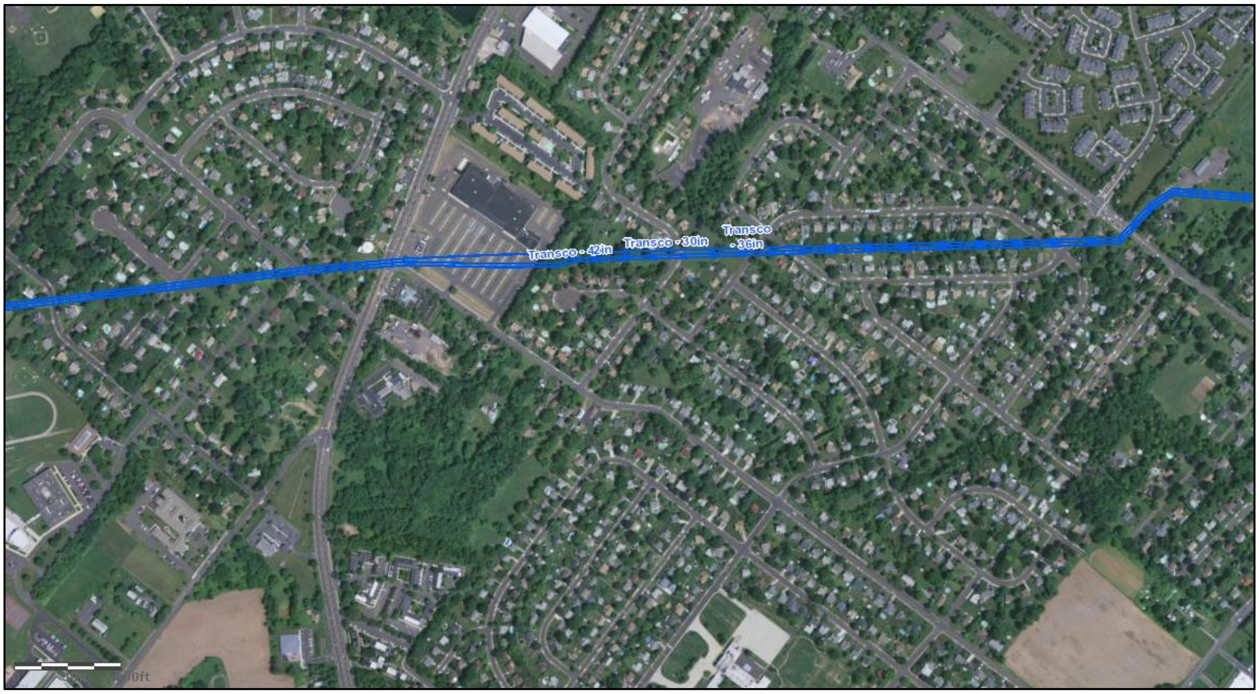

Figure 3.2.3-2 Existing Development Along the Transco System Alternative Near Warminster, Pennsylvania

The density of development adjacent to Transco's existing pipelines is similar along the loop segments of the Transco System Alternative near Wilkes Barre, Pennsylvania; and Trenton and Princeton, New Jersey. We were unable to identify alternative alignments to avoid these developed areas that would not significantly increase the length of the pipeline and the overall construction footprint, while also eliminating the option to collocate in this area.

In addition to being in close proximity to more residences and dense development, another disadvantage of the Transco System Alternative is that it would require installing an additional 51,000 hp of compression compared to the Project. The installation of the additional compression would result in a greater amount of energy used to transport the natural gas by gas- or electric-powered turbines. If natural gas-powered turbines are used, the additional compression would result in greater air emissions.

Other disadvantages of the Transco System Alternative are that it would cross 9.0 miles more forestland, six more waterbodies greater than 100 feet wide, and 120 more wetlands than the Project. While the Transco System Alternative would cross less agricultural land (75.5 miles) than the Project (95.7 miles), we conclude that the environmental disadvantages far outweigh the environmental advantages. As a result, we do not consider the Transco System Alternative to be preferable to the proposed Project.

3.3 ALTERNATIVE PIPELINE ROUTES

Major route alternatives include those that deviate from the proposed route for a significant distance and which provide a substantially different pathway from the source area to the delivery area. Minor route alternatives are typically shorter in length than major route alternatives and are often identified to avoid large environmental resources, engineering constraints, and/or developed areas. Minor route alternatives typically remain within the same general area as the proposed route. Route deviations are typically site-specific and may allow for avoidance of certain localized features such as a residence, wetland, or cultural resource site.

During the development of the proposed route, Transco evaluated and identified receipt and delivery points that would maximize the use of its existing pipeline infrastructure while minimizing the amount of required new facilities. The receipt points include the Zick and Springville Meter Stations, which would deliver 850,000 Dth/day of natural gas into the CPL North pipeline, as well as multiple points along Transco's existing Leidy Line system that would provide the remaining 850,000 Dth/d of natural gas. Transco determined the optimum location to aggregate the 1,700,000 Dth/d from these locations would be on the east side of its existing Compressor Station 517 because it would minimize the length of the CPL North pipeline and reduce the amount of compression required. From this point, Transco determined that the optimum point to tie the CPL South pipeline into its existing Mainline system would be between MPs 1,679.8 and 1,683.7, which would avoid another crossing of the Susquehanna River and the need for additional compression and/or looping.

3.3.1 Major Route Alternatives

We evaluated the following major route alternatives:

- Diamond CPL North Alternative;
- Williams Midstream CPL North Alternative; and
- Western CPL South Alternatives 1, 2, and 3.

These alternatives are described below and depicted on figure 3.3.1-1.

Diamond CPL North Alternative

The Diamond CPL North Alternative was identified as an alternative to the CPL North alignment. The Diamond CPL North Alternative starts at the Zick Meter Station and proceeds south for about 23.5 miles across primarily agricultural land and forestland to a point east of Scranton, Pennsylvania. From this point, the Diamond CPL North Alternative turns and proceeds southwest, crossing the Susquehanna River and Transco's existing Leidy Line A pipeline north of the city of Swoyersville, Pennsylvania. From there, it proceeds south crossing the Susquehanna River a second time and then continues south-southwest crossing Transco's existing Leidy Lines B and C, Penobscot Mountain, and primarily agricultural lands and forestland before terminating at MP 93.2 of the CPL South pipeline (see figure 3.3.1-1). An environmental comparison of the Diamond CPL North Alternative to the corresponding segment of the proposed route is provided in table 3.3.1-1.

TABLE 3.3.1-1

Comparison of the Diamond CPL North Alternative to the Proposed Route for the Atlantic Sunrise Project

Environmental Factor	Unit	Diamond CPL North Alternative	Proposed Route
Length	miles	79.9	56.7
Length adjacent to existing rights-of-way	miles (percent)	48.7 (61)	26.1 (46)
Construction right-of-way[a]	acres	968.4	687.3
Forestland crossed	miles	47.7	37.3
Agricultural land crossed	miles	23.1	14.6
Waterbodies crossed	no.	72	50
Waterbody crossings >100 feet wide	no.	8	2
Wetlands crossed	no. (miles)	32 (1.7)	15 (0.7)

[a] Based on a 100-foot-wide construction right-of-way.

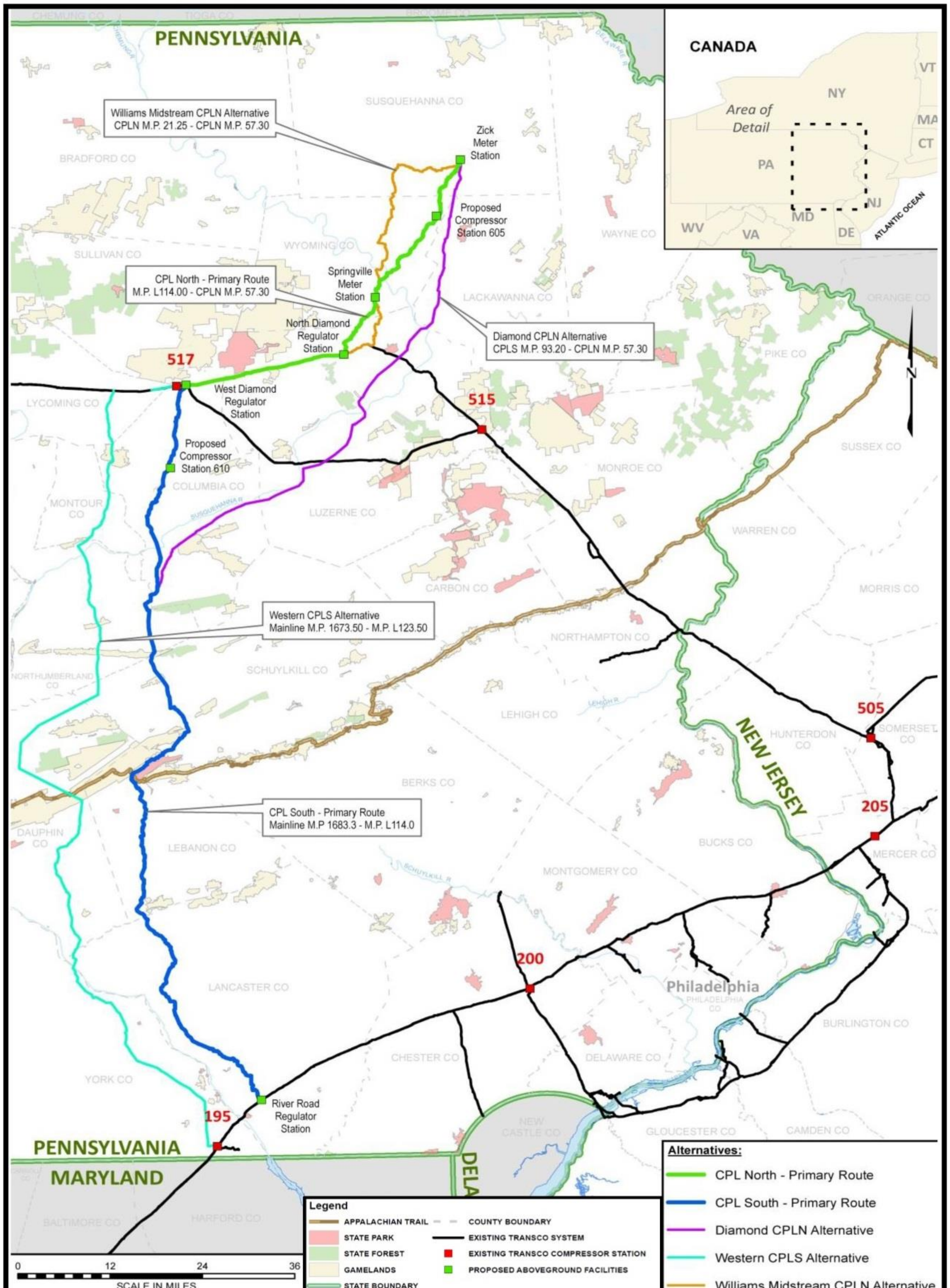

Figure 3.3.1-1
Atlantic Sunrise Project
Diamond CPL North, Williams Midstream CPL North, and Western CPL South Alternatives

The Diamond CPL North Alternative has no obvious advantages with respect to the factors listed in table 3.3.1-1 and would require about the same amount of new greenfield right-of-way as the proposed route. The primary disadvantage of the Diamond CPL North Alternative is that it would be considerably longer and affect more land than the corresponding segment of the CPL North alignment. In addition, the Diamond CPL North Alternative does not intersect the Springville Meter Station delivery point. As a result, an 8-mile-long pipeline lateral would need to be constructed from the Springville Meter Station to the Diamond CPL North Alternative, which would require another crossing the Susquehanna River.

Other disadvantages of the Diamond CPL North Alternative are that it would affect 10.4 miles more forestland and 8.5 miles more agricultural land and cross more waterbodies and wetlands than the corresponding segment of the CPL North alignment. For these reasons, we do not consider the Diamond CPL North Alternative preferable to the proposed route, and we do not recommend it.

Williams Midstream CPL North Alternative

The Williams Midstream CPL North Alternative was developed by Transco to maximize collocation with existing rights-of-way. The Williams Midstream CPL North Alternative starts at the Zick Meter Station and proceeds west for about 11 miles adjacent to Williams Field Services existing 10- and 12-inch-diameter pipelines. From this point, the Williams Midstream CPL North Alternative turns and proceeds south adjacent to Williams Field Services' existing Springville 24-inch-diameter pipeline crossing primarily agricultural land and forestland before terminating at the North Diamond Regulator Station (see figure 3.3.1-1). An environmental comparison of the Williams Midstream CPL North Alternative to the corresponding segment of the proposed route is provided in table 3.3.1-2.

TABLE 3.3.1-2

Comparison of the Williams Midstream CPL North Alternative to the Proposed Route for the Atlantic Sunrise Project

Environmental Factor	Unit	Williams Midstream CPL North Alternative	Proposed Route
Length	miles	46.2	35.3
Length adjacent to existing rights-of-way	miles (percent)	44.2 (96)	4.9 (14)
Construction right-of-way [a]	acres	560	427.9
Forestland crossed	miles	25.6	19.9
Agricultural land crossed	miles	15.9	12.5
Waterbodies crossed	no.	37	23
Waterbody crossings >100 feet wide	no.	6	2
Wetlands crossed	no. (miles)	20 (0.7)	10 (0.4)

[a] Based on a 100-foot-wide construction right-of-way.

The major benefit of the Williams Midstream CPL North Alternative is that it would be collocated with existing rights-of-way for about 96 percent of its length compared to 14 percent for the corresponding segment of the proposed route. However, the disadvantages of the alternative are that it is 10.9 miles longer and would affect more land during construction than the corresponding segment of the proposed route. The alternative would also cross more forestland, agricultural land, waterbodies, and wetlands. For these reasons, we do not consider the Williams Midstream CPL North Alternative to be preferable to the proposed route, and we do not recommend it.

Western CPL South Alternatives 1, 2, and 3

The Western CPL South Alternative (Alternative 1) is an alternative to the proposed CPL South alignment. Alternative 1 begins in Lycoming County, Pennsylvania and proceeds south across Lycoming, Columbia, Montour, Northumberland, Schuylkill, Dauphin, Lancaster, and York Counties.

The Alternative 1 alignment is about 6 to 12 miles west of the proposed route and terminates at Transco's existing Compressor Station 195 in York County, Pennsylvania. During the pre-filing period, we received comments from Patrick Kelsey requesting that we evaluate alternative alignments that incorporate segments of the proposed route and Alternative 1, which we have identified as the Western CPL South Alternative 2 (Alternative 2) and the Western CPL South Alternative 3 (Alternative 3).

The Alternative 2 alignment follows the proposed route south from Compressor Station 517 to about MP 38.1 at which point it turns and proceeds west for about 8.8 miles along an electric transmission line right-of-way. Alternative 2 then joins the Alternative 1 alignment near Locust Grove Road in Conewago Township and proceeds 4.5 miles south and crosses the Susquehanna River. After crossing the river, Alternatives 1 and 2 both proceed southwest generally following transmission line and/or pipeline rights-of-way to Compressor Station 195.

The Alternative 3 alignment follows the proposed route south from Compressor Station 517 to about MP 36.5 at the Lebanon and Lancaster County border. From here, Alternative 3 turns and proceeds about 12 miles south-southwest along a greenfield alignment across primarily agricultural land and forestland to a point on the east side of the Susquehanna River near Maytown, Pennsylvania. Alternative 3 then crosses the Susquehanna River, joins the Alternative 1 and 2 alignment, then proceeds south following the Alternative 1 and 2 alignments adjacent to an existing pipeline operated by Texas Eastern Transmission, LP (Texas Eastern) for a distance of about 20 miles. Alternative 3 then deviates from the electric transmission line and Alternative 1 and 2 alignments and continues to the southeast adjacent to a Texas Eastern pipeline right-of-way for another 8 miles, where it terminates after interconnecting with the existing Transco Mainline System about 0.5 mile west of the Susquehanna River. Figure 3.3.1-2 depicts the proposed and alternative routes.

An environmental comparison of Alternatives 1, 2, and 3 to the corresponding segment of the proposed route is provided in table 3.3.1-3.

TABLE 3.3.1-3

Comparison of the Western CPL South Alternatives 1, 2, and 3 to the Proposed Route for the Atlantic Sunrise Project

Environmental Factor	Unit	Western CPL South Alternative 1	Western CPL South Alternative 2	Western CPL South Alternative 3	Proposed Route
Length	miles	132.7	136.5	129.3	126.3
Length adjacent to existing rights-of-way	miles (percent)	49.3 (37)	41.6 (30)	36.7 (28)	14.2 (11)
Construction right-of-way [a]	acres	1,608	1,654	1,567	1,530
Forestland crossed	miles	49.3	44.0	40.7	38.2
Agricultural land crossed	miles	62.1	74.9	75.3	77.1
Developed land	miles	3.5	2.9	1.7	1.6
State land crossed	miles	5.2	2.4	2.4	2.4
Waterbodies crossed	no.	173	126	116	103
Waterbody crossings >100 feet wide	no.	9	5	3	3
Wetlands crossed	no. (feet)	23 (4,933)	17 (2,540)	8 (989)	6 (849)

[a] Based on a 100-foot-wide construction right-of-way

The proposed route is the shortest in length (126.3 miles), followed by Alternative 3 (129.3 miles), Alternative 1 (132.7 miles), and Alternative 2 (136.5). Because the proposed route is the shortest in length, it would reduce the amount of land disturbed during construction. Specifically, the proposed route would disturb 1,530 acres during construction compared to Alternatives 1, 2, and 3, which would disturb 1,608, 1,654, and 1,567 acres, respectively.

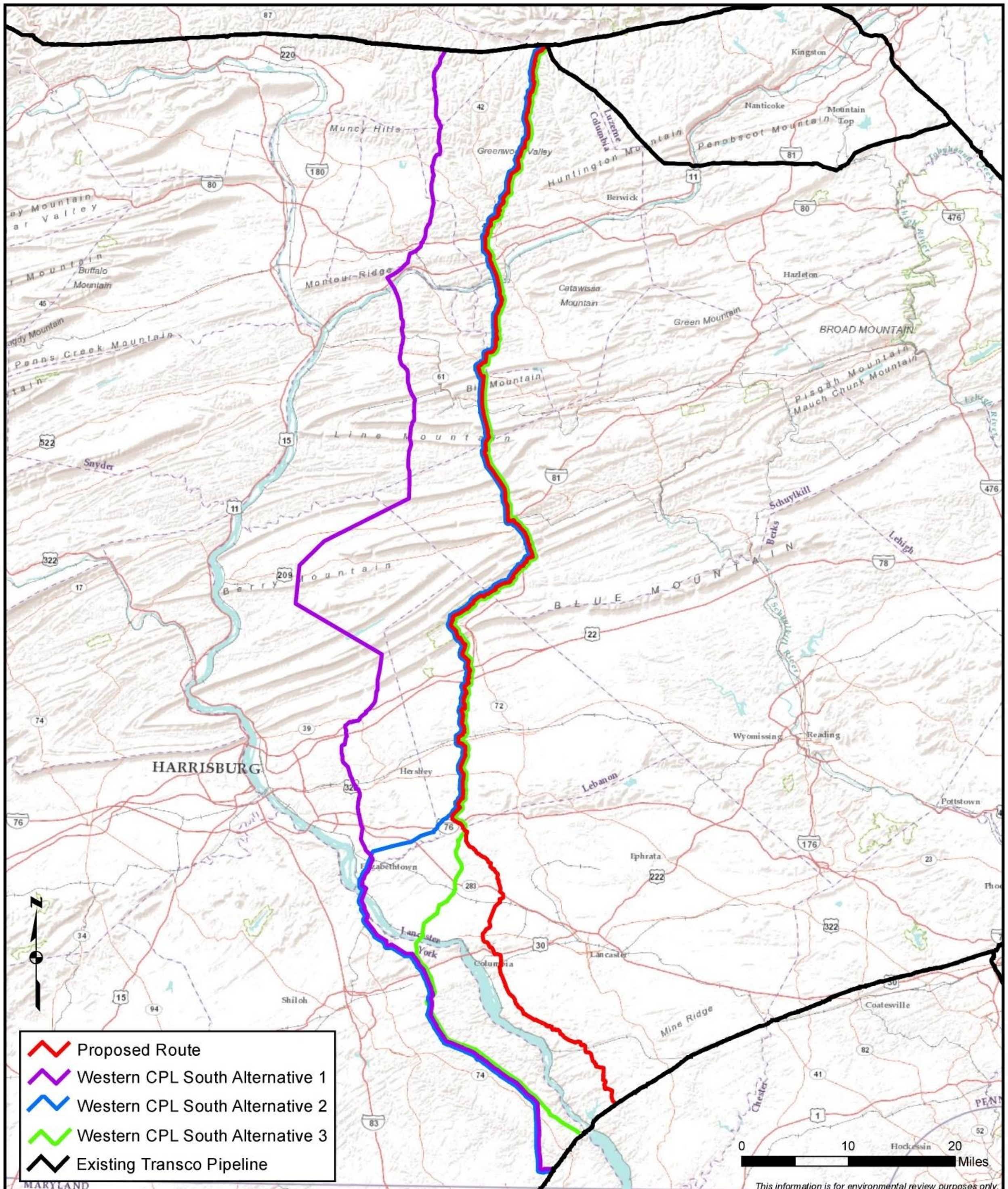

Figure 3.3.1-2
Atlantic Sunrise Project
Western CPL South Alternatives Comparison

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The advantages of the alternatives are that they follow existing rights-of-way for a greater percentage of their lengths when compared to the proposed route. Alternative 1 would be collocated for 49.3 miles (37 percent of its length), Alternative 2 would be collocated for 41.6 miles (30 percent of its length), Alternative 3 would be collocated for 25 miles (19 percent of its length), whereas the proposed route would be collocated for 14.2 miles (11 percent of its length). Some of the benefits of collocating with existing rights-of-way are that it reduces impacts on interior forest and can often be used to overlap construction workspaces in previously disturbed areas, reducing the overall impact. However, the alternatives cross more developed land than the proposed route. For example, Alternative 1 crosses dense residential development near Hummelstown, Pennsylvania (south of Swatara Creek) in an area where the alternative is collocated with three existing transmission lines (see figure 3.3.1-3 below).

Figure 3.3.1-3 Residential Development Near Hummelstown, Pennsylvania

Because the development in this area abuts the existing transmission line right-of-way, it appears that an alternative alignment would need to be developed to avoid this area. Similarly, Alternative 2 would cross the Cedar Manor and Pine Manor Mobile Home Community, the Par Line Golf Course, and the Zeager Brothers, Inc. mulch facility in Dauphin County, Pennsylvania where the alternative is collocated with an existing transmission line. Alternative 3 would have similar routing issues near Yorkana, Pennsylvania where alternative alignments would likely need to be identified to avoid residential development. Alternative alignments to avoid the constraints described above would increase the length of the alternative routes, decrease the amount collocated, and increase the amount of acreage disturbed during construction.

Another disadvantage of the alternatives is that they would increase the amount of forestland affected. Forests clean the air and water and provide fish and wildlife habitat, flood protection, and recreational opportunities. The proposed route crosses the least amount of forestland (38.2 miles) followed by Alternative 3 (40.7 miles), Alternative 2 (44 miles), and Alternative 1 (49.3 miles).

In addition to crossing the least amount of forestland, the proposed route crosses fewer waterbodies and wetlands (103 and 6) than Alternative 1 (173 and 23), Alternative 2 (126 and 17), and Alternative 3 (116 and 8).

In addition, the alternative routes cross the Susquehanna River a second time and Alternatives 1 and 2 cross more waterbodies greater than 100 feet wide than the corresponding segment of the proposed route. With respect to the second crossing of the Susquehanna River, Alternatives 1 and 2 would cross it near York Haven, Pennsylvania, at a location where the river is 2,600 feet wide. Alternative 3 would cross it northwest of Marietta, Pennsylvania, at a location where the river is 1,850 feet wide. Assuming the second crossing of the Susquehanna River is installed using the HDD technique, there would be challenges associated with these crossings due to limited workspace or differences in elevation.

At the Alternatives 1 and 2 Susquehanna River crossing location, there is limited workspace available on the north and south sides of the river to stage equipment and assemble the HDD pullback section. To complete the installation, a minimum of 2,600 feet of workspace would be needed to assemble and test the HDD pullback section. There is only 1,000 feet available between the river and railroad tracks and River Road on the north side of the crossing and only 1,100 feet available between the river and Conewago Creek and railroad tracks on the south side of the crossing. While Transco could assemble the pullback section (i.e., position, weld, x-ray, and coat individual pipe joints) in three sections, this would increase the risk of the pipeline becoming stuck in the drill hole during the pullback operation because the pullback operation would need to be interrupted and the pipeline idled as each section of the pullback section is being assembled.

The Alternative 3 Susquehanna River crossing also has workspace limitations. The river is 1,850 feet wide at this location, yet there is only 900 feet of space available between the river and railroad tracks and Old River Road on the north side of the crossing and only 300 feet of space between the river and River Drive on the south side of the crossing. As described above, Transco would be required to assemble the pullback section in separate sections in order to complete the crossing. Of greater concern, however, is the elevation difference between the north and south sides of the river. The north side of the river is relatively flat and has an elevation of 260 feet. In contrast, the south side of the river is extremely steep and rises to an elevation of 600 feet before leveling out. Because HDD staging areas require relatively level areas, the workspace would likely need to be located at an elevation of at least 600 feet. This would result in a 340-foot elevational change between the entry and exit sides, which would create a "dry hole" condition on the high end of the HDD, which would increase the potential for HDD complications including the risks of hole collapse and a significant return of drilling fluid to the low side of the crossing.

Patrick Kelsey also identified several options for crossing the Susquehanna River between Falmouth and Bainbridge, Pennsylvania. However, all of these crossing options have similar constraints and constructability issues as those described above.

Comments on the draft EIS suggested that we re-evaluate Alternatives 2 and 3 because of the collocation with existing rights-of-way. While the alternative routes would have the benefit of increasing collocation with existing rights-of-way, the environmental disadvantages far outweigh any benefit the increased collocation would provide. In addition, we believe a second crossing of the Susquehanna River that would be required by Alternatives 1, 2, or 3 would be technically challenging and would increase the potential of a drill failure. For these reasons, we do not find that Alternatives 1, 2, or 3 are preferable or provide an environmental advantage over the proposed route, and we do not recommend them.

3.3.2 Minor Route Alternatives

During the initial route identification process, Transco attempted to collocate with existing rights-of-way where practicable and feasible. Transco's initially planned pipeline route crossed the well head protection area of public water supply wells owned and operated by the Elizabethtown Area Water Authority (EAWA), Shenk's Ferry Wildflower Preserve, and Tucquan Glen Nature Preserve in Lancaster County, Pennsylvania.

The public water supply wells operated by the EAWA provide a source of water to residents of Mount Joy Township, West Donegal Township, and Elizabethtown Borough.

Shenk's Ferry Wildflower Preserve is a 50-acre sanctuary that supports more than 70 species of wildflowers that bloom from mid-March until the end of May and another 60 species of wildflowers that bloom in the summer and fall. Shenk's Ferry Wildflower Preserve has 2 miles of walking trails. The Tucquan Glen Nature Preserve is 336 acres in size and has 2.4 miles of hiking trails. The Tucquan Glen Nature Preserve has at least 35 varieties of wildflowers and over 20 species of ferns and 40 species of trees.

We received comments from the EAWA expressing concern that the initially planned route would be within 400 feet of its public water supply wells. The EAWA recommended that the pipeline not be located within 0.5 mile of these wells to avoid crossing the wellhead protection areas associated with these wells. We received over 240 comments expressing concern about the initially planned alignment across Shenk's Ferry Wildflower Preserve and Tucquan Glen Nature Preserve and the potential for the Project to affect threatened and endangered species, fish and wildlife, streams and forests, water and air quality, cultural resources, wildflower vegetation, and recreational land. In response to these concerns, Transco revised the planned route during the pre-filing process to avoid the wellhead protection area and the crossing of Shenk's Ferry Wildflower Preserve and Tucquan Glen Nature Preserve.

We received comments from over 600 Conestoga Township residents suggesting that the initially planned pipeline route across Shenk's Ferry Wildflower Preserve and Tucquan Glen Nature Preserve would be preferable to the proposed route. The residents identified the Conestoga Alternative Route, which would follow an alignment similar to the initially planned CPL South pipeline route by Transco in Conestoga Township (see Conestoga Alternative Route).

Transco evaluated 19 other minor route alternatives that were identified during pre-filing by its engineering and environmental staff or suggested by landowners, municipalities, and other stakeholders. Table 3.3.2-1 identifies the milepost locations of these alternatives and whether they were incorporated into the proposed route. Transco incorporated 13 of these minor route alternatives into the proposed route and rejected the other 6. We reviewed these route alternatives during the pre-filing period and concur with Transco's conclusions regarding their incorporation or rejection as part of the proposed route. The alternatives that were incorporated into the proposed route are now considered part of the proposed Project and are included in our analysis of the Project in section 4.0 of this EIS.

In addition to the major and minor route alternatives described above, we evaluated a number of minor route variations. Minor route variations typically involve minor shifts in the pipeline alignment to avoid a site-specific resource issue or concern and are generally smaller in scale and shorter than route alternatives.

Transco already incorporated 52 route variations into the proposed route during the pre-filing period to avoid or reduce effects on environmental or other resources, resolve engineering or constructability issues, or address stakeholder concerns. These 52 route deviations are not evaluated further here because the concerns for which they were identified have been addressed. As such, they are now part of the proposed action and are included in our impacts assessment in section 4.0.

As part of its application and in recent supplemental filings, Transco identified another 81 route variations that it evaluated for incorporation into the proposed route. Transco incorporated 80 of the 81 route variations into its proposed route (see section 3.3.3). As indicated above, the environmental impacts of the routing through these areas are discussed as part of the proposed action in section 4.0 of this EIS.

Since filing its application, several additional minor alternatives were identified by stakeholders and Transco. Table 3.3.2-2 identifies the minor route alternative, milepost location, and the purpose of the alternative. A description and our evaluation of these minor route alternatives are provided below.

CPL North Minor Route Alternatives

<u>CPL North Alternatives 5 and 6</u>

CPL North Alternative 5 (Alternative 5) and CPL North Alternative 6 (Alternative 6) were identified by Dale Wilkie to maximize collocation with property lines and transmission lines. Alternative 5 deviates from the proposed route at MP 24.1 on the east side of Chestnut Ridge Lane. From this point, Alternative 5 proceeds north for 0.3 mile adjacent to Chestnut Ridge Lane until it reaches an overhead powerline right-of-way. It then follows the powerline right-of-way and a property line northeast and then heads east until it rejoins the proposed route at MP 24.6. Alternative 6 begins at the same location, but proceeds south, east, and then north along other property lines until it rejoins the proposed route at MP 24.5. It then follows the same alignment as the proposed route to MP 24.6 (see figure 3.3.2-1).

TABLE 3.3.2-1

Summary of Minor Route Alternatives Evaluated During Pre-Filing for the Atlantic Sunrise Project

Minor Route Alternative	Milepost Location	Purpose of Alternative	Incorporated into Proposed Route	Reason Alternative Incorporated or Rejected
CPL North Minor Alternatives				
CPL North Alternative 1	34.3–39.2	To increase the amount of collocation with an existing pipeline	No	1.2 miles longer and crosses more forestland (1.0 mile) and waterbodies (one)
CPL North Alternative 2	44.5–50.5	To minimize effects on forestland	No	Engineering constraints associated with crossing an underground railroad tunnel
CPL North Alternative 3	52.9–56.9	To increase the amount of collocation with an existing pipeline and to avoid two ponds	No	0.6 mile longer and crosses more forestland (0.8 mile) and wetlands (two)
CPL North Alternative 4	27.0–29.2	To avoid multiple wetland crossings and allow perpendicular crossings of waterbodies	Yes	Crosses one less wetland and improves waterbody crossing locations
CPL South Minor Alternatives				
CPL South Alternative 1	52.1–70.4	To cross Appalachian National Scenic Trail at an alternative location	No	Crosses more forestland (1.4 miles), waterbodies (one) and wetlands (seven)
CPL South Alternative 2	76.3–94.5	To increase the amount of collocation with an existing transmission line	No	0.5 mile longer and crosses more forestland (0.8 mile) and one active strip mine
CPL South Alternative 3	107.0–125.2	To increase the amount of collocation with an existing pipeline and transmission line	No	1.3 miles longer and crosses more forestland (3.3 miles) and interior forest (0.1 mile)
CPL South Alternative 4	29.6–34.4	To avoid a future housing development	Yes	Avoids future residential lots and crosses less forestland (0.1 mile) and wetlands (one)
CPL South Alternative 5	54.7–58.7	To avoid ponds and development	Yes	Avoids ponds and chicken coops and is 0.2 mile shorter and crosses less forestland and interior forest (0.1 mile) and wetlands (one)
CPL South Alternative 6	71.5–74.1	Requested by landowner to address routing concerns	Yes	Addresses routing concerns identified by landowner
CPL South Alternative 7	20.8–24.8	Requested by West Hempfield Township to increase distance from existing and proposed residential subdivisions	Yes	Addresses routing concerns identified by West Hempfield Township
CPL South Alternative 8	111.4–113.1	To route the pipeline to the proposed Compressor Station 610 property	Yes	Addresses routing to the proposed compressor station site and crosses less forestland (0.1 mile)
CPL South Alternative 9	89.2–92.7	To avoid steep slopes adjacent to road crossings	Yes	Avoids steep slopes adjacent to road crossings
CPL South Alternative 10	10.2–11.1	To minimize the crossing of a county natural heritage inventory site (Safe Harbor East Woods)	Yes	Avoids Safe Harbor East Woods and reduces forestland and interior forest impacts by 0.1 mile
CPL South Alternative 11	64.8–67.6	To avoid steep slopes adjacent to Old Forge Road and improve crossing of Mill Creek	Yes	Avoids steep slopes, improves crossing of Mill Creek and crosses one less waterbody

TABLE 3.3.2-1 (cont'd)

Summary of Minor Route Alternatives Evaluated During Pre-Filing for the Atlantic Sunrise Project

Minor Route Alternative	Milepost Location	Purpose of Alternative	Incorporated into Proposed Route	Reason Alternative Incorporated or Rejected
CPL South Alternative 12	11.7–14.9	To avoid cultural resource sites	Yes	Avoids cultural resource sites and increases length collocated
CPL South Alternative 13	69.2–71.3	To avoid a spring and steep side-slopes	Yes	Avoids spring and steep side slopes
CPL South Alternative 14	59.6–60.6	Requested by the National Park Service to cross the Appalachian National Scenic Trail at an alternative location	Yes	Comparable land use impacts and addresses concerns raised by the National Park Service
CPL South Alternative 15	35.7–37.8	Requested by the Pennsylvania Turnpike Commission (PTC) to cross Interstate 76 at an alternative location	Yes	Comparable land use impacts and addresses concerns raised by the PTC

TABLE 3.3.2-2

Summary of Minor Route Alternatives Identified After Application Submittal for the Atlantic Sunrise Project [a]

Minor Route Alternative	Milepost Location	Reason Alternative was Identified
CPL North Minor Alternatives		
CPL North Alternatives 5 and 6	24.1–24.6	To maximize collocation with property lines
CPL North Alternatives 7, 8, 9, 10, and 10A	24.3–26.8	To avoid crossing flood-prone residential property
CPL North Alternative 11	M-0060 MP 0.4–MP 24.4	To minimize effects on property used for a variety of sporting events
CPL North Alternatives 12, 12 West, and 12 East	26.3–30	To address landowner concerns regarding alignment across property and cultural resource features
CPL South Minor Alternatives		
CPL South Alternatives 16, 16A, and 16B	59.3–60.5	To cross the Appalachian National Scenic Trail at an alternative location
CPL South Alternative 18	2.4–8.6	To avoid crossing the Lakewood Estates residential subdivision
CPL South Alternatives 21, 22, and 23	9.2–10.2	To reduce effects on residences and the Life Counseling Ministries
CPL South Alternatives 24A, 24B, 24C, and 24D	MP 102.1–M-071 MP 0.5	To minimize effects on existing residential and commercial development.
CPL South Alternatives 25 and 26	68.3–70.1	To minimize effects on existing residential development and to avoid crossing a dead-end street
CPL South Alternative 27	5.6–6.9	To avoid crossing road entrances to Lakewood Estates subdivision
Conestoga Alternative Route	2.1–14.1	To maximize collocation with existing rights-of-way
Conestoga River Alternative	12.0–M-0248 0.0	To avoid crossing lands subject to a Restrictive Covenant
Railroad Alternative	15.9–19.4	To collocate with existing railroad right-of-way
Lynda Like Alternative	0.0–15.0	To collocate with existing roads
Sharon and Russel Olt Alternative	66.9–67.3	To address routing concerns identified by landowner

[a] Transco incorporated CPL South Alternatives 17, 19, and 20 into the proposed route, which is evaluated in section 4.0.

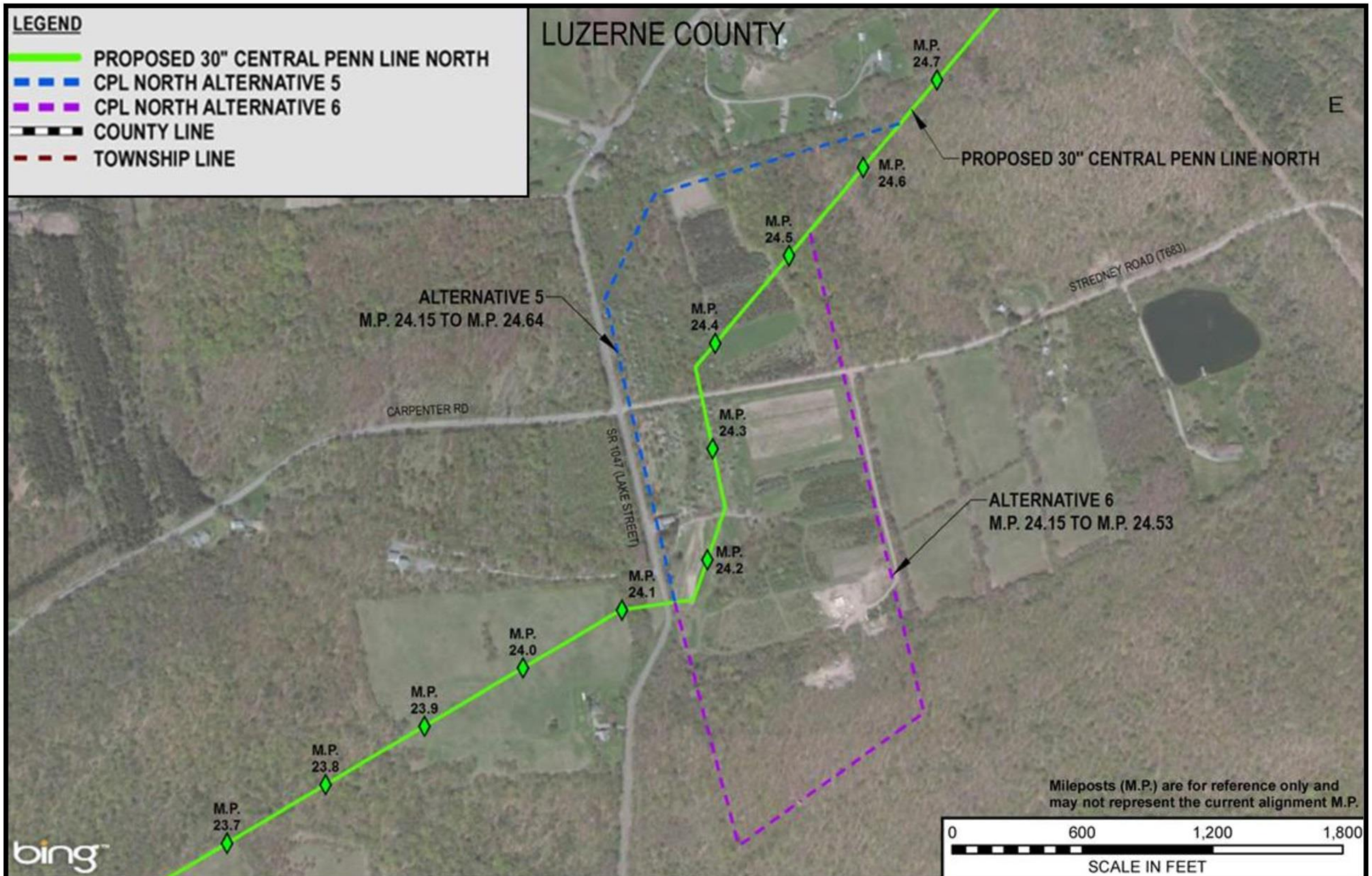

Figure 3.3.2-1
Atlantic Sunrise Project
CPL North Alternatives 5 and 6

An environmental comparison of Alternatives 5 and 6 to the corresponding segment of the proposed route is provided in table 3.3.2-3.

TABLE 3.3.2-3

Comparison of the CPL North Alternatives 5 and 6 to the Corresponding Segment of the Proposed Route for the Atlantic Sunrise Project

Environmental/Engineering Factor	Unit	CPL North Alternative 5	CPL North Alternative 6	Proposed Route
Length	miles	0.6	1.0	0.5
Length adjacent to existing right-of-way	miles	0.4	0.0	0.0
Construction right-of-way [a]	acres	6.5	10.9	5.5
Forestland crossed	miles	0.3	0.8	0.3
Agricultural land crossed	miles	0.1	0.2	0.2
Residences within 50 feet of the construction workspace	no.	0	0	0
Waterbodies crossed	no.	1	1	1
Wetlands crossed	no. (feet)	0 (0)	0 (0)	0 (0)
Road crossings	no.	1	1	1

[a] Based on a 90-foot-wide construction right-of-way.

All three routes would avoid wetlands, cross the same number of waterbodies, and cross comparable amounts of agricultural land.

Of the three routes, the proposed route is the shortest (0.5 mile), followed by Alternative 5 (0.6 mile) and Alternative 6 (1.0 mile). Because Alternative 6 is the longest route, it would affect more land during construction (12.1 acres) than either Alternative 5 (7.3 acres) or the proposed route (6.3. acres). Alternative 5 follows existing rights-of-way for 0.4 mile or about 67 percent of its length. In contrast, neither Alternative 6 nor the corresponding segment of the proposed route follow existing rights-of-way.

In addition to being longer and affecting more land during construction, Alternative 6 would affect 0.5 acre more forestland than either Alternative 5 or the corresponding segment of the proposed route.

According to Dale Wilkie, Alternative 5 is the preferred alignment across his property. Although Alternative 5 would cross close to a barn, Dale Wilkie indicated that the barn could be removed to accommodate construction.

In the draft EIS, we recommended that Transco incorporate Alternative 5 into the proposed route. Transco filed supplemental information in August 2016 and indicated that it had incorporated Alternative 5 into the proposed route and made some minor adjustments to avoid affecting a waterbody. Accordingly, this routing and the associated environmental impacts are evaluated in section 4 as part of the proposed action.

<u>CPL North Alternatives 7, 8, 9, 10, and 10A</u>

In response to landowner concerns regarding drainage and flooding issues, impacts on pastureland and septic systems, and potential effects on the Goodleigh Manor Subdivision, we are evaluating five route alternatives near Kunkle, Pennsylvania, between MPs 24.3 and 26.8 of the proposed route (see figure 3.3.2-2).

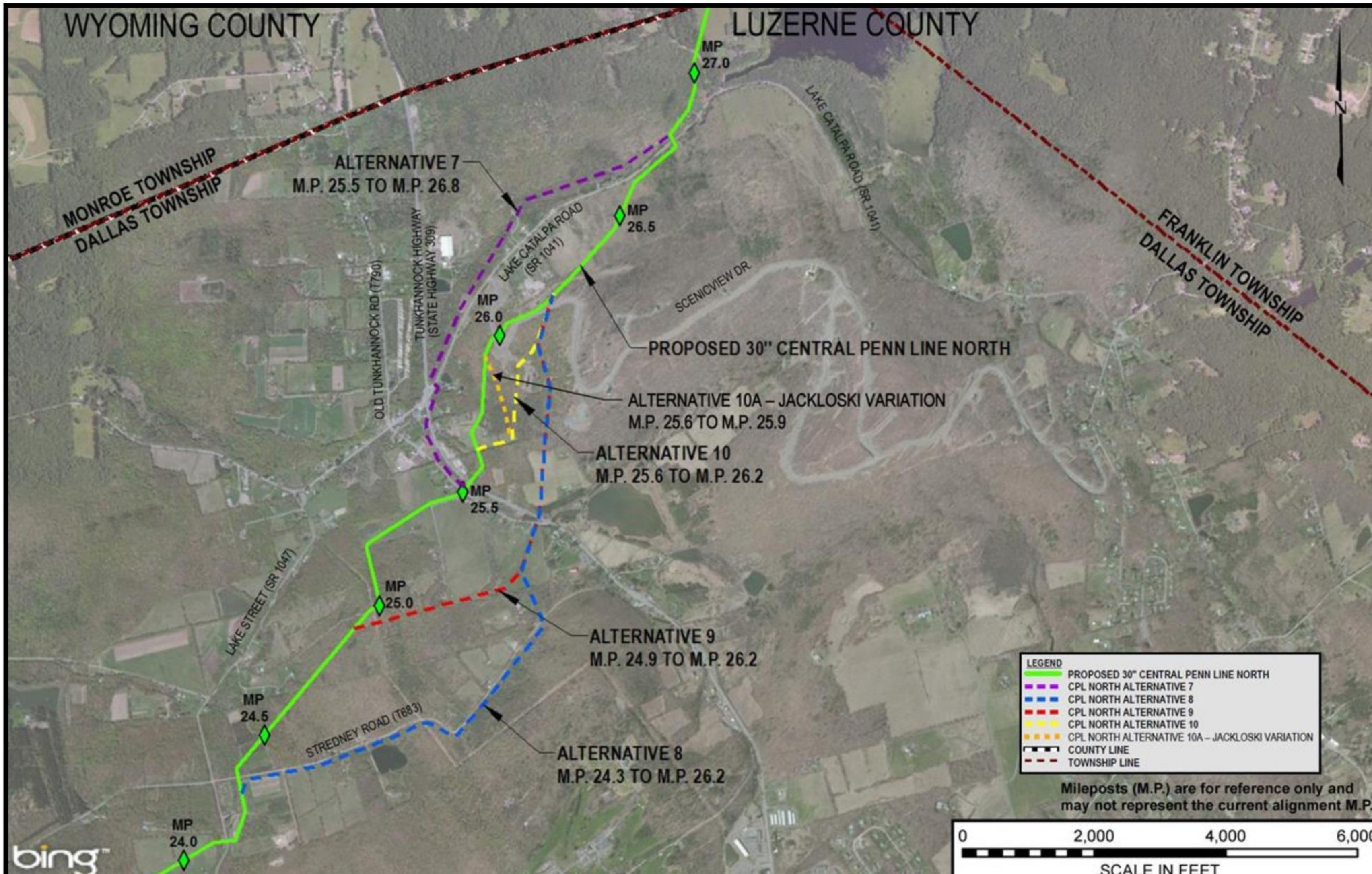

Figure 3.3.2-2
Atlantic Sunrise Project
CPL North Alternatives 7, 8, 9, 10, and 10A

Walter and Robyn Kochan (Kochans) provided comments and indicated that their property often floods after a significant rainfall and during spring snow melt and that the flooding often extends onto Lake Catulpa Road and Pennsylvania Route 309 (PA 309). The Kochans indicated that right-of-way clearing along the proposed route would increase stormwater runoff and exacerbate the flooding issues. The Dallas Township Board of Supervisors submitted comments and indicated that the Kochans live on a flood-prone property that is adversely affected during heavy rains and reiterated that clearing the pipeline right-of-way along the proposed route could increase flooding in and around their property. Jack Jackloski provided comments and indicated that the proposed route would affect his septic system and that construction activities would affect his pasture and his ability to care for his cattle and horses. Jim Comes, President of Landview Properties, Inc., submitted comments and expressed concern about the potential pipeline alignment affecting future residential development in the Goodleigh Manor Subdivision.

CPL North Alternative 7 (Alternative 7) follows the same alignment as the proposed route from MP 24.3 to MP 25.5. At MP 25.5, Alternative 7 deviates from the proposed route and proceeds west for 0.3 mile adjacent to the south side of PA 309 to the Kunkle Fire and Rescue Station. Alternative 7 then crosses to the east side of PA 309 and proceeds north for 0.1 mile, at which point it crosses Lake Catalpa Road. After crossing the road, Alternative 7 proceeds northeast adjacent to the west side of Lake Catalpa Road across primarily forestland before rejoining the proposed route at MP 26.8.

CPL North Alternative 8 (Alternative 8) deviates from the proposed route at MP 24.3 and proceeds east for about 1 mile across primarily pastureland and forestland adjacent to the south side of Stredney Road. From this point, Alternative 8 turns and proceeds north crossing Stredney Road and PA 309. After crossing PA 309, Alternative 8 continues north across pastureland, forestland, and the Goodleigh Manor Subdivision before rejoining the proposed route at MP 26.2. It then follows the same alignment as the proposed route to MP 26.8.

CPL North Alternative 9 (Alternative 9) follows the same alignment as the proposed route from MPs 24.3 to 24.9. At MP 24.9, Alternative 9 separates from the proposed route and proceeds east for 0.4 mile adjacent to the north side of a pipeline operated by PVR NEPA Gas Gathering, LLC. It then turns north and follows the same alignment as Alternative 8 to MP 26.8.

CPL North Alternative 10 (Alternative 10) follows the same alignment as the proposed route from MPs 24.3 to 25.6. At MP 25.6, the alternative turns and proceeds east for 0.1 mile following the southern property boundary of the Jackloski property to avoid bisecting his pasture and affecting his septic system. It then turns and proceeds north across forestland and the Goodleigh Manor Subdivision, eventually joining and following the same alignment as Alternatives 8 and 9 to MP 26.8.

CPL North Alternative 10A (Alternative 10A) follows the same alignment as the proposed route (and CPL North Alternative 10) to MP 25.6. The alternative then turns and proceeds east for 0.1 mile following the same alignment as CPL North Alternative 10 along the southern property boundary of the Jackloski property to avoid bisecting his pasture and affecting his septic system. From there, the alternative proceeds northwest to MP 25.9 where it rejoins the proposed route. It then follows the same alignment as the proposed route to MP 26.8.

An environmental comparison of Alternatives 7, 8, 9, 10, and 10A to the corresponding segment of the proposed route is provided in table 3.3.2-4.

TABLE 3.3.2-4

Comparison of the CPL North Alternatives 7, 8, 9, 10, and 10A to the Corresponding Segment of the Proposed Route for the Atlantic Sunrise Project

Environmental/ Engineering Factor	Unit	CPL North Alternative 7	CPL North Alternative 8	CPL North Alternative 9	CPL North Alternative 10	CPL North Alternative 10A	Proposed Route
Length	miles	2.6	2.7	2.5	2.5	2.6	2.5
Length adjacent to existing right-of-way (percent)	miles	1.0 (38)	1.3 (48)	0.6 (24)	0.4 (16)	0.5 (19)	0.5 (20)
Construction right-of-way [a]	acres	28.4	29.5	27.3	27.3	28.4	27.3
Forestland crossed	miles	1.9	1.9	1.7	1.6	1.7	1.6
Agricultural land crossed	miles	0.4	0.8	0.8	0.8	0.8	0.7
Residences within 100 feet of the pipeline centerline	no.	3	3	1	0	0	0
Residential lots crossed within Goodleigh Manor Subdivision	no.	0	6	6	5	4	4
Waterbodies crossed	no.	2	2	3	2	2	2
Wetlands crossed	no. (feet)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Road crossings	no.	4	5	5	6	5	5

[a] Based on a 90-foot-wide construction right-of-way.

The alternative routes and the proposed route are all about the same length. Alternatives 7 and 8 would follow existing rights-of-way for a greater percentage of their length (38 and 48 percent, respectively); however, because the alternatives are primarily collocated with roads, they would be closer to developments and residences than the proposed route and Alternatives 9, 10, and 10A.

Alternative 7 would avoid crossing residential lots within the Goodleigh Manor Subdivision. In contrast, Alternatives 8 and 9 would cross six residential lots, Alternative 10 would cross five lots, and Alternative 10A and the proposed route would cross four lots. Alternatives 8, 9, and 10 would also cross through the middle of the residential lots, which would preclude the development of the lots. Alternative 10A and the proposed route would minimize the number of lots within the Goodleigh Manor Subdivision that would be affected by the Project.

Alternatives 7 and 8 would cross the most forestland (1.9 miles) compared to Alternative 9 (1.7 miles), Alternative 10 (1.6 miles), Alternative 10A (1.7 miles), and the proposed route (1.6 miles).

Alternative 9 would cross one more waterbody than the proposed route and the other alternatives. Melvin Morris provided comments and indicated that Alternative 8 would cross in close proximity to a lake he constructed on his property on the south side of Stredney Road and that construction could increase erosion and sedimentation into his lake.

In the draft EIS, we recommended that Transco incorporate Alternative 10A into the proposed route as it appeared to address the concerns of the Kochans, Jack Jackloski, and the Goodleigh Manor Subdivision. In comments filed on the draft EIS in June 2016, the Kochans indicated that they prefer Alternative 10 or an alternative alignment (Kochan Preferred Alternative) that avoids their property by following an alignment across Jackloski's property and the Goodleigh Manor Subdivision northeast of their property boundary (see figure 3.3.2-3).

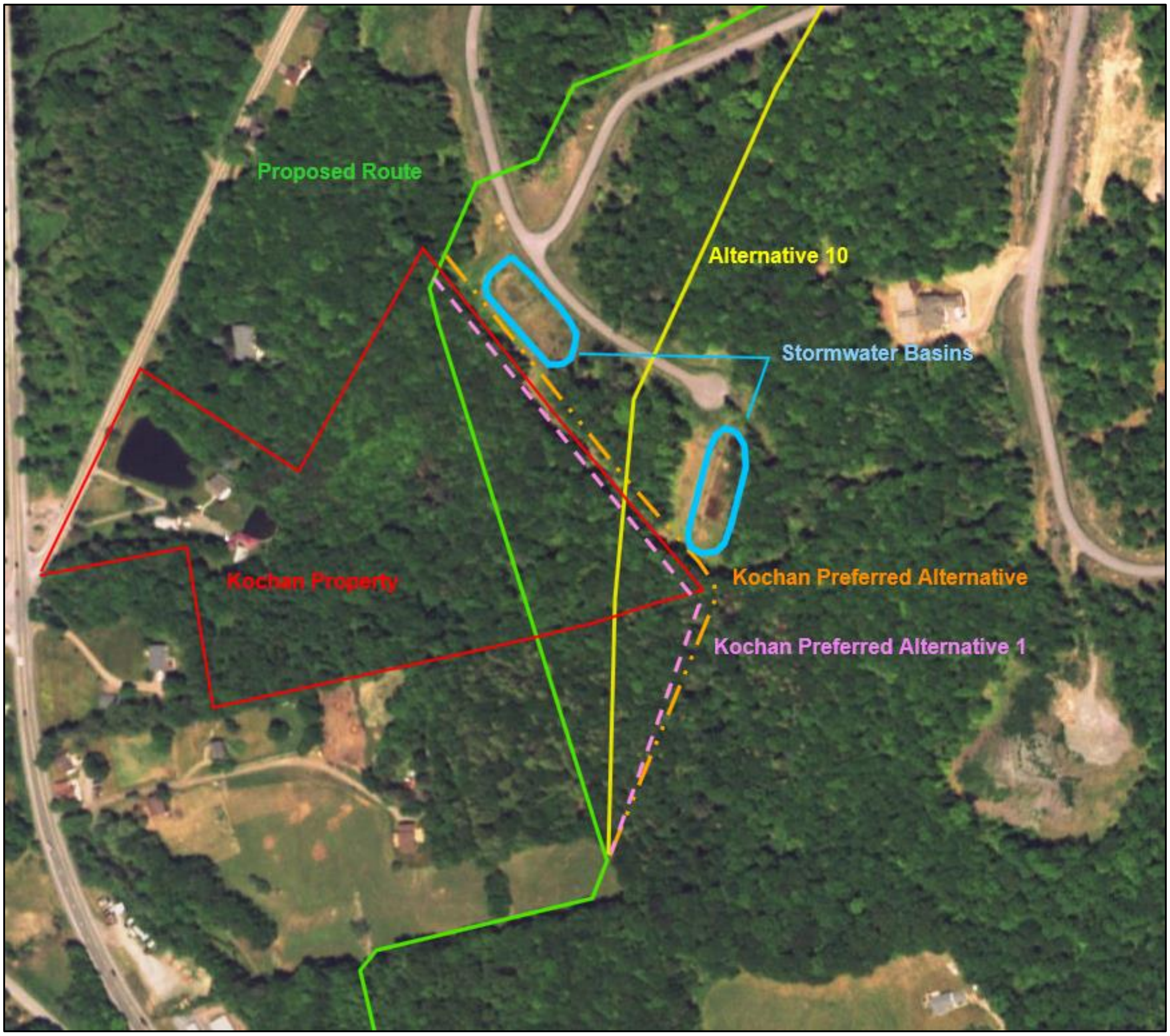

Figure 3.3.2-3 Kochan Preferred Alternative

We previously did not recommend Alternative 10 in the draft EIS because it would cross five residential lots within the Goodleigh Manor Subdivision. A disadvantage of the Kochan Preferred Alternative is that it would cross one residential lot within the Goodleigh Manor Subdivision. In addition, there is insufficient space between the Kochan Property boundary and the existing stormwater basins of the subdivision to construct the Kochan Preferred Alternative. However, an alignment across the Kochan's property that abuts their northeastern property boundary (which we are calling Kochan Preferred Alternative 1) would increase the separation distance of the pipeline from their residence and avoid bisecting their property. Therefore, **we recommend that:**

- **<u>Prior to construction</u>, Transco should file with the Secretary a revised alignment sheet that incorporates the Kochan Preferred Alternative 1 between MPs M-0142 0.1 and M-0142 0.4 into the proposed route.**

CPL North Alternative 11

The CPL North Alternative 11 (Alternative 11) was identified by Thomas and Joan Byron (Byrons) to minimize effects on their property. The Byrons submitted comments and indicated that their property is enrolled in Pennsylvania's "Clean and Green" Program and that it is used for a variety of public uses, such as hosting soccer and lacrosse games and cross country running events. They commented on November 1, 2015, that their property had been used recently by 17 (Division III colleges) for the Mid-American Conference Championship in cross country.

Alternative 11 deviates from the proposed route near MP M-0060 0.4 and proceeds northwest (west of the Byron property line) for 0.5 mile across primarily forestland. From there, the alternative proceeds north/northeast across side-sloping topography for 0.4 mile to the south side of Carpenter Road. It then crosses to the north side of Carpenter Road between two residences, after which it proceeds west for 0.8 mile across forestland and Ellsworth Hill Road until it rejoins the proposed route at MP 24.4 (see figure 3.3.2-4).

An environmental comparison of Alternative 11 to the corresponding segment of the proposed route is provided in table 3.3.2-5.

TABLE 3.3.2-5

Comparison of the CPL North Alternative 11 to the Corresponding Segment of the Proposed Route for the Atlantic Sunrise Project

Environmental/Engineering Factor	Unit	CPL North Alternative 11	Proposed Route
Length	miles	2.0	1.8
Length adjacent to existing right-of-way	miles	0.0	0.0
Construction right-of-way [a]	acres	21.8	19.6
Forestland crossed	miles	1.9	1.5
Agricultural land crossed	miles	0.0	0.3
Residences within 100 feet of the pipeline centerline	no.	0	0
Waterbodies crossed	no.	0	0
Wetlands crossed	no. (feet)	0 (0)	0 (0)
Road crossings	no.	2	2

[a] Based on a 90-foot-wide construction right-of-way.

Alternative 11 has no apparent environmental advantage over the proposed route.[1] It is 0.2 mile longer and would disturb 1.9 acres more land during construction than the corresponding segment of the proposed route. In addition, Alternative 11 crosses 0.4 mile more forestland than the proposed route.

Another disadvantage of Alternative 11 is that it would require constructing on side-slopes for about 0.4 mile, which would require additional workspace for more spoil storage that would be needed due to the creation of a level workspace for safety during construction. The proposed route crosses relatively level topography. Neither the alternative nor the proposed route cross the soccer and lacrosse fields on the Byron tract. See section 4.8.6.2 for additional information regarding the Clean and Green Program.

Because Alternative 11 does not offer any significant environmental advantages and would result in greater impacts than the proposed route, we are not recommending it.

[1] While the stated wishes or concerns of a landowner are considered when assessing alternatives, and may factor into environmental categories related to land use or various other environmental resources on a property, we must evaluate the overall impacts of the proposed route versus the alternative route (including shifting impacts onto other landowners) in accordance with the criteria explained at the beginning of this section.

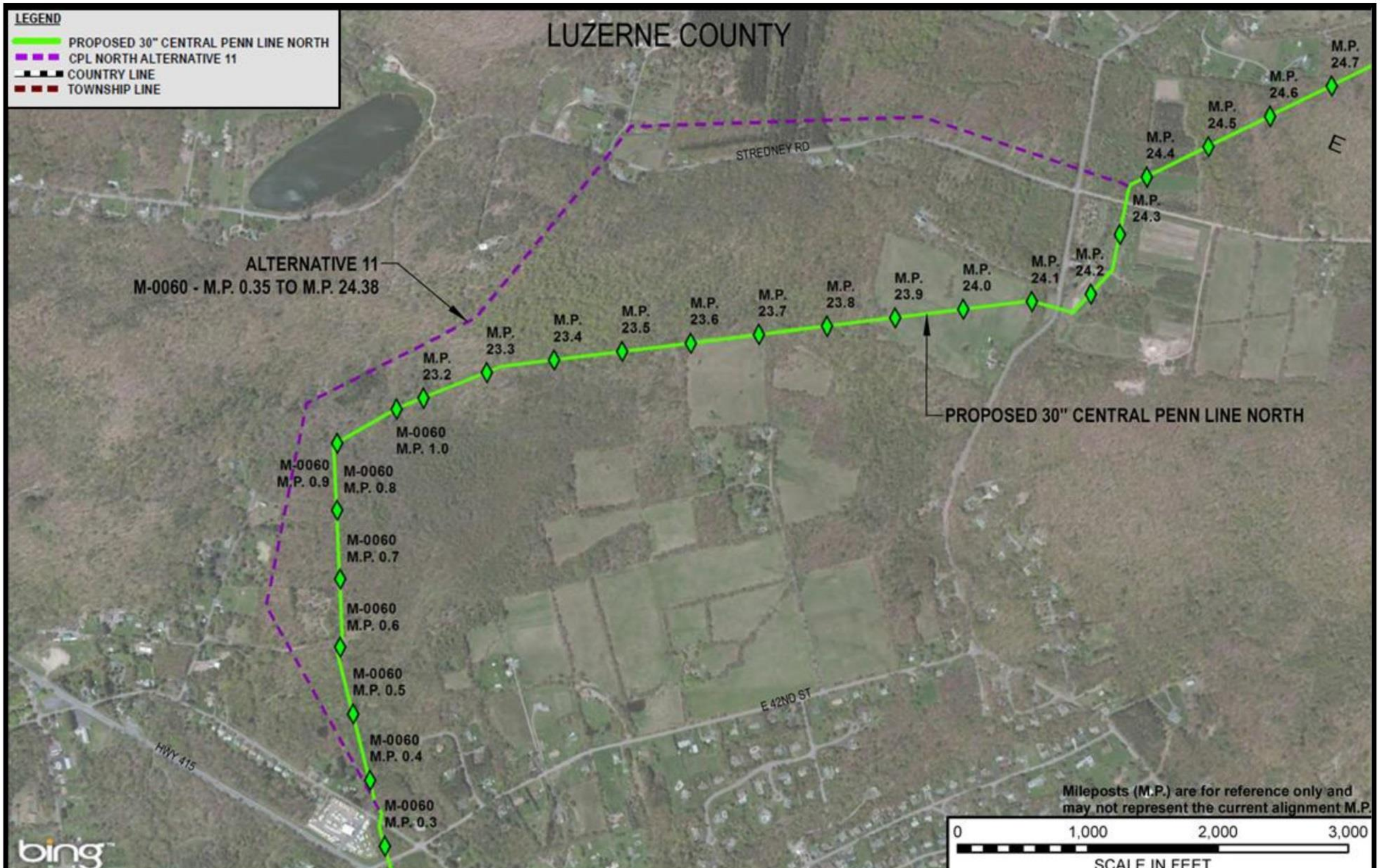

Figure 3.3.2-4
Atlantic Sunrise Project
CPL North Alternative 11

On October 4, 2016, the Byrons submitted comments indicating that Transco had developed an alternative alignment across their property, which would be more acceptable than the currently proposed route. On November 14, 2016, Transco filed the alternative route (Byron Reroute) and indicated that the alternative alignment would cross two fewer wetlands and affect 0.1 acre less forested wetland than the corresponding segment of the proposed route(see figure 3.3.2-5). Because the Byron Reroute affects fewer wetlands and addresses some of the concerns of the landowner regarding an alignment across their property, **we recommend that:**

- **<u>Prior to construction</u>, Transco should file with the Secretary a revised alignment sheet that incorporates the Byron Reroute along CPL North between MPs 23.3 and 24.1 into the proposed route.**

In addition, because the Byrons' property is host to several public events, **we recommend that:**

- **<u>Prior to construction across the Byron property</u>, Transco should develop and file with the Secretary, for review and written approval by the Director of OEP, a schedule for construction and restoration activities on the Byron property that minimizes conflict with the planned public use of the property. Transco should develop the restoration activities in consultation with the Byrons.**

<u>CPL North Alternatives 12, 12 West, and 12 East</u>

Subsequent to issuance of the draft EIS, Transco incorporated a route alternative into the proposed route on property owned by Geraldine Nesbitt to follow her eastern property boundary and minimize impacts on forested wetlands. The previously proposed route that was evaluated in the draft EIS is referred to as CPL North Alternative 12 (Alternative 12) in the analysis below. In her comments on the draft EIS, Ms. Nesbitt suggested that we should evaluate siting the proposed pipeline adjacent to existing pipeline rights-of-way in the vicinity of her property. There are three existing pipeline rights-of-way in the vicinity of the Nesbitt property: one west of her property and two east of her property (see figure 3.3.2-6).

Collocating with the existing rights-of-way would add to the overall length of the Project. Moreover, the existing rights-of-way do not proceed in the same direction as that of the proposed route and would require constructing through numerous residential properties and dense development, particularly along alignments located east of the Nesbitt property. For these reasons, we conclude that following existing rights-of-way in this area does not provide a significant environmental advantage over the proposed route and is not evaluated further.

In addition, Ms. Nesbitt identified CPL North Alternative 12 West (Alternative 12 West) and CPL North Alternative 12 East (Alternative 12 East) to avoid her property and minimize impacts on cultural resource features and interior forest areas. On October 16, 2016, we mailed a letter and route maps to potentially affected landowners along Alternative 12 West requesting comments on the pipeline alignment. We did not ask for comments from landowners along Alternative 12 East because, as further explained below, we do not believe Alternative 12 East would be preferable due to steep topography and the impacts on residential lots within the Goodleigh Manor Subdivision. On November 14, 2016, Transco filed supplemental information and provided a revised alignment and analysis of CPL North Alternative 12 West to address site-specific routing constraints and landowner concerns.[2] Our analyses of Alternatives 12 (the originally proposed route), 12 West, and 12 East are provided below.

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[2] In its supplemental filing, Transco identified the alternative as CPL North Alternative 12A. However, for our analysis we are identifying it as CPL North Alternative 12 West.

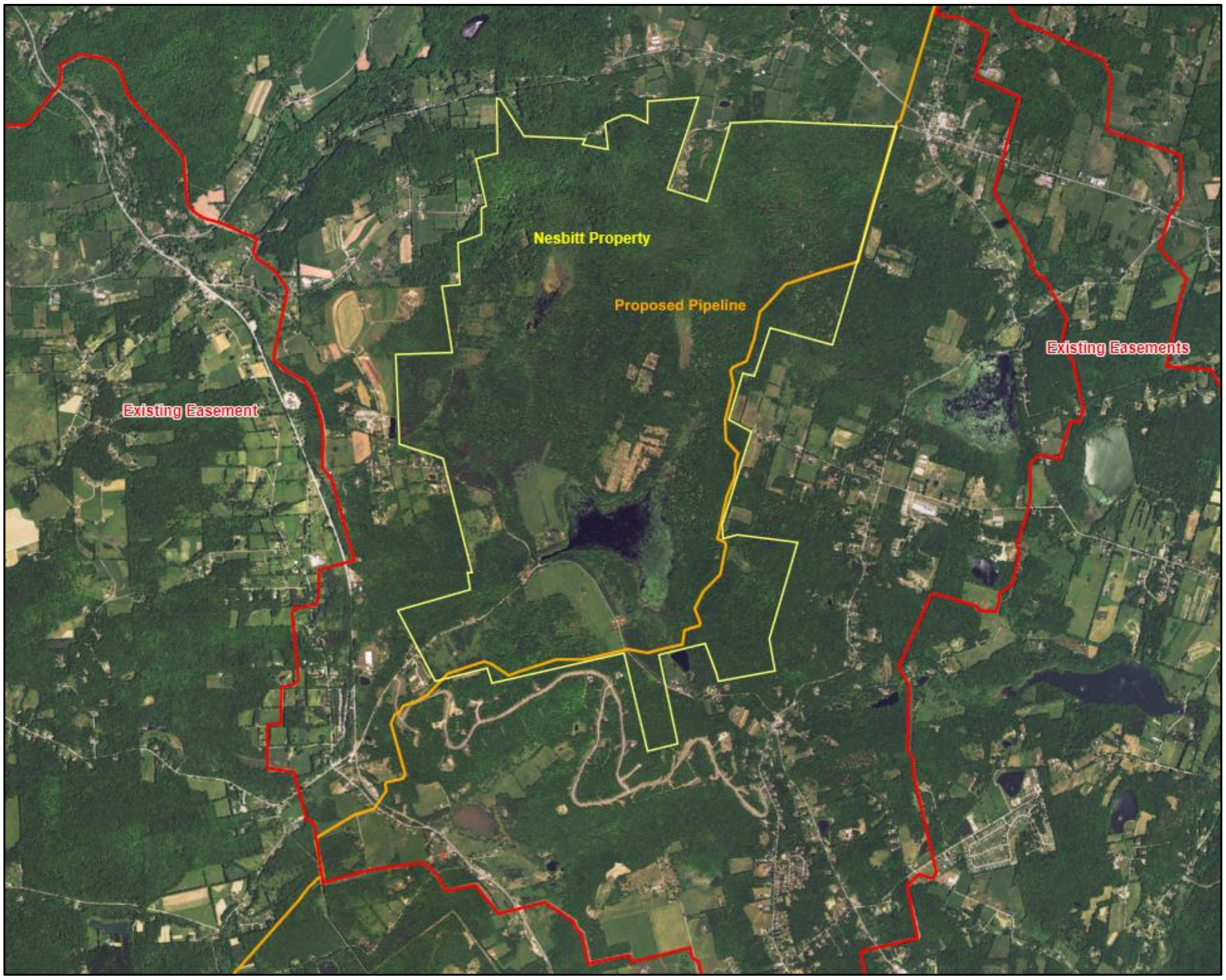

Figure 3.3.2-6 Existing Pipeline Easements Near the Nesbitt Property

Alternative 12 follows the same alignment as the proposed route from MPs 25.6 to 26.2, at which point it deviates from the proposed route and proceeds 2.5 miles northeast across Lake Catulpa Road, Plattsburg Road, pasture, and forestland. It then rejoins the proposed route at MP M-0088 3.0 and follows the proposed route to MP 30.2. Alternative 12 West follows the same alignment as the proposed route from MPs 25.6 to 25.9, at which point it deviates from the proposed route and proceeds north across Lake Catulpa Road where it joins an existing pipeline right-of-way for a distance of 0.9 mile. At this point, Alternative 12 West turns and proceeds northeast and crosses primarily agricultural land and forestland along the western and northern boundary of the Nesbitt property before rejoining the proposed route at MP 30.2. Alternative 12 East deviates from the proposed route at MP 25.6 and proceeds east across forestland, agricultural land, and the Goodleigh Manor Subdivision. After crossing the Goodleigh Manor Subdivision, Alternative 12 East turns and proceeds north across Lake Catulpa Road and forestland east of the Nesbitt property, where it rejoins the proposed route at MP 29.9 and follows the proposed route to MP 30.2 (see figure 3.3.2-7A). An environmental comparison of Alternatives 12, 12 West, and 12 East to the corresponding segment of the proposed route is provided in table 3.3.2-6.

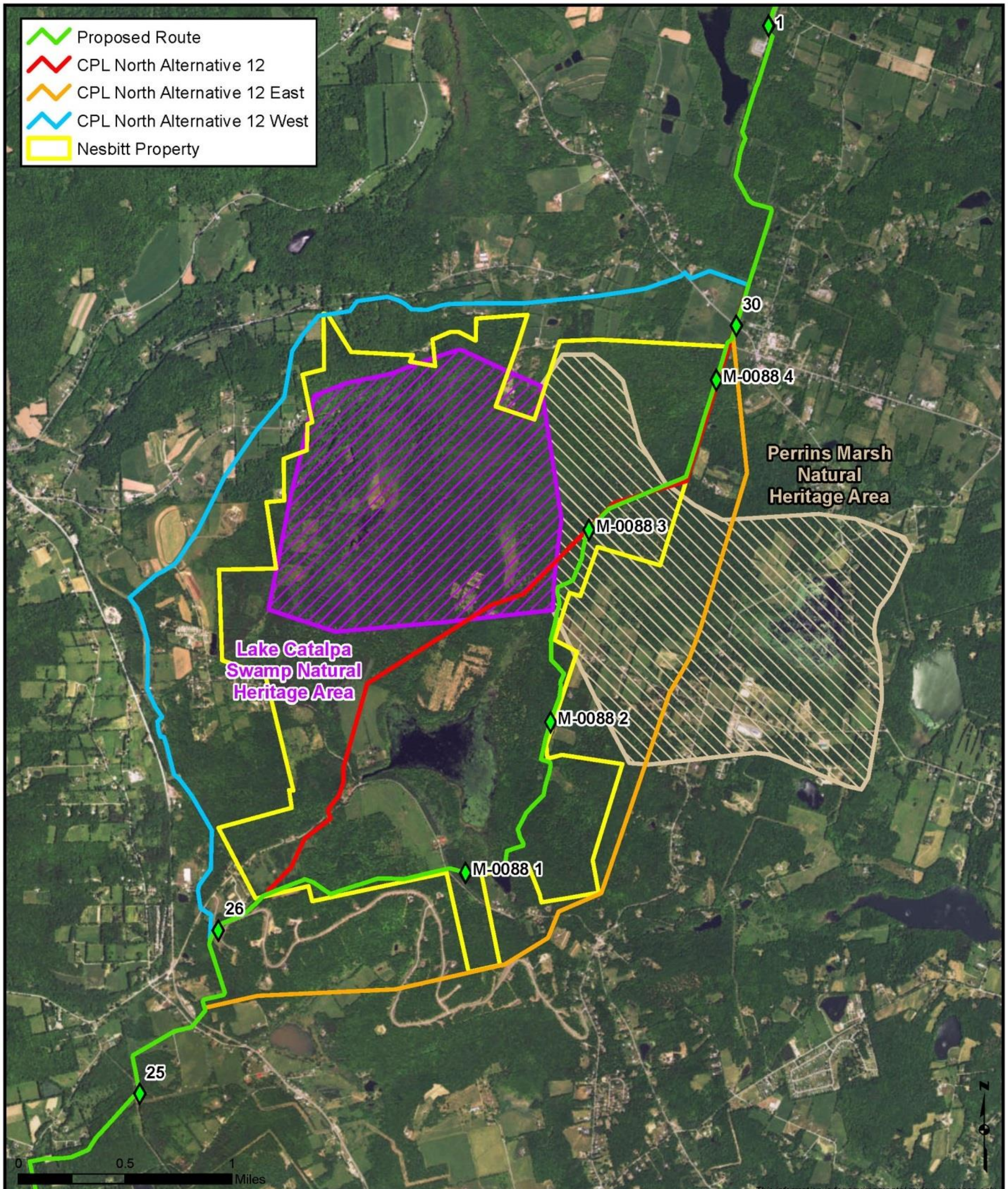

Figure 3.3.2-7A
Atlantic Sunrise Project
CPL North Alternatives 12, 12 West, and 12 East

TABLE 3.3.2-6

Comparison of the CPL North Alternatives 12, 12 West, and 12 East to the Corresponding Segment of the Proposed Route for the Atlantic Sunrise Project

Environmental/Engineering Factor	Unit	Proposed Route	CPL North Alternative 12 West	CPL North Alternative 12 East	CPL North Alternative 12
Length	miles	5.2	5.9	5.2	4.9
Length adjacent to existing right-of-way	miles	0.0	1.4	0.0	0.0
Construction right-of-way [a]	acres	56.7	64.4	56.7	51.3
Forestland crossed	miles (acres)	4.5 (49.1)	3.5 (38.2)	4.2 (45.8)	3.5 (38.2)
Agricultural land crossed	miles	0.4	2.2	0.7	1.0
Residences within 100 feet of the pipeline centerline	no.	1	1	18 [b]	2
Lake Catalpa Swamp Natural Heritage Area crossed	miles	0.0	0.0	0.0	0.5
Perrins Marsh Natural Heritage Area crossed	miles	0.9	0.0	1.2	0.7
Nesbitt Estate Rural Historic District crossed	miles	4.2	<0.1	0.1	3.6
Waterbodies crossed (field survey/remote sensing results)	no.	1 [c] (8)	1[c] (10)	1 [c] (0) [d]	3 [c] (8)
Wetlands crossed (field survey/remote sensing results)	no.	0 [c] (11)	0 [c] (12)	0 [c] (0) [d]	0 [c] (12)
Forested wetlands affected during construction	acres	1.5	0.1	0 [d]	3.1
Number of parcels crossed	no.	6	38	40	6
Road crossings	no.	4	9	7	5

[a] Based on a 90-foot-wide construction right-of-way.

[b] Fifteen are residential lots planned within the Goodleigh Manor Subdivision.

[c] Crossing number based on review of National Hydrography Dataset flowlines for waterbody crossings and National Wetlands Inventory data for wetland crossings.

[d] Field survey data are not available for CPL North Alternative 12 East.

Alternative 12 West is the longest (5.9 miles) and would disturb more land during construction (64.4 acres) than the proposed route (5.2 miles and 56.7 acres), Alternative 12 East (5.2 miles and 56.7 acres), and Alternative 12 (4.7 miles and 51.3 acres). In addition, Alternative 12 West would cross more roads (nine) than the proposed route (four) or Alternatives 12 (five) and 12 East (seven). Extra workspace would be required at road crossings, which would increase the overall construction footprint of Alternative 12 West when compared to the other routes. With the exception of Alternative 12 West, none of the alternatives would be collocated with existing rights-of-way. Collocating with existing rights-of-way versus a greenfield alignment can potentially minimize impacts on forestland by overlapping previously disturbed areas and reducing the amount of tree clearing. Alternative 12 West would be collocated for a distance of about 1.4 miles along an existing pipeline right-of-way east of State Route 309, Plattsburg Road, and an electric transmission line south of Monkey Hollow Road. However, of this 1.4 miles, 0.7 mile would be collocated in forested areas; the remaining 0.7 mile would be collocated in agricultural land. In our experience, the benefits with collocation are optimized where the collocation is with an existing interstate natural gas pipeline and subsequently the proposed project overlaps with the previously cleared or maintained areas. Only a portion of the 0.7 mile would be located adjacent to a pipeline and it is not known whether or not that easement could be used for construction.

Therefore, we conclude that the benefits of collocation associated with Alternative 12 West would be limited, at best.

An advantage of Alternative 12 West and Alternative 12 is that they would cross less forestland (3.5 miles) than the proposed route (4.5 miles) and Alternative 12 East (4.2 miles). However, the type of forested habitat crossed by the alternatives varies. In her comments on the draft EIS, Ms. Nesbitt indicated that her entire property contains approximately 1,944 acres of forest and, when combined with neighboring forested tracts, the total acreage of contiguous forest would be about 2,774 acres. Of the four alternatives, Alternative 12 West would largely avoid this contiguous forestland by following existing rights-of-way and crossing smaller forested tracts west and north of the Nesbitt property. The proposed route and Alternatives 12 and 12 East would cross areas of large contiguous forest, including limited amounts of interior forest habitat, which would fragment this area as a result of tree clearing during construction. See section 4.5.3 for further discussion on interior forest habitat along the proposed route.

A disadvantage of Alternative 12 East is that it would cross 15 residential lots within the Goodleigh Manor Subdivision. In contrast, the proposed route and other alternatives would avoid crossing this subdivision and would cross within 100 feet of fewer residences. Another disadvantage of Alternative 12 East is that it would cross steep side-slopes near Goodleigh Manor Subdivision and north of Lake Catulpa Road near Demunds Corner. The topography along the proposed route and Alternatives 12 and 12 West is not as severe.

The Lake Catalpa Swamp Natural Heritage Area and the Perrins Marsh Natural Heritage Area are located on the Nesbitt property. The Lake Catalpa Swamp Natural Heritage Area is considered a good to marginal example of a broadleaf-conifer swamp natural community (Pennsylvania Natural Heritage Program [PNHP], 1995). The Perrins Marsh Natural Heritage Area is a large marsh and pond complex that contains one known rare aquatic plant and a diversity of common plants and animals (PNHP, 2006). With respect to the Perrins Marsh Natural Heritage Area crossings, Alternative 12 East would cross 1.2 miles, followed by Alternative 12 (0.7 mile) and the proposed route (0.7 mile). In addition to crossing the Perrins Marsh Natural Heritage Area, Alternative 12 would cross 0.5 mile of the Lake Catalpa Swamp Natural Heritage Area. Alternative 12 West would avoid crossing either of these natural heritage areas.

Transco identified waterbodies and wetlands along the proposed route and Alternatives 12 West and 12 using a combination of field survey and remote sensing techniques. Alternative 12 West would cross the most waterbodies (12) followed by the proposed route and Alternative 12, which would each cross 8 waterbodies. The three routes cross a comparable number of wetlands. The proposed route would cross 11 wetlands compared to 12 wetland crossings along Alternative 12 West and Alternative 12. However, of the wetlands crossed, Alternative 12 would affect the most forested wetlands (3.1 acres) compared to the proposed route (1.5 acres) and Alternative 12 West (0.1 acre). Field surveys and remote sensing techniques were not completed along Alternative 12 East. However, we would expect Alternative 12 East to cross a similar number of wetlands and waterbodies as the proposed route because it crosses similar landforms. Because the USACE has not completed its public interest review as part of its permitting requirements under section 404 of the CWA, including site visits, it may acquire new or additional data regarding wetlands and waterbodies along these alternative routes.

Transco completed cultural resource surveys along the portions of the proposed route and Alternative 12 that cross the Nesbitt property, which is recommended as an eligible historic property under the Nesbitt Estate Rural Historic District. No archaeological resources were identified along Alternative 12. Transco identified four archaeological resources along the proposed route, three of which are being recommended as not eligible for listing on the NRHP and a historic farmstead, which would be avoided by the limits of disturbance. However, Alternative 12 would be within the viewshed of the main Nesbitt residence, which is considered a contributing element of the Nesbitt Estate Rural Historic District. The proposed route, Alternative 12 West, and Alternative 12 East would not be within the viewshed of the main Nesbitt residence. Additional information on cultural resources is provided in section 4.10. We do not have comparable cultural resource field survey data for Alternatives 12 West and 12 East; however, the alignments would have the advantage of crossing less of the Nesbitt Estate Rural Historic District than Alternative 12 or the proposed route, which would cross about 3.6 miles and 4.2 miles, respectively. Alternative 12 West would cross about 112 feet of the Nesbitt Estate Rural Historic District in the northwest corner of the property. Alternative 12 East could affect about 0.1 mile of the Nesbitt Estate Rural Historic District in the southern portion of the property near the Goodleigh Manor Subdivision.

Alternative 12 and the proposed route would affect six landowners. In contrast, Alternatives 12 West and 12 East would affect about 38 and 40 landowners, respectively. The increase in the number of affected landowners is a substantial disadvantage of Alternative 12 West and 12 East.

Other Pipeline Alignments and Comments Considered

In response to our supplemental scoping letter sent to the newly affected landowners, several landowners along the Alternative 12 West alignment submitted comments indicating that they were opposed to the Project and identified concerns related to tree clearing and restoration; impacts on hydrology, property values, future development; and safety. Section 4 describes how these types of impacts are minimized or mitigated during pipeline construction and restoration of the right-of-way. Nicole Chapin and Holly Lambert submitted comments and indicated that they already have a pipeline on their property and the installation of Alternative 12 West would further encumber and limit the use of their property.

In comments submitted on September 16, 2016, Ms. Nesbitt suggested we evaluate an alternative along Levitt Hill Road, which crosses the northwestern portion of her property. An alignment along Levitt Hill Road would cross a comparable amount of forestland to that of the proposed route and would cross about 1.4 miles of the Lake Catalpa Swamp Natural Heritage Area. In addition, due to steep slopes adjacent to Levitt Hill Road (north of Crow Road), the route would likely require a greater offset from Levitt Hill Road, which would affect more wetlands in the headwaters of a tributary to Leonard Creek. Moreover, to reach Levitt Hill Road, the alignment would require crossing through residential properties near the intersection of Plattsburg Road and Nesbitt Road and would cross open water ponds and a tributary to Leonard Creek. For these reasons, we do not believe an alignment adjacent to Levitt Hill Road would provide a significant environmental advantage to the proposed route and we are not considering it further.

Walter and Robyn Kochan submitted several comments and suggested following the existing Energy Transfer pipeline right-of-way located west of State Route 309 or paralleling State Route 309. As described above, we considered opportunities to collocate with existing pipeline rights-of-way, but dismissed them from further consideration due to residential development. In addition, an alignment adjacent to the Energy Transfer right-of-way would require crossing two additional waterbodies south of Kunkle Alderson Road that would be avoided by the proposed route and Alternatives 12, 12 West, and 12 East. With respect to following an alignment that parallels State Route 309, we do not think that would be feasible or preferable from an environmental perspective because of several constraints. Leonard Creek runs parallel to the east side of State Route 309 and there are several single family residences and the Village Storage facility that are located immediately east of State Route 309. In addition, a manufactured home development, Barry Motors, the Kunkle Volunteer Fire Department, and a single family residence are located immediately west of State Route 309.

We received a comment from an individual that suggested three minor route adjustments near MP 30.0. The first route adjustment (Option 1) would originate on the Nesbitt property south of Whitelock Creek. Option 1 would deviate from the proposed route and proceed north along an alignment about 0.3 mile west of the proposed route. In this area, the proposed route is sited along the Nesbitt property's eastern boundary. Option 1 would move the centerline away from the property line and in closer proximity to residences located adjacent to Levitt Hill Road and State Highway 292. The second route adjustment (Option 2) would deviate from Alternative 12 West and proceed north across Monkey Hollow Road and State Highway 292 before turning and proceeding northeast and north where it would rejoin the proposed route. This alignment would place the pipeline centerline within 100 feet of residences located on Monkey Hollow Road, State Highway 292, and Pine Ridge Road. The third route adjustment (Option 3) would deviate from the proposed route 0.3 mile north of State Highway 292 and proceed west for 0.2 mile before turning and proceeding north where it would rejoin the proposed route. In this area, the proposed route is sited along a property line and an existing pipeline right-of-way. Option 3 would cross through the middle of the property and would not provide the advantage of collocating with existing rights-of-way. We do not believe that any of these options would provide an environmental benefit and are not considering them further.

We received comments from Robert and Susan Stanski and Mary and Larry Wilson suggesting that the alignment of Alternative 12 West should be moved to the south end of their property closer to Levitt Hill Road. In addition, Gloria Thomas and Jean Stromick submitted comments suggesting that the alignment of Alternative 12 West should follow their property line to avoid bisecting the property. Based on these comments, we identified the Levitt Hill Road Deviation (see figure 3.3.2-7B).

The Levitt Hill Road Deviation would be about the same length as the corresponding segment of Alternative 12 West. The Levitt Hill Road Deviation would cross slightly more forestland than the corresponding segment of Alternative 12 West; however, the Levitt Hill Road Deviation would address landowner concerns by following property boundaries, where practicable, and increasing the distance from residences located along Monkey Hollow Road.

Conclusion

Based on our review, we conclude that Alternative 12 and Alternative 12 East would not provide a significant environmental advantage over the proposed route and have removed these from further consideration. However, we conclude that both the proposed route and Alternative 12 West are environmentally acceptable, with each route having its advantages and disadvantages, trading increased impacts in certain categories for less impacts in other categories. 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.

Alternative 12 West would provide certain environmental benefits compared to the proposed route, such as reducing the amount of forestland and forested wetland crossings; avoiding the Perrins Marsh Natural Heritage Area; and reducing the crossing length of the Nesbitt Estate Rural Historic District. In contrast, the proposed route is shorter, would affect less land during construction, and reduce the number of landowners affected. Additionally, Transco modified its original pipeline alignment across the Nesbitt property to avoid bisecting her tract by following her eastern property boundary and to reduce the amount of forested wetlands impacted.

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. In balancing impacts on different resources by the proposed route and the alternative, we conclude that Alternative 12 West would not provide a significant environmental advantage over the proposed route; therefore, we are not recommending Alternative 12 West be incorporated into the proposed route.

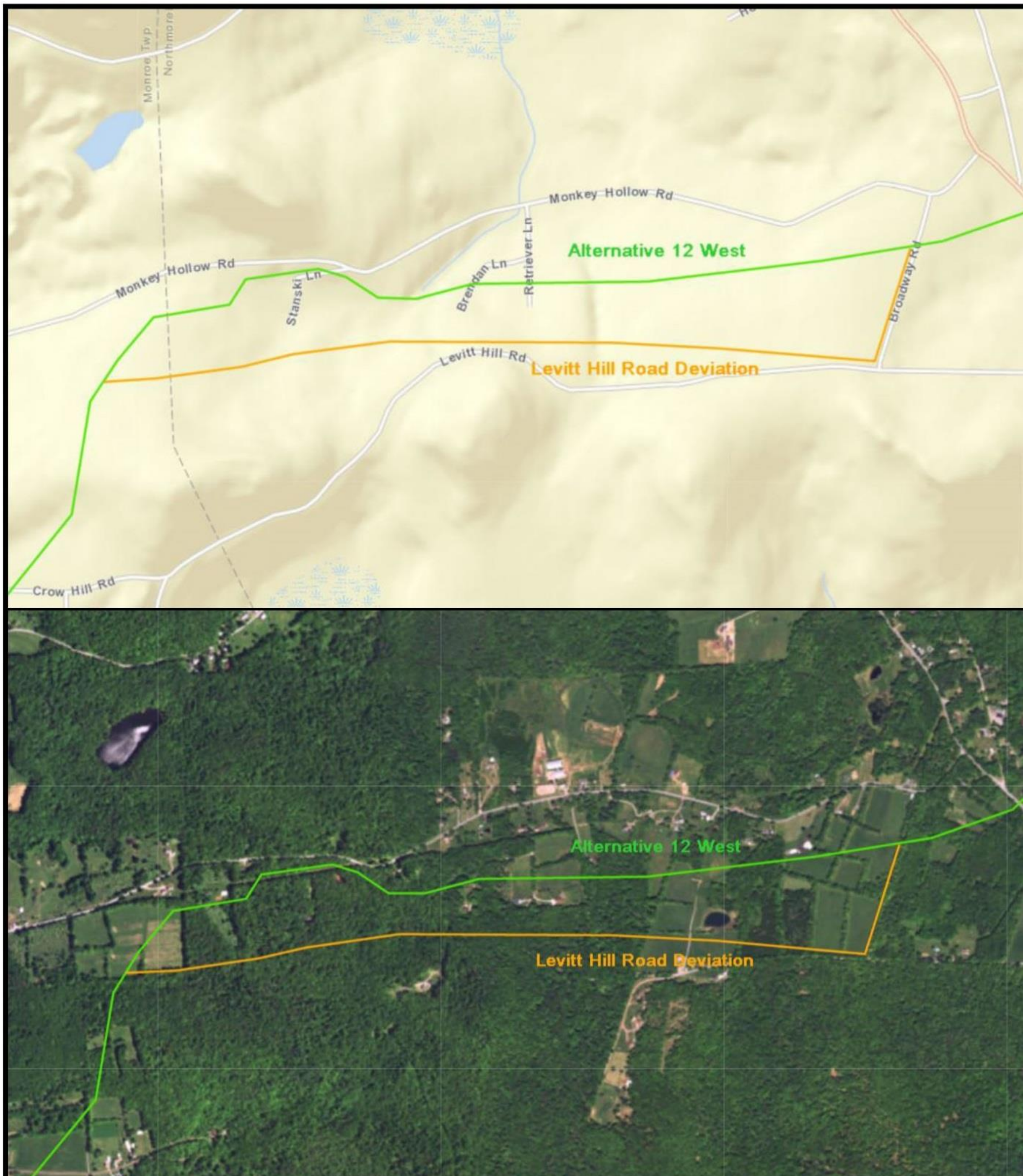

Figure 3.3.2-7B
Atlantic Sunrise Project
CPL North Alternative 12 West Levitt Hill Road Deviation

CPL South Minor Alternative Routes

CPL South Alternatives 16, 16A, and 16B

CPL South Alternative 16 (Alternative 16) was developed at the request of the PGC to change the location of the Appalachian National Scenic Trail (Appalachian Trail) crossing in State Game Land (SGL) 211. In its comments on the draft EIS, the U.S. Department of the Interior (DOI) requested that we evaluate an alternative that is collocated on the south side of PA 443 (Alternative 16A) to minimize impacts on forestland clearing adjacent to the trail. The Appalachian Trail Conservancy filed comments and requested that we evaluate its Open Field Alternative that would cross the Appalachian Trail on land owned by the National Park Service (NPS) in an open field adjacent to the proposed route (Alternative 16B). The DOI and Appalachian Trail Conservancy also asked that we provide additional information on CPL South Alternative 1 (see figure 3.3.2-8).

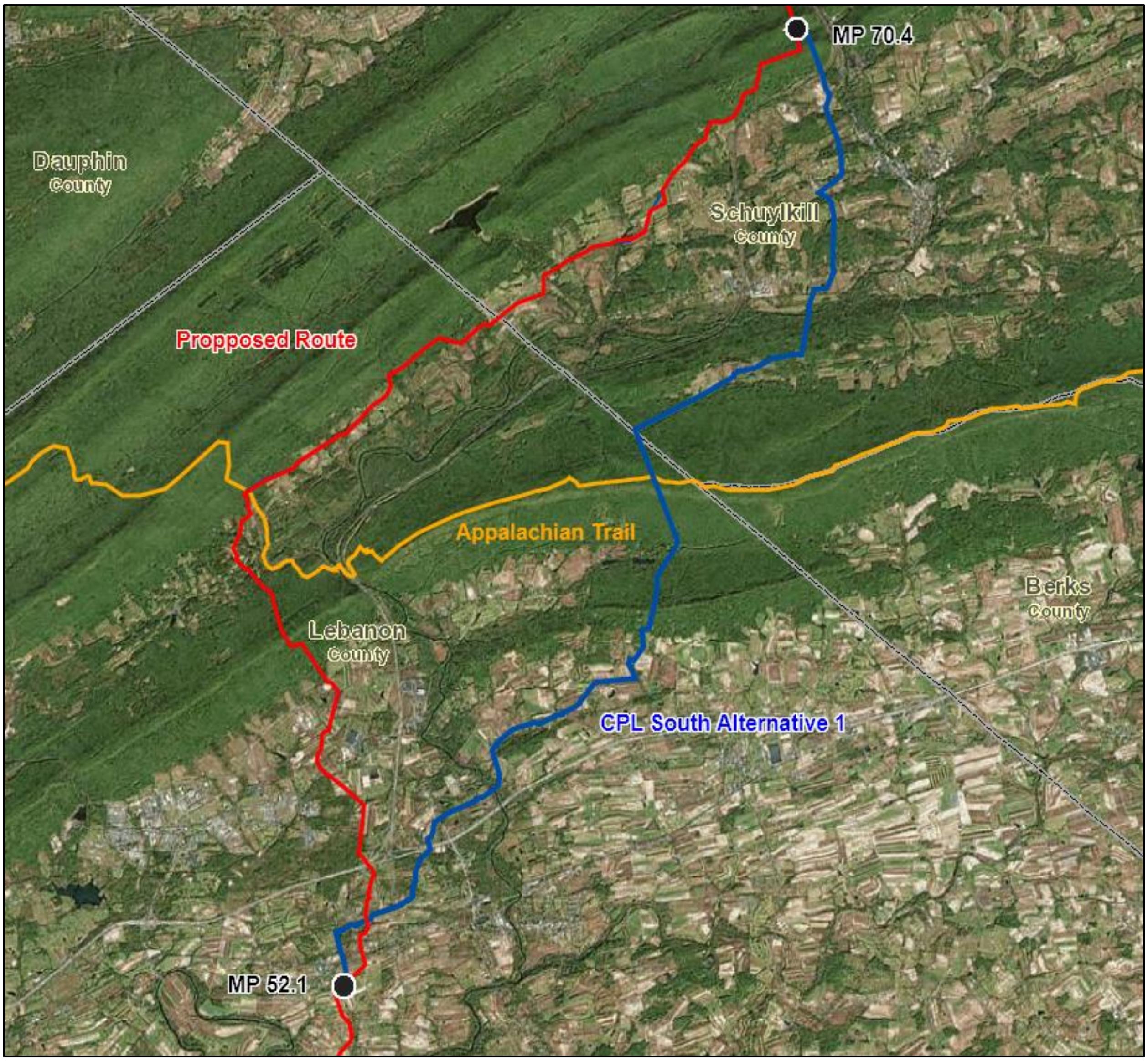

Figure 3.3.2-8 CPL South Alternative 1

During the pre-filing process, Transco evaluated CPL South Alternative 1, but dismissed it from further consideration because it would cross more forestland (1.4 miles), waterbodies (one), and wetlands (seven) than the corresponding segment of the proposed route. We reviewed this alternative during the pre-filing period and concur that it does not provide an environmental advantage over the proposed route.

Alternative 16 deviates from the proposed route at MP 59.3 and proceeds east, crossing Green Point School Road. After crossing Green Point School Road, Alternative 16 enters Swatara State Park and crosses PA 443. Alternative 16 then turns and proceeds northeast and then north across forestland, the Appalachian Trail, an unnamed tributary to Trout Run, and PA 443 (again). After this crossing of PA 443, Alternative 16 exits Swatara State Park and proceeds northeast across agricultural land before rejoining the proposed route at MP M-0200 0.6.

Alternative 16A follows the same alignment as Alternative 16 to the east side of PA 443. At this point, Alternative 16A turns and proceeds north adjacent to PA 443 for 0.3 mile where it rejoins the Alternative 16 alignment. It then follows the same alignment as Alternative 16 to MP M-0200 0.6. Alternative 16B follows the same alignment as the proposed route from MPs 59.3 to MP M-0176 0.3 and then turns and proceeds northeast across the Appalachian Trail in an open field before rejoining the proposed route at MP M-0200 0.6 (see figure 3.3.2-9).

An environmental comparison of Alternatives 16, 16A, and 16B to the corresponding segment of the proposed route is provided in table 3.3.2-7.

TABLE 3.3.2-7

Comparison of the CPL South Alternatives 16, 16A, and 16B to the Corresponding Segment of the Proposed Route for the Atlantic Sunrise Project

Environmental/Engineering Factor	Unit	CPL South Alternative 16	CPL South Alternative 16A	CPL South Alternative 16B	Proposed Route
Length	miles	1.2	1.1	1.0	1.1
Length adjacent to existing right-of-way	miles	0	0.3	0.0	0
Construction right-of-way [a]	acres	14.6	13.3	12.1	13.3
Forestland crossed	miles	0.5	0.4	0.3	0.5
Agricultural land crossed	miles	0.6	0.6	0.6	0.6
State land crossing	miles	0.6	0.6	0.0	0.6
NPS land crossed	miles	0	0	0.2	0
Residences within 100 feet of the pipeline centerline	no.	0	0	0	0
Waterbodies crossed	no.	2	2	1	1
Wetlands crossed	no. (feet)	0 (0)	0 (0)	(0)	0 (0)
Road crossings	no.	6	6	1	1

[a] Based on a 100-foot-wide construction right-of-way.

Transco would cross the Appalachian Trail along the proposed route using the conventional bore crossing method to minimize tree clearing and visual impacts adjacent to the trail. Assuming a similar crossing method would be used at the Appalachian Trail crossing location along Alternatives 16 and 16A, the impacts of the three routes on the trail would be comparable. Alternative 16 would cross the trail in an open field, which would not require specialized construction techniques to minimize visual impacts at the trail crossing. However, the Appalachian Trail Conservancy suggested that trenchless construction techniques be used to cross forestland northeast of the trail crossing along Alternative 16B to reduce tree clearing and minimize visual impacts.

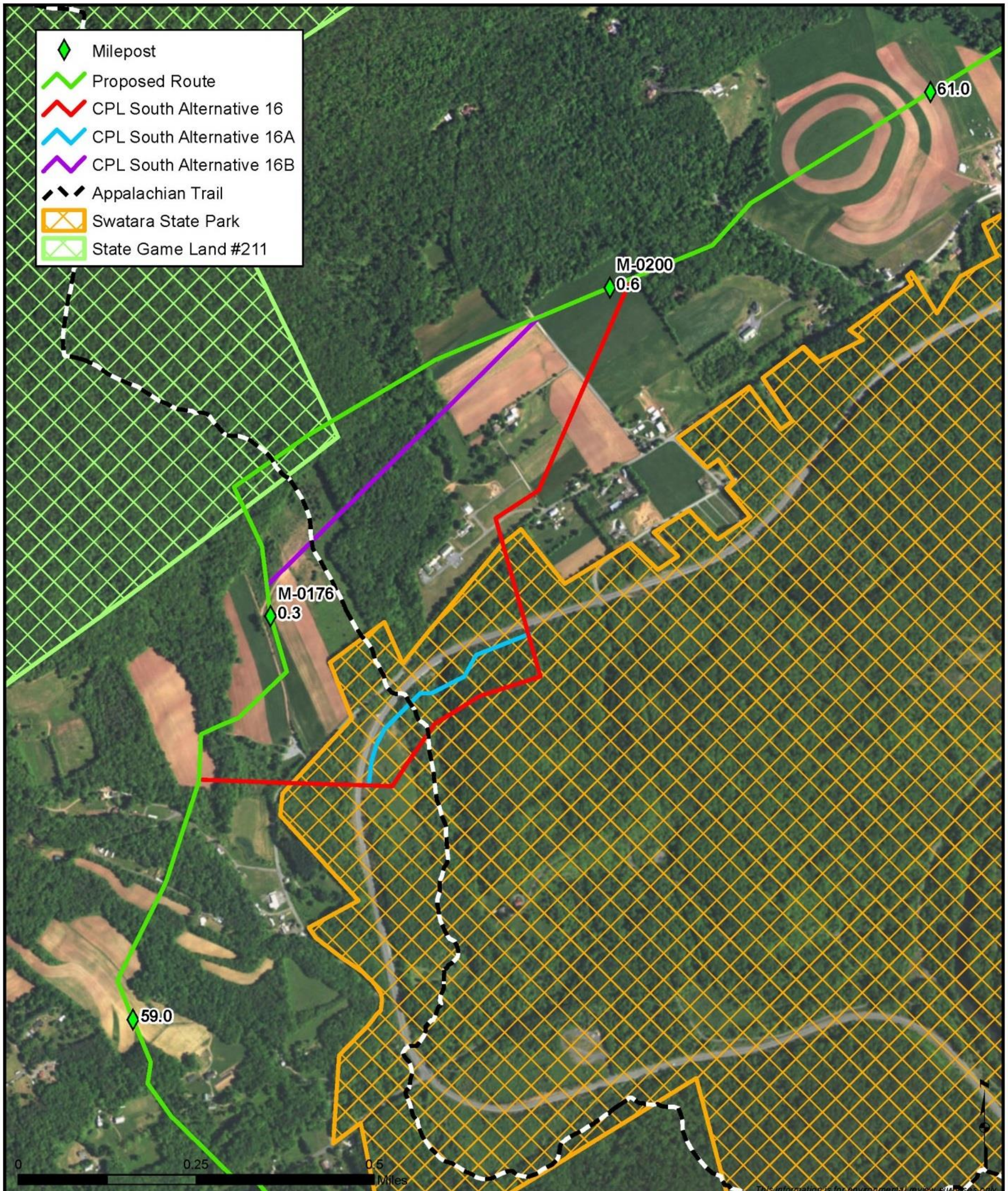

Figure 3.3.2-9
Atlantic Sunrise Project
CPL South Alternatives 16, 16A, and 16B

All four routes are about the same length. Alternative 16A would be collocated for a greater percentage of its length compared to the other routes. However, there are steep side slopes where an unnamed tributary to Trout Run crosses under PA 443, which would require an alignment further from PA 443 in this area to avoid the steep side slopes and culvert at the waterbody crossing. Alternatives 16 and 16A would cross one more waterbody and five more roads than Alternative 16B and the corresponding segment of the proposed route, which would add to the overall construction footprint as a result of the need for ATWS.

Alternatives 16 and 16A and the proposed route would all cross the same amount of state land (0.6 mile). While Alternative 16B would avoid crossing state land, it would cross land owned by the NPS, which would require obtaining a right-of-way permit from the NPS. Current law (30 USC 185) specifically excludes the NPS from granting right-of-way permits. Right-of-way permits may be issued for activities specifically authorized by Congress and only if there is no practicable alternative to the use of NPS lands. Because Alternatives 16 and 16A do not offer an environmental advantage and because the proposed route is a practicable alternative that avoids crossing NPS land, we conclude that Alternatives 16, 16A, and 16B are not preferable to the proposed route, and we are not recommending them.

CPL South Alternative 18

CPL South Alternative 18 (Alternative 18) was identified in response to comments submitted by the Martic Township Supervisors (Supervisors) and other parties. The Supervisors recommended that the pipeline should be aligned within existing utility rights-of-way to the greatest extent possible and suggested that it should not be within or adjacent to any residential development within Martic Township that has only one means of ingress and egress.

Alternative 18 deviates from the proposed route at MP 2.4 and proceeds 2.5 miles northwest across primarily agricultural land and forestland. At this point, it joins and follows an overhead transmission line right-of-way north for about 1.7 miles across forestland. It then turns and proceeds northwest and crosses Marticville Road, the Enola Low Grade Trail, Pequea Creek, and agricultural land before rejoining the proposed route at MP 8.6 (see figure 3.3.2-10).

An environmental comparison of Alternative 18 to the corresponding segment of the proposed route is provided in table 3.3.2-8.

TABLE 3.3.2-8

Comparison of the CPL South Alternative 18 to the Corresponding Segment of the Proposed Route of the Atlantic Sunrise Project

Environmental/Engineering Factor	Unit	CPL South Alternative 18	Proposed Route
Length	miles	5.7	6.2
Length adjacent to existing right-of-way	miles (percent)	1.7 (30)	0.4 (6)
Construction right-of-way [a]	acres	69.1	75.2
Forestland crossed	miles	2.3	1.6
Forest interior crossed	miles	0.6	0.3
Agricultural land crossed	miles	2.6	4.1
Residences within 100 feet of the pipeline centerline	no.	1	0
Waterbodies crossed	no.	8	5
Wetlands crossed	no. (feet)	0 (0)	0 (0)
Road crossings	no.	6	9
Enola low grade trail crossings	no.	1	1

[a] Based on a 100-foot-wide construction right-of-way.

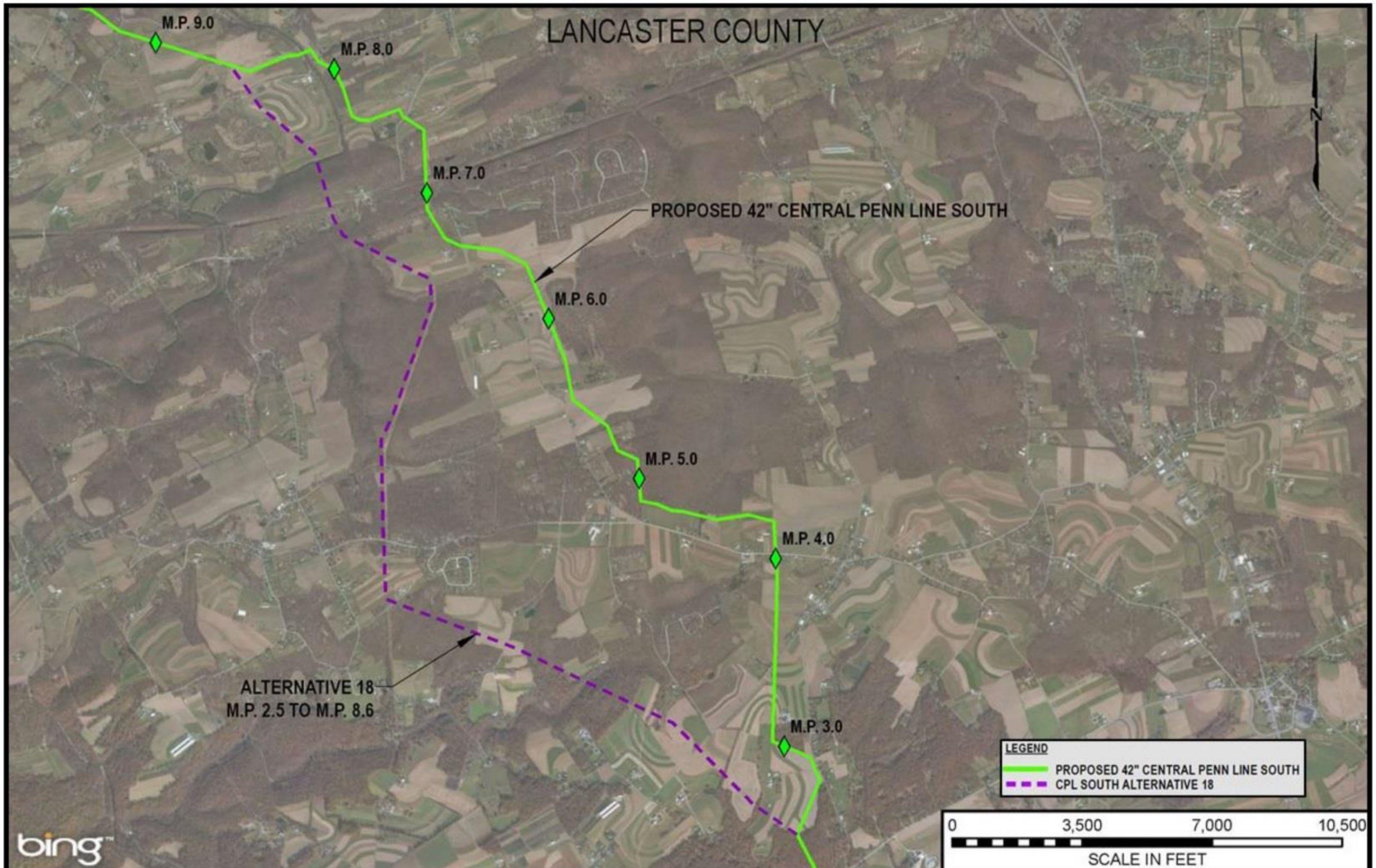

Figure 3.3.2-10
Atlantic Sunrise Project
CPL South Alternative 18

Alternative 18 is 0.5 mile shorter, follows existing rights-of-way for a greater distance (1.3 miles) and would disturb 6.1 acres less land during construction than the corresponding segment of the proposed route. While collocation is generally considered advantageous, Alternative 18 would be collocated with a transmission line in an area that crosses steep slopes and side-slopes. Construction in these areas often requires additional workspace to create a safe and level surface for construction activities. In addition, steep slopes are more susceptible to erosion. A disadvantage of Alternative 18 is that it would cross more forestland (0.7 mile) and forest interior (0.3 mile) than the proposed route. Forestland, and in particular forest interior, provides important habitat for many plant and animal species including large mammals, wildflowers, wood frogs, and bird species.

Another disadvantage of Alternative 18 is that it would cross three more waterbodies than the proposed route. One of the waterbodies that would be crossed by both the alternative and the proposed route is Tucquan Creek. Tucquan Creek was designated by Pennsylvania as a scenic river in December 1998 and supports a high-quality cold water fishery. The proposed route would cross Tucquan Creek near the headwater of the creek in an area surrounded by agricultural land. In contrast, Alternative 18 would cross Tucquan Creek and two tributaries further downstream in an area that is heavily forested. Tree clearing along the stream banks could result in a loss of streambank habitat, which could contribute to impacts on trout and other fish. Moreover, Alternative 18 would require crossing Martock Run (a tributary of Pequea Creek) twice in an area that is densely forested, while the proposed route would cross Martock Run near its headwaters in an area surrounded by agricultural land.

With respect to the specific siting recommendations of the Supervisors, the proposed route would not cross the only point of ingress and egress to the Lakewood Estates Subdivision. The pipeline route crosses Lakewood Drive; access to the subdivision could occur along Lakewood Drive or Oak Glen Drive.

Because the environmental disadvantages of Alternative 18 outweigh the environmental advantages, we have eliminated it from further consideration.

CPL South Alternatives 21, 22, and 23

Based on comments from William and Delores Smith, John Timothy Gross, Dennis and Beverly Schaeffer, and Brian and Deborah Martin regarding the proximity of the proposed pipeline to existing residential structures, we are evaluating three alternatives along the CPL South route (CPL South Alternatives 21, 22, and 23) between MPs 8.4 and 10.2 of the proposed route (see figure 3.3.2-11).

CPL South Alternative 21 (Alternative 21) follows the same alignment as the proposed route from MPs 8.4 to 9.2. At MP 9.2, Alternative 21 turns and proceeds west across agricultural land and between a residential property and the Life Counseling Ministries (LCM) facility on the east side of Meadow Lane. After crossing Meadow Lane, Alternative 21 continues west-northwest, crossing primarily agricultural land and forestland before rejoining the proposed route at MP 10.2 on the south side of River Corner Road.

CPL South Alternative 22 (Alternative 22) deviates from the proposed route at MP 8.4 and proceeds north-northwest across agricultural land and forestland for about 0.8 mile crossing Pequea Creek Road and Sickmans Mill Road. After crossing Sickmans Mill Road, Alternative 22 proceeds north for about 1.0 mile and then west across forestland, Hilltop Drive, and agricultural land before rejoining the proposed route at MP 10.2.

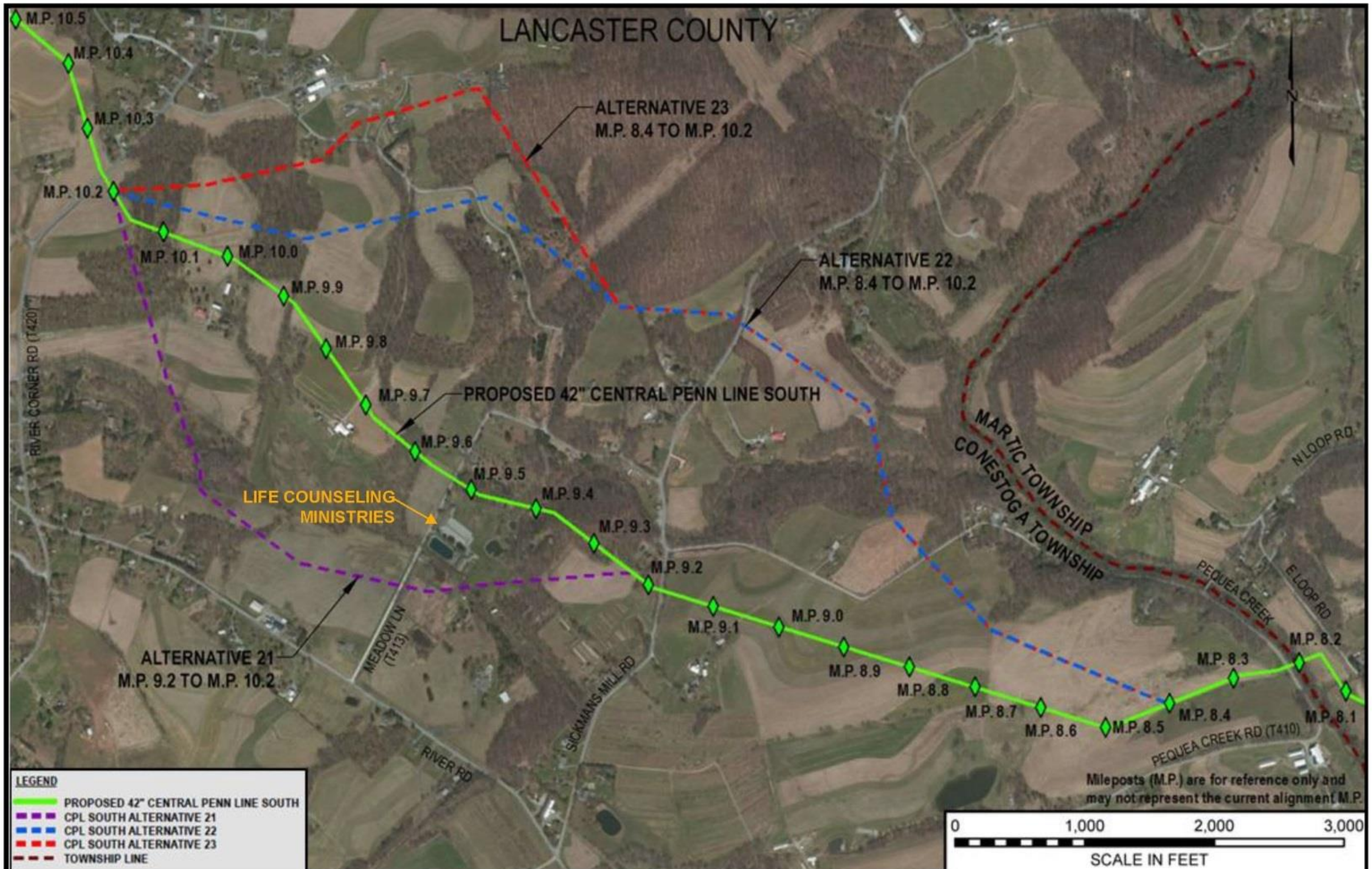

Figure 3.3.2-11
Atlantic Sunrise Project
CPL South Alternatives 21, 22, and 23

CPL South Alternative 23 (Alternative 23) follows the same alignment as Alternative 22 to Sickmans Mill Road. After crossing Sickmans Mill Road, Alternative 23 deviates from the Alternative 22 alignment and proceeds north for about 0.4 mile across forestland, a miniature railroad track, and the parking area of the Ambush Outdoor Adventure Park. From there, the alternative proceeds west-southwest for about 0.5 mile, crossing the miniature railroad track a second time, residential property, agricultural land, and forestland before rejoining the proposed route at MP 10.2.

An environmental comparison of Alternatives 21, 22, and 23 to the corresponding segment of the proposed route is provided in table 3.3.2-9.

TABLE 3.3.2-9

Comparison of the CPL South Alternatives 21, 22, and 23 to the Corresponding Segment of the Proposed Route for the Atlantic Sunrise Project

Environmental/Engineering Factor	Unit	CPL South Alternative 21	CPL South Alternative 22	CPL South Alternative 23	Proposed Route
Length	miles	2.0	1.9	2.0	1.8
Length adjacent to existing right-of-way	miles	0.0	0.0	0.0	0.0
Construction right-of-way [a]	acres	24.2	23.0	24.2	22.0
Forestland crossed	miles	0.4	0.6	0.6	0.5
Agricultural land crossed	miles	1.5	1.3	1.0	1.3
Residences within 100 feet of the pipeline centerline	no.	0	0	1	0
Residences within 200 feet of the pipeline centerline	no.	1	0	4	5
Distance to LCM property (length crossed) Length	feet	142 (531)	2,337 (0)	2,337 (0)	458 (324[b])
Waterbodies crossed	no.	1	1	1	1
Wetlands crossed	no. (feet)	1 (321)	0 (0)	0 (0)	0 (0)
Road crossings	no.	2	3	3	2
Railroad crossings	no.	0	0	2	0

a Based on a 100-foot-wide construction right-of-way.
b Length crossed associated with ATWS. Pipeline centerline does not cross property.

The proposed route is the shortest (1.8 miles), followed by Alternative 22 (1.9 miles), and Alternatives 21 and 23 (2.0 miles). Although Alternative 21 crosses the least amount of forestland (0.4 mile), it would affect 321 feet of a National Wetlands Inventory (NWI)-mapped emergent wetland located northwest of Meadow Lane. The proposed route, in contrast, crosses 0.1 mile more forestland, but completely avoids wetlands. Alternatives 22 and 23 would also avoid wetlands, but crosses 0.1 mile more forestland than the proposed route.

Alternative 21 crosses the most agricultural land (1.5 miles), followed by Alternative 22 and the proposed route (1.3 miles), and Alternative 23 (1.0 mile). We received comments from David Pomper (representing Ms. Follin Smith, a landowner along Alternatives 22 and 23) and Megan and Blair Mohn indicating that Alternatives 22 and 23 would cross certified organic cropland and that construction and operation activities (particularly pesticide use for right-of-way maintenance) would adversely affect the organic certification of the properties. The USDA requires anyone who produces, processes, or handles organic agricultural products to be certified by a USDA-accredited certifier in order to sell, label, or represent their products as organic. To become certified, an organic producer, processer, or handler must develop, implement, and maintain an organic system plan (Pennsylvania Certified Organic, 2015). All farmland must be free of prohibited materials for at least 3 years prior to harvest of an organic crop. Prohibited materials include any fertilizer or composted plant and animal matter that contains a synthetic substance not included on the national list of synthetic substances allowed for use in organic crop production and sewage sludge (7 CFR 205). Transco would implement the measures contained in its

Draft Agricultural and Construction Monitoring Plan to minimize impacts on agricultural land. These include measures to maintain organic certification of agricultural land, which would mitigate the effect of the Project on the certification of organic farms.

The proposed route would be within 200 feet of the most residences (five) followed by Alternative 23 (four), and Alternative 21 (one). No existing residences are within 200 feet of Alternative 22. Residences in close proximity to pipeline construction activities would be exposed to additional noise and dust and could potentially encounter access issues throughout the duration of construction (see sections 4.8.3.1 and 4.11). One of the residences along the proposed route that could encounter access issues is the residence of John Gross. The proposed pipeline would be adjacent to his driveway for a distance of about 490 feet and would require ATWS that would extend across the width of his driveway to cross Meadow Lane and an unnamed tributary of Pequea Creek.

Another disadvantage of the proposed route and Alternative 21 is that they would require construction near the LCM facility located on Meadow Lane. LCM hosts events and provides lodging and financial, marriage, and personal counseling services on its 19-acre campus. The proposed route would cross about 458 feet north of the main LCM building and would require siting some ATWS on the north end of the property to complete the crossing of Meadow Lane and an unnamed tributary of Pequea Creek. In addition, a 2-acre contractor staging area would be directly across the street from the LCM facility. Alternative 21 would cross about 531 feet of the property and would pass within 142 feet of the main LCM building. Based on the distance of the proposed route and Alternative 21, neither route would have a direct effect on the LCM facility but both routes could affect uses of the property during construction.

Of the routes evaluated, we conclude that Alternative 22 would provide the greatest separation distance from existing residential structures while not significantly increasing effects on other environmental features. Transco would implement measures to minimize impacts on agricultural land, including measures to maintain organic certification of agricultural land affected during construction and operation.

In the draft EIS, we recommended that Transco incorporate Alternative 22 into the proposed route. Transco filed supplemental information in June 2016 and indicated that it had incorporated Alternative 22 into the proposed route. Accordingly, this routing and the associated environmental impacts are evaluated in section 4 as a part of the proposed action.

<u>CPL South Alternatives 24A, 24B, 24C, and 24D</u>

CPL South Alternatives 24A (Alternative 24A), 24B (Alternative 24B), and 24C (Alternative 24C) were identified by Dr. Linda Quodomine to avoid crossing her existing equine veterinary clinic and pastures and to increase the distance of the pipeline from residences (see figure 3.3.2-12). Over 400 letters have been filed in support of an alternative that avoids Dr. Quodomine's equine facility.

In addition, we received comments from Connie Giger suggesting we evaluate two alternative alignments that avoid her property near MP 102.6. Connie Giger indicated that she had concerns about the Project affecting a pond, springs, and iron ore mines on her property. The first alternative would deviate from the proposed route at MP 102.0 and proceed northwest about 0.7 mile before rejoining the proposed route at MP 102.7. The alignment would be adjacent to her western property boundary, about 600 feet west of the proposed route. The alternative alignment would cross more forestland than the corresponding segment of the proposed route and would be located within 100 feet of a residence near MP 102.0.

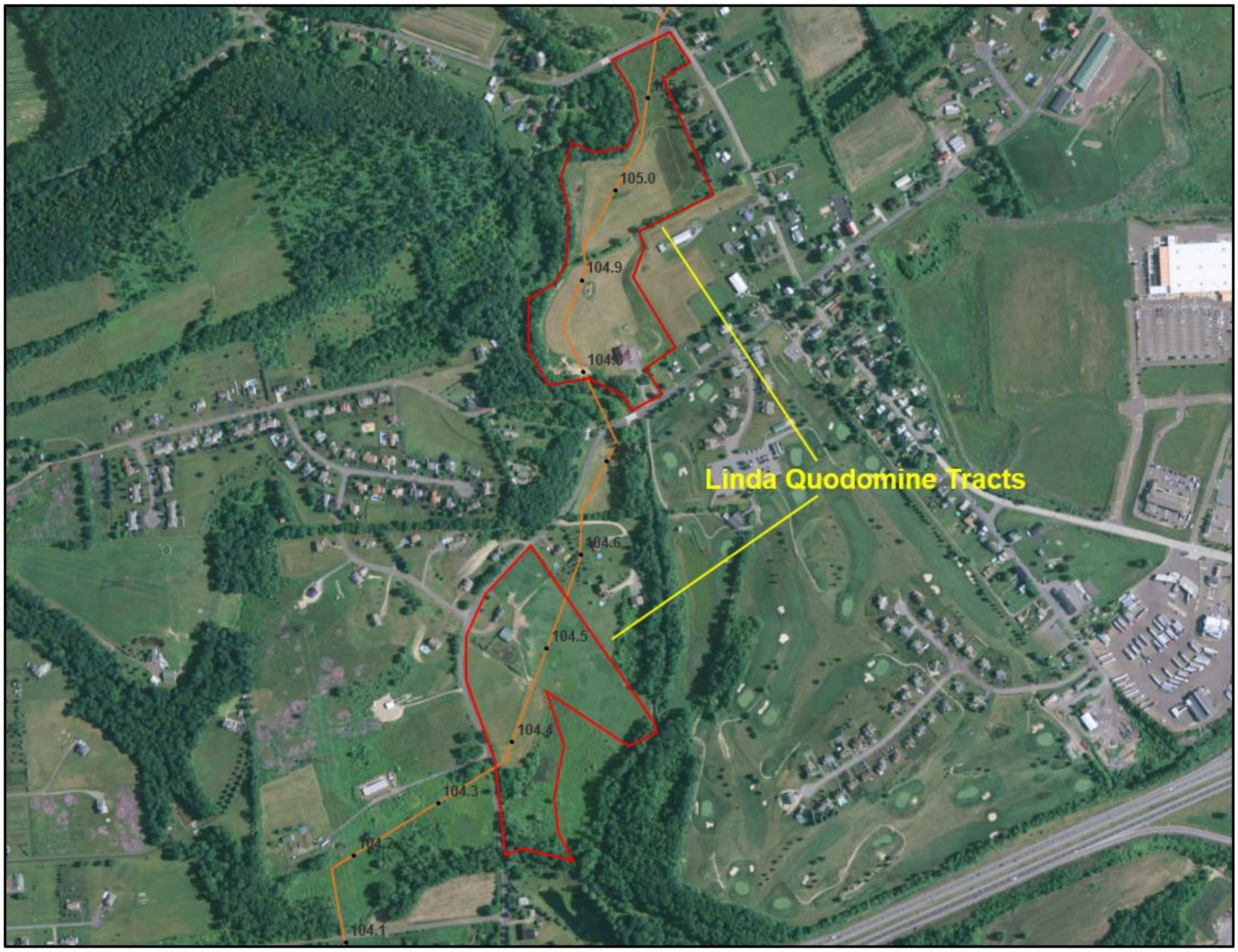

Figure 3.3.2-12 Dr. Linda Quodomine Tracts Crossed by the Atlantic Sunrise Project

The second alternative would deviate from the proposed route at MP 103.9 and proceed southeast toward the intersection of Montour Boulevard and Rupert Drive. The suggested alignment does not rejoin the proposed route, but from this location the alternative would have to cross Montour Boulevard and proceed southwest to rejoin the proposed route. The second alternative would not be collocated with existing rights-of-way, would increase forestland clearing by 2,500 feet, and would complicate construction due to steep slopes and the presence of Valley Road, Montour Run (a tributary to Fishing Creek), and existing railroad tracks located parallel to Montour Boulevard. For these reasons, the alternatives suggested by Connie Giger are not preferable to or do not provide an environmental advantage over the proposed route and are not evaluated further. An evaluation of Alternatives 24A, 24B, and 24C is provided below.

Alternative 24A follows the same alignment as the proposed route from MPs 102.1 to 103.5. From this point, the alternative turns east and proceeds 1.7 miles adjacent to an existing transmission line right-of-way across forestland, Pennsylvania Route 42 (PA 42), and agricultural land. The alternative deviates from the transmission line right-of-way and proceeds north across agricultural land, forestland, and Interstate 80. After crossing Interstate 80, Alternative 24 proceeds 1.6 miles north across primarily agricultural land and forestland before it rejoins the proposed route at MP M-0171 0.5.

Alternative 24B follows the same alignment as the proposed route from MPs 102.1 to 103.5. At this point, the alternative turns and proceeds 0.8 mile west adjacent to a transmission line right-of-way and crosses agricultural land and forestland. Alternative 24B then turns and proceeds north across agricultural land, Interstate 80, and Frozen Run. After crossing Frozen Run, the alternative turns and proceeds northeast and then east across primarily agricultural land and forestland before rejoining the proposed route at MP 5.0. It then follows the same alignment as the proposed route to MP M-0171 0.5.

We identified Alternative 24C to reduce the length of Alternative 24A. Alternative 24C deviates from the proposed route at MP 102.1 and joins an existing transmission line right-of-way, which it follows north for about 1.8 miles across agricultural land and forestland. It then joins and follows the same alignment as Alternative 24A to MP M-0171 0.5 (see figure 3.3.2-13). An environmental comparison of the CPL South Alternatives 24A, 24B, and 24C to the corresponding segment of the proposed route is provided in table 3.3.2-10.

TABLE 3.3.2-10

Comparison of the CPL South Alternatives 24A, 24B, and 24C to the Corresponding Segment of the Proposed Route for the Atlantic Sunrise Project

Environmental/Engineering Factor	Unit	CPL South Alternative 24A	CPL South Alternative 24B	CPL South Alternative 24C	Proposed Route
Length	miles	5.3	5.8	4.6	4.4
Length adjacent to existing right-of-way	miles (percent)	3.0 (57)	2.3 (39)	2.3 (50)	2.0 (45)
Construction right-of-way [a]	acres	64.2	70.3	55.8	53.3
Forestland crossed	miles	2.2	2.3	1.8	1.7
Agricultural land crossed	miles	2.4	3.2	2.3	2.4
Residences within 100 feet of the pipeline centerline	no.	0	1	0	3
Waterbodies crossed	no.	1	4	1	3
Wetlands crossed	no. (miles)	0 (0)	0 (0)	0 (0)	0 (0)
Road crossings	no.	9	6	9	7

[a] Based on a 100-foot-wide construction right-of-way.

Alternative 24B would be the longest (5.8 miles) followed by Alternative 24A (5.3 miles), Alternative 24C (4.6 miles), and the proposed route (4.4. miles). An advantage of Alternative 24A is that it follows existing rights-of-way for a greater percentage of its length (57 percent) than either Alternative 24B (50 percent), Alternative 24C (39 percent), or the proposed route (45 percent) and, along with Alternative 24C, would require the least amount of greenfield right-of-way.

The main advantages of Alternatives 24A, 24B, and 24C are that they avoid crossing the equine facility operated by Dr. Linda Quodomine and would be located farther from residences. Dr. Quodomine owns two properties within 0.2 mile of each other that are used in her veterinary practice. The proposed route would bisect the pastures of these two properties and limit her ability to house and treat animals. The alternatives would also avoid crossing within 100 feet of two residences located on James Avenue. The alignment of the proposed route in this area would require clearing mature landscape vegetation adjacent to these two residences.

Another advantage of Alternatives 24A and 24C are that they would reduce the number of waterbodies crossed. Alternative 24B would cross the most waterbodies (four), followed by the proposed route (three), and Alternatives 24A and 24C (one). David and Lucille Ruckle provided comments and expressed concern that Alternatives 24B and 24C would cross Fishing Creek watershed in an area near a municipal surface water intake. Alternatives 24B and 24C would not cross any waterbodies located within the Fishing Creek watershed. Transco would implement its Procedures and Spill Plan to avoid or minimize effects associated with spills or leaks of hazardous liquids. The measures include restricting refueling within 100 feet of wetlands and waterbodies, maintaining spill response equipment, and measures to contain, clean up, and properly dispose of contaminated material (see attachment 9 of Transco's ECP).

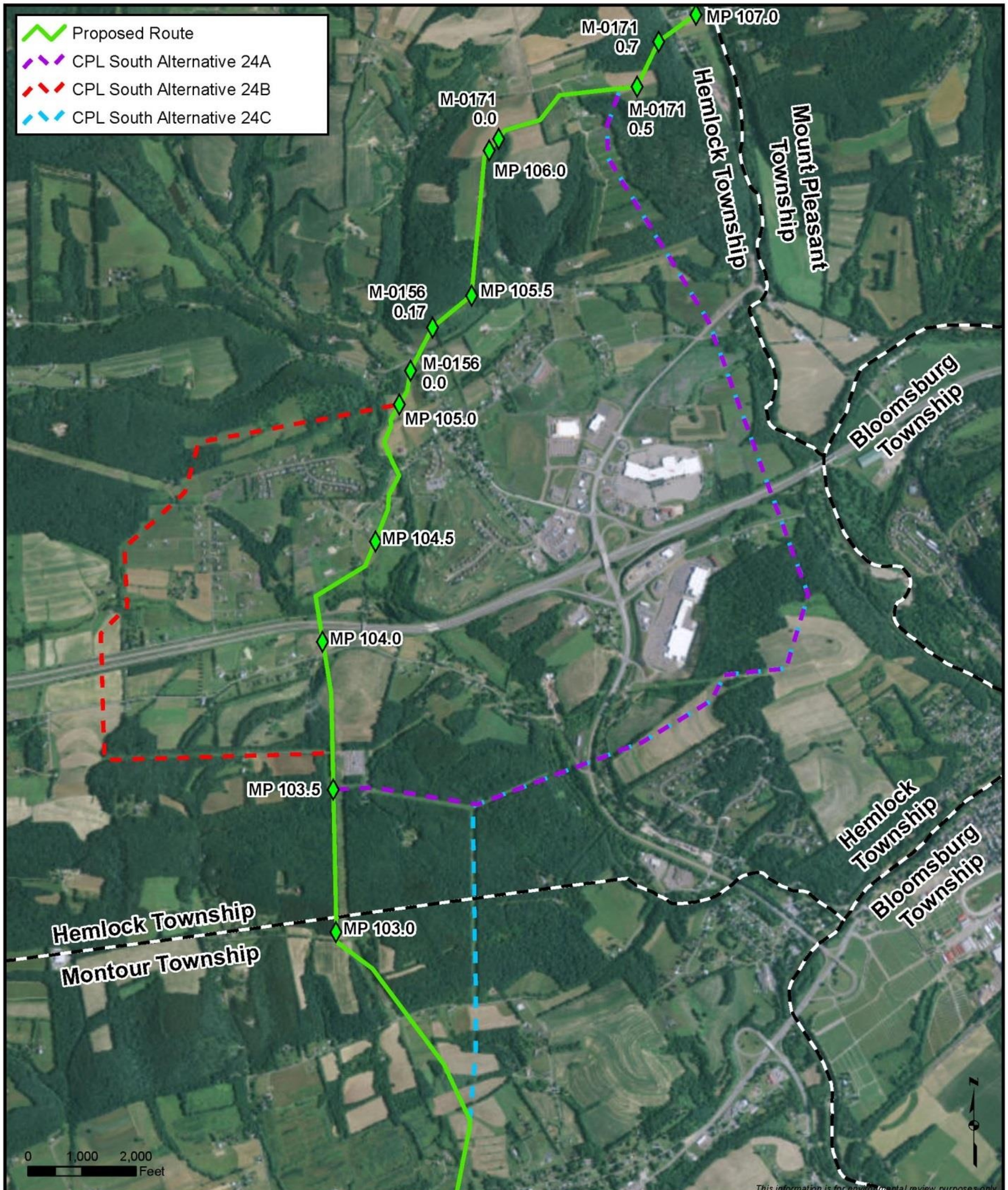

Figure 3.3.2-13
Atlantic Sunrise Project
CPL South Alternatives 24A, 24B, and 24C

In the draft EIS, we recommended that Transco incorporate Alternative 24C into the proposed route between MPs 102.1 and M-071 0.5. Following the issuance of the draft EIS, Transco provided additional information on the feasibility of Alternative 24C and identified a minor realignment (now called "Alternative 24D") to improve the crossing location of I-80 to avoid crossing through the middle of Kenneth Shannon's planned subdivision (see figure 3.3.2-14).

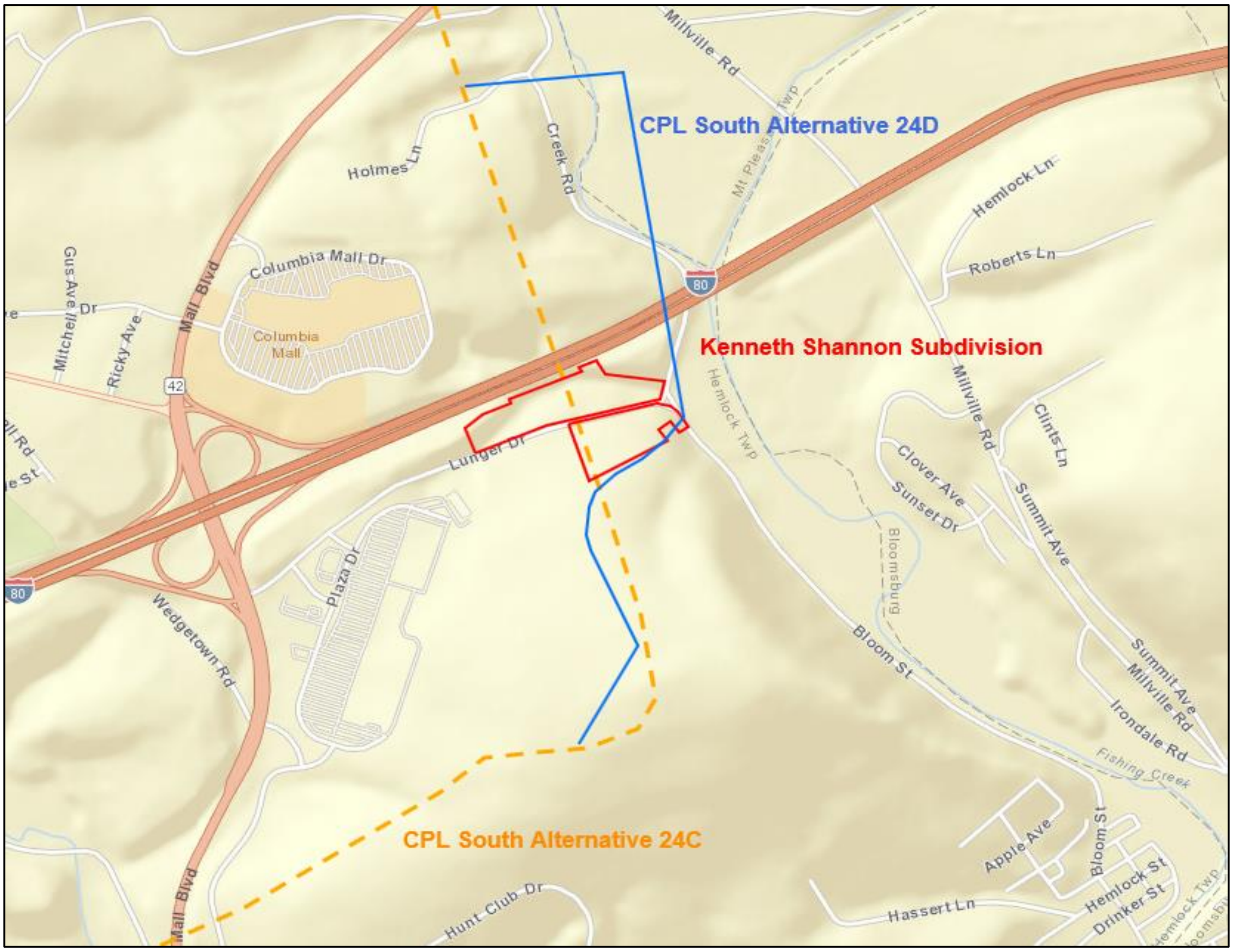

Figure 3.3.2-14 CPL South Alternative 24D

Transco completed geotechnical investigations and determined that crossing I-80 using the HDD technique is feasible and indicated in its August 2016 supplemental filing that it had incorporated Alternative 24D into the proposed route. We concur with the incorporation of Alternative 24D into the proposed route. Accordingly, this routing and the associated environmental impacts are evaluated in section 4 as part of the proposed action.

On November 14, 2016, Transco filed Route Deviation M-0431 to increase the separation distance of the proposed route (i.e., Alternative 24D) from a new residence currently under construction by Kenneth Shannon. On November 16, 2016, Kenneth Shannon filed comments and recommended that Route Deviation M-0431 be incorporated into the proposed route. On November 21, 2016, Transco filed a revised alignment of Route Deviation M-0431 based on field surveys, which would avoid affecting Kenneth Shannon's residence and a new landowner (see figure 3.3.2-15).

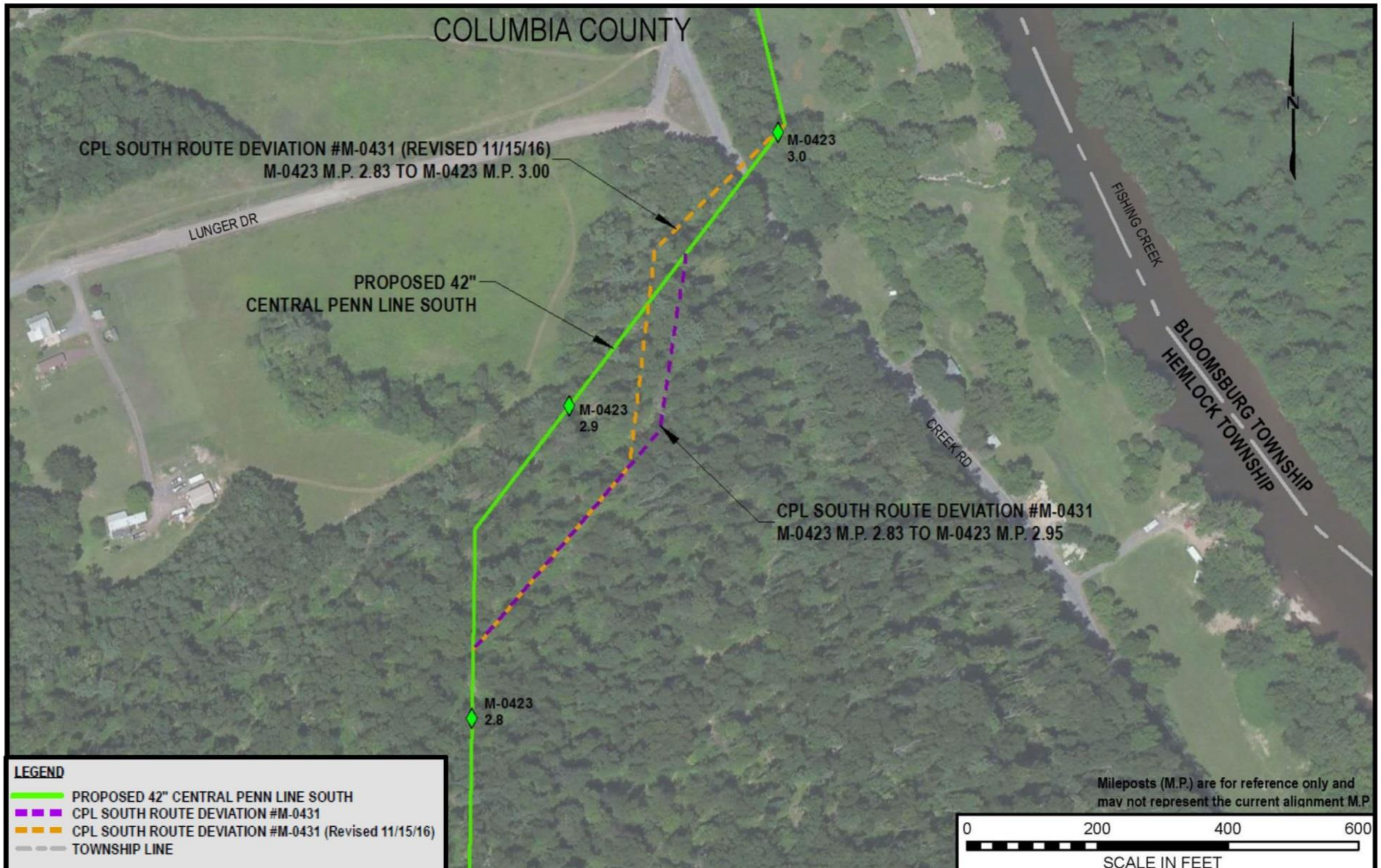

Figure 3.3.2-15
Atlantic Sunrise Project
CPL South Route Deviation M-0431

While Transco did not incorporate this route deviation into the proposed alignment as part of its November 21, 2016 supplemental filing, Transco indicated that it would be willing to incorporate the route deviation if recommended by us. Because Kenneth Shannon finds the alignment of Route Deviation M-0431 acceptable and because the alignment would avoid affecting a new landowner, **we recommend that:**

- **Prior to construction, Transco should file with the Secretary a revised alignment sheet that incorporates the revised Route Deviation M-0431 between MPs M-0423 2.8 and M-0423 3.0 into the proposed route.**

In her comments on the draft EIS, Connie Giger indicated that Alternative 24D would involve siting a 100- by 175-foot valve and a permanent access road in her farm field that she leases for crop production. Ms. Giger states that the rental of that property is a significant source of income for her and is used to pay her property taxes. She also indicated that water runoff and erosion is currently a serious problem in this area and expressed concern that erosion due to the valve pad would affect her property downhill. Both Connie and Jeff Giger expressed safety concerns that the valve site would be in an area of known erosion about 150 feet from the home of a family member. We identified three alternative valve locations (Options A, B, or C) that are level, would not affect agricultural land, would be accessible from public roads, and would meet DOT valve spacing requirements (see figure 3.3.2-16).

Figure 3.3.2-16 Alternative Valve Locations for Alternative 24D

Because the proposed valve site and permanent access road would take agricultural land out of production and to address landowner concerns, **we recommend that:**

- **<u>Prior to construction</u>, Transco should file with the Secretary a revised alignment sheet that incorporates the Option A, B, or C valve site location for Alternative 24D.**

CPL South Alternatives 25 and 26

CPL South Alternative 25 (Alternative 25) and CPL South Alternative 26 (Alternative 26) were identified by Garry and Bonnie Gross to avoid crossing Summit Drive, which is a cul-de-sac road that is only accessible from Chapel Drive (see figure 3.3.2-17).

Alternative 25 follows the same alignment as the proposed route from MPs 68.3 to 68.7. At this point, the alternative turns and proceeds south where it crosses Interstate 81. After crossing Interstate 81, Alternative 25 proceeds northeast for 0.5 mile across agricultural land and open land. From there, it crosses the Pine Grove Landfill for a distance of 2,897 feet. Based on interpretation of aerial photography, it appears that the alignment of the alternative crosses two separate containment cells of the landfill. After crossing the landfill, Alternative 25 turns north, crosses back to the north side of Interstate 81 and proceeds about 0.3 mile across forestland before rejoining the proposed route at MP 70.1.

Alternative 26 deviates from the proposed route at MP 68.3 and proceeds 0.7 mile north across forestland and SGL 211 before turning and proceeding 0.8 mile east across forestland to MP 69.5 where it rejoins the proposed route. It then follows the same alignment as the proposed route to MP 70.1.

An environmental comparison of the CPL South Alternatives 25 and 26 to the corresponding segment of the proposed route is provided in table 3.3.2-11.

TABLE 3.3.2-11

Comparison of the CPL South Alternatives 25 and 26 to the Corresponding Segment of the Proposed Route for the Atlantic Sunrise Project

Environmental/Engineering Factor	Unit	CPL South Alternative 25	CPL South Alternative 26	Proposed Route
Length	miles	2.3	2.0	1.8
Length Adjacent to Existing right-of-way	miles	0	0	0
Construction right-of-way [a]	acres	27.9	24.2	21.8
State Game Land Crossed	feet	0	2,200	0
Forestland Crossed	miles	0.8	2.0	1.5
Agricultural Land Crossed	miles	0.7	0.0	0.3
Residences Within 100 feet of the Pipeline Centerline	no.	0	0	0
Waterbodies Crossed	no.	0	0	0
Wetlands Crossed	no. (miles)	0 (0)	0 (0)	0 (0)
Landfills Crossed	no. (feet)	1 (2,897)	0 (0)	0 (0)
Road Crossings	no.	3	0	1

[a] Based on a 100-foot-wide construction right-of-way.

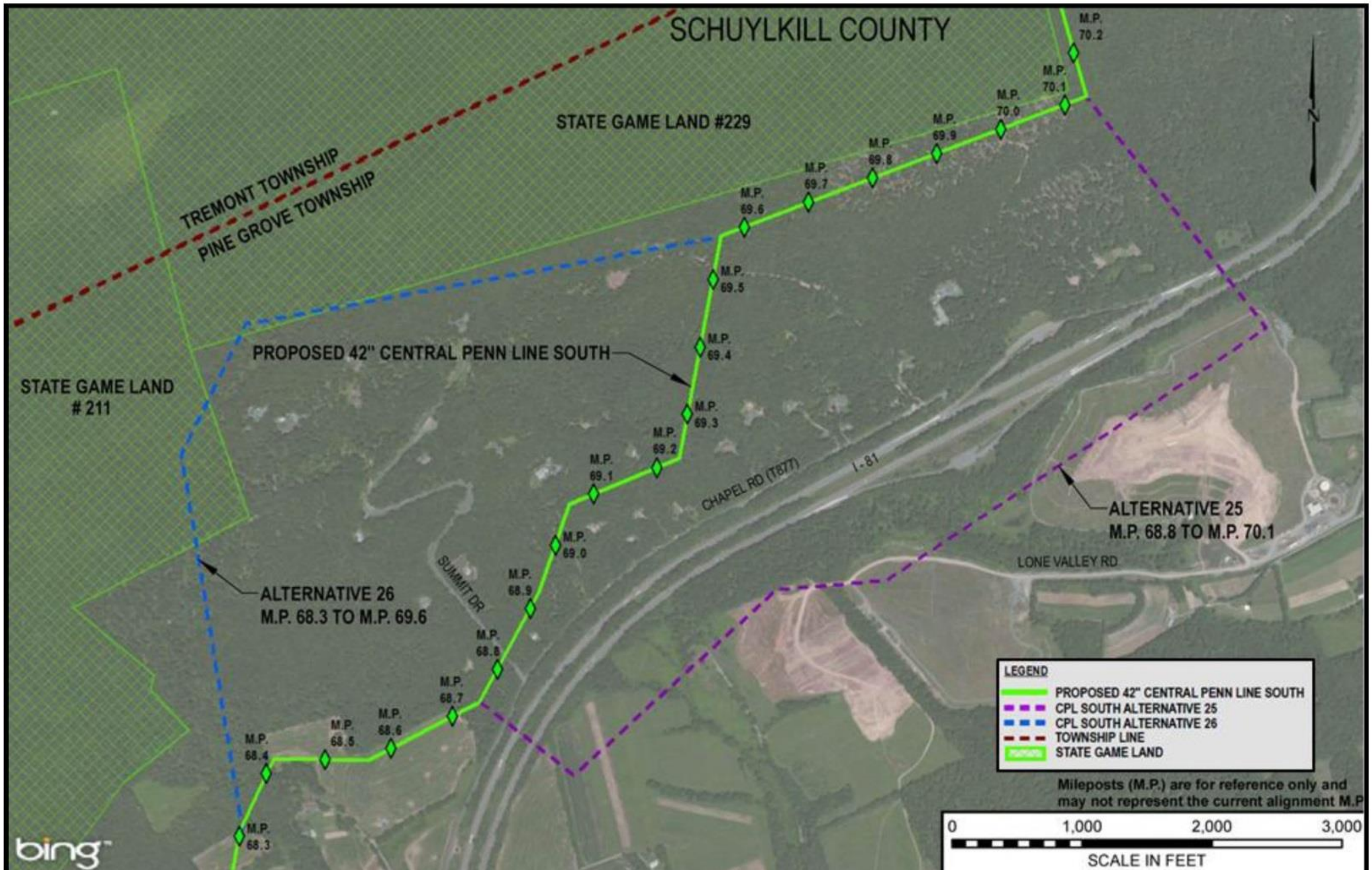

Figure 3.3.2-17
Atlantic Sunrise Project
CPL South Alternatives 25 and 26

None of the routes cross waterbodies or wetlands, or are within 100 feet of residences. However, the proposed route is the shortest (1.8 miles) of the three routes followed by Alternative 26 (2.0 miles) and Alternative 25 (2.3 miles), and thus would affect the least amount of land.

The primary advantage of the alternatives is that they would avoid crossing Summit Drive. The primary disadvantages of Alternative 25 are that it would require crossing Interstate 81 twice and would cross about 2,200 feet of the Pine Grove Landfill. When siting pipelines, landfills and areas adjacent to landfills are generally avoided to minimize the potential for affecting the containment cell, liner, and/or drainage systems associated with the landfill.

The main disadvantage of Alternative 26 is that it would cross 2,200 feet of SGL 211. State Game Lands are managed by the PGC for a variety of wildlife and recreational uses. In addition, Alternative 26 would cross 2.0 miles of forestland, which is 1.2 miles more than Alternative 25 and 0.5 mile more than the corresponding segment of the proposed route.

We consider residences and residential areas in our evaluation of alternative routes. Thus, we acknowledge that the alternative routes, which avoid crossing Summit Drive, would reduce the impact of the Project on the residents living there. However, we also note that all of the residences along Summit Drive are more than 100 feet from the pipeline, which would lower impacts compared with other areas of the route outside of the milepost range considered in this analysis, where there are closer residences. Additionally, it is important to realize that we must also consider the other environmental factors in determining whether an alternative route confers a clear advantage over a proposed route. Based on our weighing of these other factors, we conclude that the alternative routes are not preferable to the proposed route, and we are not recommending them.

CPL South Alternative 27

The CPL South Alternative 27 (Alternative 27) was identified by John and Deborah Sowers to cross Red Hill Road further south of the Lakewood Estates Subdivision. The Sowers submitted comments and suggested that the southern crossing of Red Hill Road should be south of Stump Road. The Sowers expressed concern that vehicles would not be able to access or leave the subdivision if there were a pipeline incident that closed Lakewood Drive and the section of Red Hill Road between the proposed pipeline crossings. The Sowers indicated that if the pipeline were routed south of Stump Road, residents of the subdivision would have an egress route via Stump Road. Figure 3.3.2-18 identifies the pipeline alignment across Red Hill Road and Lakewood Drive.

We recognize that safety is an important issue. The DOT regulates the operation and maintenance of pipeline facilities and requires that each pipeline operator establish an emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency (see section 4.12.1).

CPL South Alternative 27 (Alternative 27) deviates from the proposed route near MP 5.6 and proceeds west across Red Hill Road. It then turns and proceeds about 1.3 miles north across agricultural land and forestland before rejoining the proposed route at MP 6.9 (see figure 3.3.2-19).

An environmental comparison of Alternative 27 to the corresponding segment of the proposed route is provided in table 3.3.2-12.

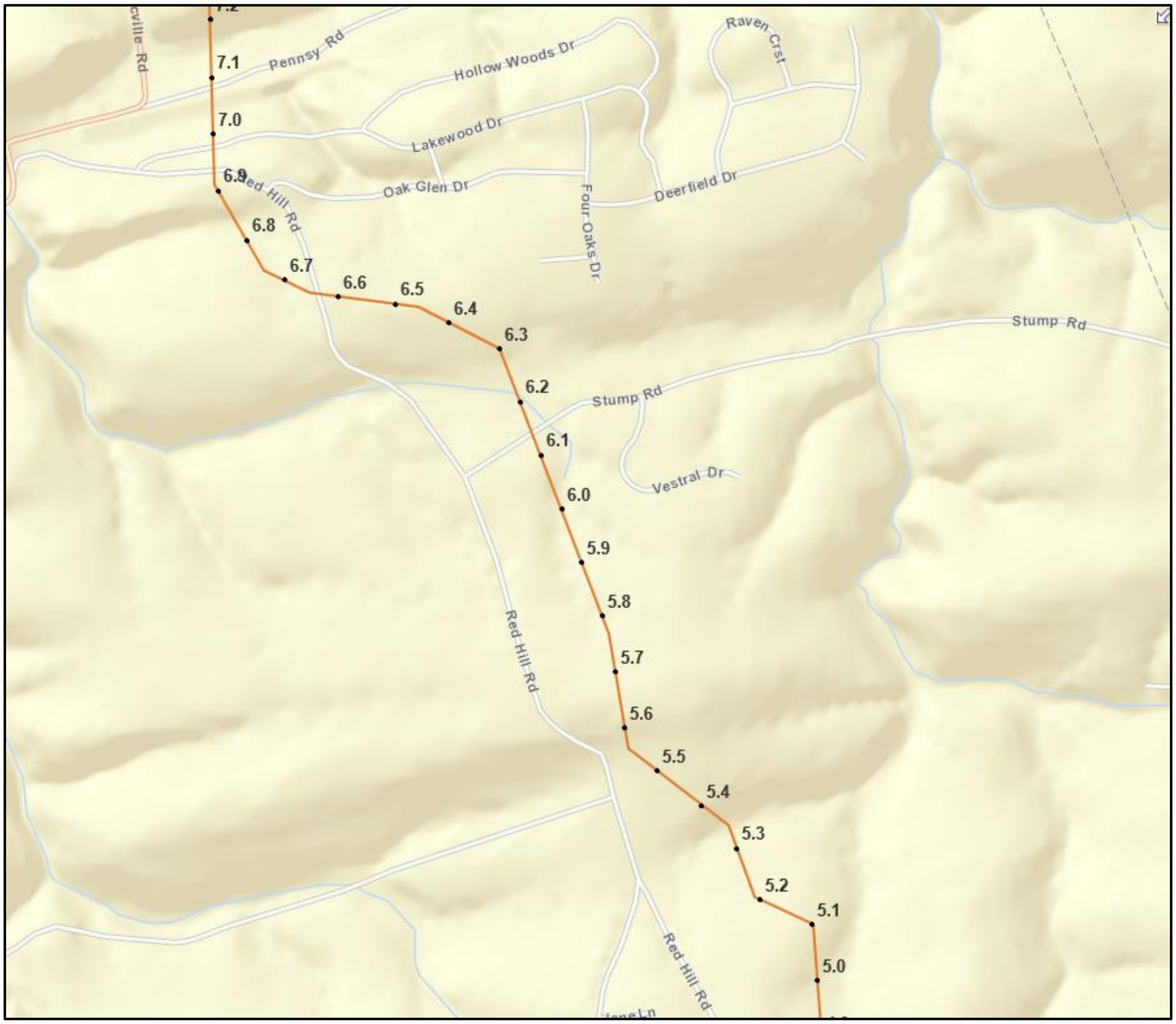

Figure 3.3.2-18 Road Crossings Near Lakewood Estates Subdivision

TABLE 3.3.2-12

Comparison of the CPL South Alternative 27 to the Corresponding Segment of the Proposed Route for the Atlantic Sunrise Project

Environmental/Engineering Factor	Unit	CPL South Alternative 27	Proposed Route
Length	miles	1.4	1.4
Length adjacent to existing right-of-way	miles (percent)	0 (0)	0 (0)
Construction right-of-way [a]	acres	16.9	16.9
Forestland crossed	miles	0.2	0.0
Agricultural land crossed	miles	1.1	1.3
Residences within 100 feet of the pipeline centerline	no.	1	0
Waterbodies crossed	no.	1	1
Wetlands crossed	no. (feet)	0 (0)	0 (0)
Road crossings	no.	1	2

[a] Based on a 100-foot-wide construction right-of-way.

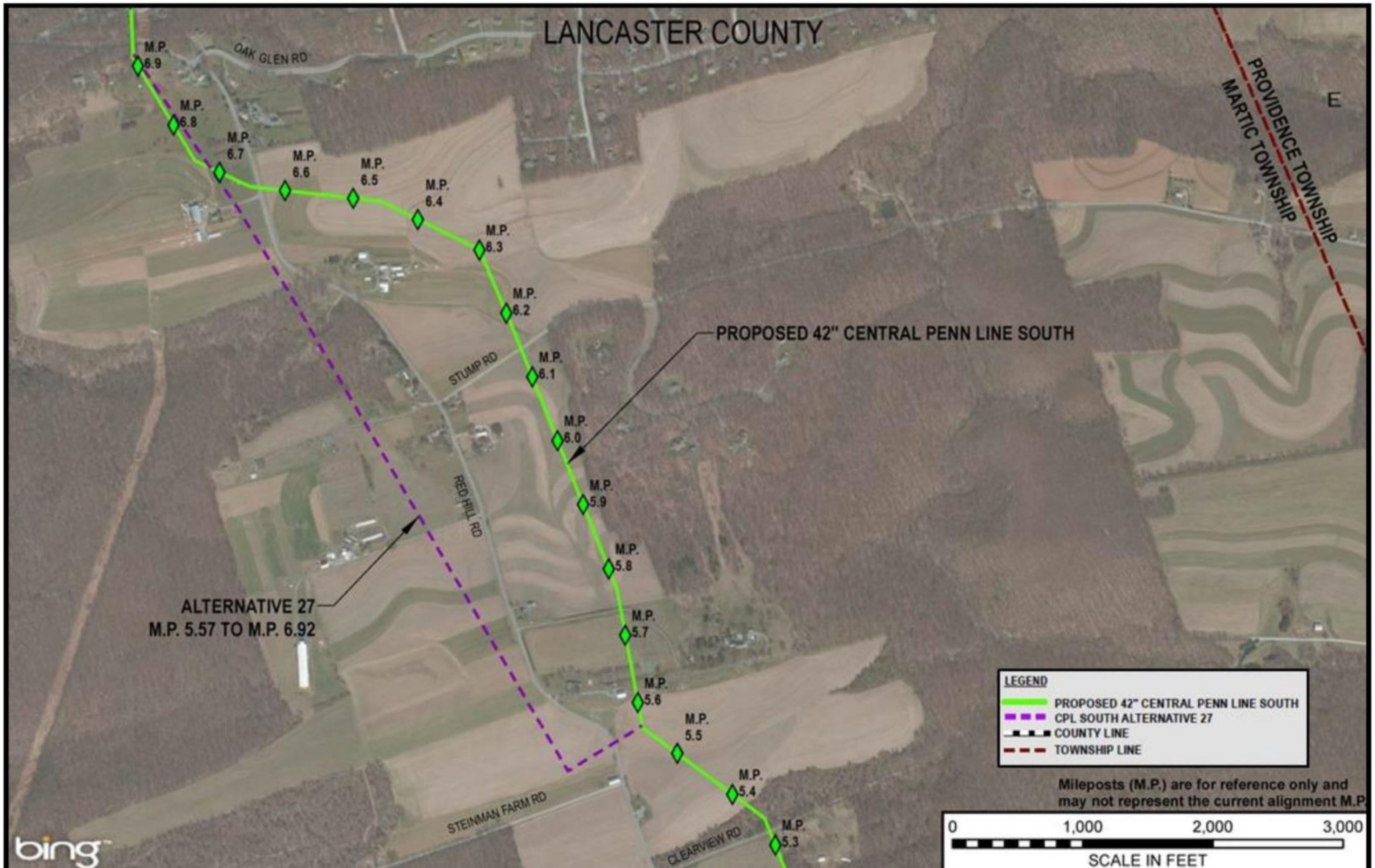

Figure 3.3.2-19
Atlantic Sunrise Project
CPL South Alternative 27

Alternative 27 is the same length as the proposed route (1.4 miles), but would cross more forestland (0.2 mile) and be within 100 feet of one more residence than the corresponding segment of the proposed route. In addition, Alternative 27 would traverse steep terrain where it crosses Martock Run (a tributary of Pequea Creek). In contrast, the proposed route would cross Martock Run in a relatively level agricultural field and would not require clearing riparian vegetation.

Because the environmental advantages do not outweigh the environmental disadvantages, we conclude that the proposed route is environmentally preferable to Alternative 27. We do not recommend this alternative.

<u>Conestoga Alternative Route</u>

The Conestoga Alternative Route was identified by Conestoga Township residents to maximize collocation with existing PPL transmission line rights-of-way adjacent to the Susquehanna River. The Conestoga Alternative Route deviates from the proposed route at MP 2.1 and proceeds 3.0 miles northwest across forestland and agricultural land. From this point, the alternative joins an existing transmission line right-of-way and proceeds north across primarily agricultural land and forestland. Along this segment, the Conestoga Alternative Route crosses the Tucquan Glen Nature Preserve, Pequea Creek Recreational Center and Pequea Creek Woods Natural Heritage Area, Shenk's Ferry Wildflower Preserve Natural Heritage Area, PPL Environmental Preserve, Safe Harbor Recreation Area, and Safe Harbor Woods Natural Heritage Area. After crossing Safe Harbor Woods Natural Heritage Area, the Conestoga Alternative proceeds northwest where it rejoins the proposed route at MP 14.1 (see figure 3.3.2-20). An environmental comparison of the Conestoga Alternative Route to the corresponding segment of the proposed route is provided in table 3.3.2-13.

TABLE 3.3.2-13

Comparison of the Conestoga Alternative Route to the Corresponding Segment of the Proposed Route for the Atlantic Sunrise Project

Environmental/Engineering Factor	Unit	Conestoga Alternative Route	Proposed Route
Length	miles	11.1	12.1
Length adjacent to existing right-of-way	miles (percent)	6.0 (54)	0.5 (4)
Construction right-of-way [a]	acres	134.5	146.6
Forestland crossed	miles	7.0	2.6
Agricultural land crossed	miles	3.7	8.6
Residences within 100 feet of the pipeline centerline	no.	4	4
Recreation areas/preserves crossed	miles	4.3	2.1
Tucquan Glen Nature Preserve	miles	0.5	0.0
Pequea Creek Recreational Center	miles	0.5	0.0
Pequea Creek Woods Natural Heritage Area	miles	0.4	0.0
Shenk's Ferry Wildflower Preserve Natural Heritage Area	miles	0.4	0.0
PPL Environmental Preserve	miles	0.4	0.0
Safe Harbor Recreation Area	miles	0.8	0.0
Safe Harbor East Woods Natural Heritage Area	miles	0.0	<0.1
Safe Harbor Woods Natural Heritage Area	miles	1.3	0.4
Trout Run Ravine, Red Hill Hollow, Camp Snyder Woods Natural Heritage Area	miles	0.0	1.6
Waterbodies crossed/fishery classification	no.	10	9
Trout Stocking	no.	2	0
High Quality Cold Water Fishes	no.	2	2
Cold Water Fishes	no.	0	2
High Quality Warm Water Fishes	no.	1	0
Warmwater Fishes	no.	5	5
State wild and scenic rivers crossed	no.	2	1
Wetlands crossed	no. (feet)	0 (0)	0 (0)
Road crossings	no.	18	17

[a] Based on a 100-foot-wide construction right-of-way.

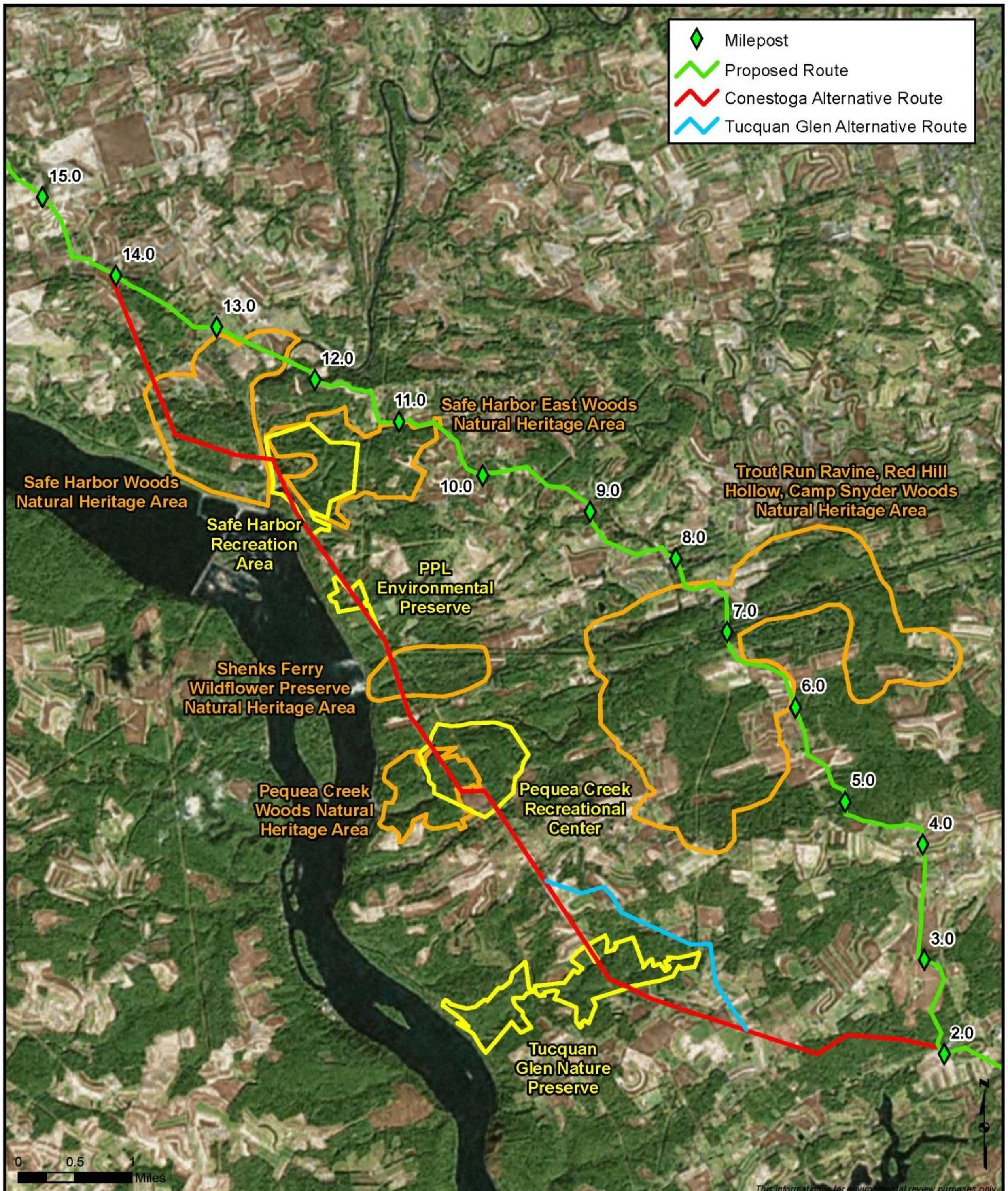

Figure 3.3.2-20
Atlantic Sunrise Project
Conestoga Alternative Route

The advantages of the Conestoga Alternative Route are that it is 1 mile shorter and would follow existing rights-of-way for a greater percentage of its length (54 percent) than the corresponding segment of the proposed route (4 percent). Collocating with existing rights-of-way can reduce visual impacts and minimize impacts on forestland. In addition to considering the use of existing rights-of-way when siting pipelines, we must also consider and evaluate impacts on designated parks, nature preserves, recreational lands, and other environmental features.

While the Conestoga Alternative Route would be collocated with existing rights-of-way for a greater percentage of its length, it would cross 4.4 miles more forestland than the corresponding segment of the proposed route. The main disadvantage of the Conestoga Alternative Route is that it would cross seven recreational areas and/or preserves for a total distance of about 4.3 miles. In contrast, the proposed route would cross three natural heritage areas for a total distance of about 2.1 miles; however, Safe Harbor Woods would be avoided as part of the HDD across the Conestoga River. In its comments on the draft EIS, the DOI indicated that it supports a pipeline route that avoids the Safe Harbor Recreation Area and Shenk's Ferry Wildflower Preserve. John Gross submitted comments and suggested that an alternative route could be implemented to avoid Tucquan Glen Nature Preserve. While John Gross' suggested alternative would avoid the Tucquan Glen Nature Preserve, it would add about 0.2 mile to the length of the Conestoga Alternative Route, cross a tree farm/nursery, and cross near several residences located along Hilldale Road and Douts Hill Road.

The Conestoga Alternative Route and the proposed route would cross a comparable number of waterbodies (10 versus 9). However, the Conestoga Alternative Route would cross two Pennsylvania scenic rivers (Tucquan Creek and Clark Run). While the proposed route would also cross Tucquan Creek, the crossing location is in an area surrounded by agricultural land and would not require significant tree clearing adjacent to the waterbody. Another disadvantage of the Conestoga Alternative Route is the limited amount of workspace available adjacent to the Conestoga River to complete an HDD crossing. River Road, Safe Harbor Park, and residential development are located immediately east of the Conestoga River, which would limit the amount of space available to stage HDD equipment. In addition, the pullback section would need to be assembled on the west side of the crossing within Conestoga River Park. There is about 200 feet of elevation change between these two locations, which would increase the potential for HDD complications including the risks of hole collapse and a significant return of drilling fluid to the low side of the crossing. In contrast, sufficient workspace is available along the proposed route and the entry and exit sides of the HDD are comparable in elevation. We received comments from John Gross indicating that the direct pipe installation method or the dam and pump method could be used at the Conestoga River crossing along the Conestoga Alternative Route. The direct pipe method is a trenchless installation method that combines microtunneling and HDD technology and has the benefit of requiring a smaller footprint to complete pipeline installation compared to the HDD method. The direct pipe or dam-and-pump methods may be feasible at this crossing location; however, that does not change our conclusion that the Conestoga Alternative Route is not preferable to the proposed route; as such, we do not recommend it.

Conestoga River Alternative

The Conestoga River Alternative was identified by Transco to avoid crossing a conservation easement located at the Conestoga River near MP 12.3. The alignment crosses land subject to a Declaration of Restrictive Covenants for Conservation (Restrictive Covenant) by PPL Holtwood, LLC, which established an area known as the Conestoga River Riparian Planting Site. The Conestoga River Riparian Planting Site was established to satisfy a condition of the USACE permit issued to PPL Holtwood, LLC for construction and operation of the Holtwood Hydroelectric Expansion Project on the Susquehanna River. The Conestoga River Riparian Planting Site includes a restrictive covenant that was established "to assure that the conservation area, including its airspace and subsurface, will be retained in perpetuity in its natural condition to prevent any use of the conservation area that will impair or interfere with its natural resource functions and values." Transco indicated that in April 2016, the Holtwood Expansion Project and associated property, including the area subject to the Restrictive Covenant was sold to Brookfield Renewable Energy Group. The Restrictive Covenant is subject to enforcement by the USACE and PADEP and would need to be amended to allow pipeline installation along the proposed route. Transco indicated that it has been communicating with Brookfield Renewable Energy Group on the necessary amendment to the Restrictive Covenant, but has not been able to negotiate an easement at this time.

The Conestoga River Alternative deviates from the proposed route at MP 12.0 and proceeds 0.5 mile southwest across forestland and agricultural land. From this point, the Conestoga River Alternative turns and proceeds northwest across forestland, the Conestoga River, and agricultural land before rejoining the proposed route near MP M-0248 0.0 (see figure 3.3.2-21).

An environmental comparison of the Conestoga River Alternative to the corresponding segment of the proposed route is provided in table 3.3.2-14.

TABLE 3.3.2-14

Comparison of the Conestoga River Alternative to the Corresponding Segment of the Proposed Route of the Atlantic Sunrise Project

Environmental/Engineering Factor	Unit	Conestoga River Alternative	Proposed Route
Length	miles	1.3	1.1
Length adjacent to existing right-of-way	miles	0.0	0.0
Construction right-of-way [a]	acres	15.8	13.3
Forestland crossed	miles	0.6	0.2
Agricultural land crossed	miles	0.6	0.6
Residences within 100 feet of the pipeline centerline	no.	0	0
Waterbodies crossed	no.	2	2
Wetlands crossed	no. (feet)	0 (0)	0 (0)
Road crossings	no.	2	2
Subject to a Restrictive Covenant	Yes/No	No	Yes

[a] Based on a 100-foot-wide construction right-of-way.

The advantages of the proposed route is that it is 0.3 mile shorter, crosses 0.4 mile less forestland, and would disturb 2.5 acres less land during construction than the Conestoga River Alternative. However, the proposed route would be subject to a Restrictive Covenant. Both the Conestoga River Alternative and the proposed route would cross a similar amount of agricultural land.

The proposed route and the Conestoga River Alternative would cross the same number of waterbodies. Transco is currently proposing to install the pipeline across the Conestoga river along the proposed route using the HDD method and indicated that, based on geotechnical studies completed to date, the HDD method would be feasible along the Conestoga River Alternative. However, Transco indicated that it has only been able to complete two of the four geotechnical borings along the Conestoga River Alternative and, as a result, the geological conditions along the Conestoga River Alternative profile have not been completely assessed.

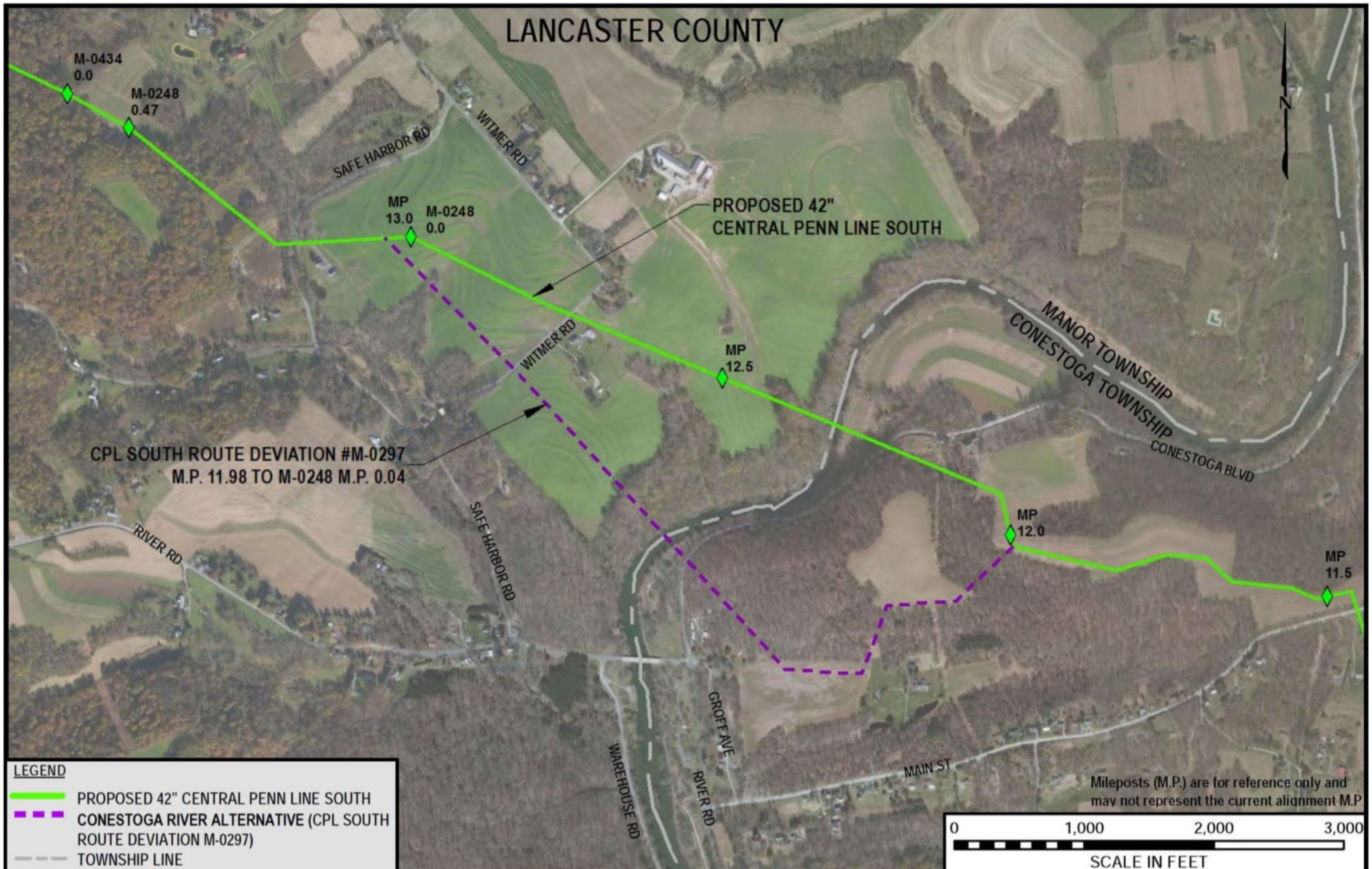

Figure 3.3.2-21
Atlantic Sunrise Project
Conestoga River Alternative (CPL South Route Deviation M-0297)

At this time, Transco indicates that the proposed route is the preferred location to complete the HDD crossing of the Conestoga River. However, because Transco has not been able to secure an easement across the Conestoga River along the proposed route due to the Restrictive Covenant, **we recommend that:**

- **With its Implementation Plan, Transco should file documentation that it has acquired the necessary easement on tract PA-LA-137_B.000 along the proposed route. In the event that Transco is unsuccessful in acquiring the necessary easement, Transco should incorporate the Conestoga River Alternative into the proposed route.**

Railroad Alternative

We received a comment from Milton Machalek suggesting that the proposed CPL South route should be sited adjacent to the existing railroad tracks along the east side of the Susquehanna River. The area surrounding the existing railroad tracks where this alternative would be located (near Columbia and Washington Borough, Pennsylvania) is densely developed and there is insufficient space adjacent to the existing railroad tracks to construct the pipeline. The Susquehanna River is immediately west of the railroad tracks between Columbia, Pennsylvania and Susquehannock State Park (the most obvious beginning and end points of the suggested alignment) and much of the area east of the railroad tracks is steeply sloped and not suitable for pipeline construction. Potential workspace is also constrained by PA 441 or River Road, which border the railroad tracks. As a result, we do not consider collocating the pipeline with the existing railroad tracks to be a viable alternative.

Lynda Like Alternative

We received a comment from Lynda Like suggesting an alternative in Lancaster County, Pennsylvania. Based on the description provided, the alternative would deviate from the proposed route near CPL South MP 15.0 (near Breneman Road) and proceed about 8 miles east to PA 272 on the west side of Willow Street, Pennsylvania. From there, the route would turn south and proceed adjacent to PA 272 to Transco's existing mainline pipeline system. Based on our review, the alternative would be at least 3 miles longer than the proposed route. The alternative would also cross dense commercial and residential areas adjacent to PA 272. For these reasons, we did not evaluate this alternative further.

Sharon and Russell Olt Alternative

In a letter dated August 30, 2015, Sharon and Russell Olt provided comments and suggested an alternative that would follow their southern and eastern property lines to increase the separation distance of the pipeline from their residence. The Olts also requested that the alternative alignment be located a sufficient distance from neighboring residences to minimize impacts. Since the issuance of the draft EIS, the Olts submitted comments identifying two alternative pipeline alignment options across their property. A description of the Option 1 and 2 Alternatives are provided below.

The alignment that Transco filed in its application crossed the Olt's property on a diagonal and was located about 190 feet from their residence. After filing its application, Transco incorporated route deviation M-0196 into the proposed route. This change increased the distance between the pipeline and the Olt residence by paralleling an existing unimproved road on their property. The Sharon and Russel Olt Alternative we evaluated in the draft EIS deviated from the proposed route near CPL South MP 66.8 and proceeded east for 0.3 mile, crossing Klick Drive, before following their southern property line across agricultural land. From there, the alternative would turn and proceed north along their eastern property line before rejoining the proposed route at M-0196 MP 0.2. The Option 1 and 2 Alternatives would generally be located between 300 to 700 feet south of the proposed route (see figure 3.3.2-22).

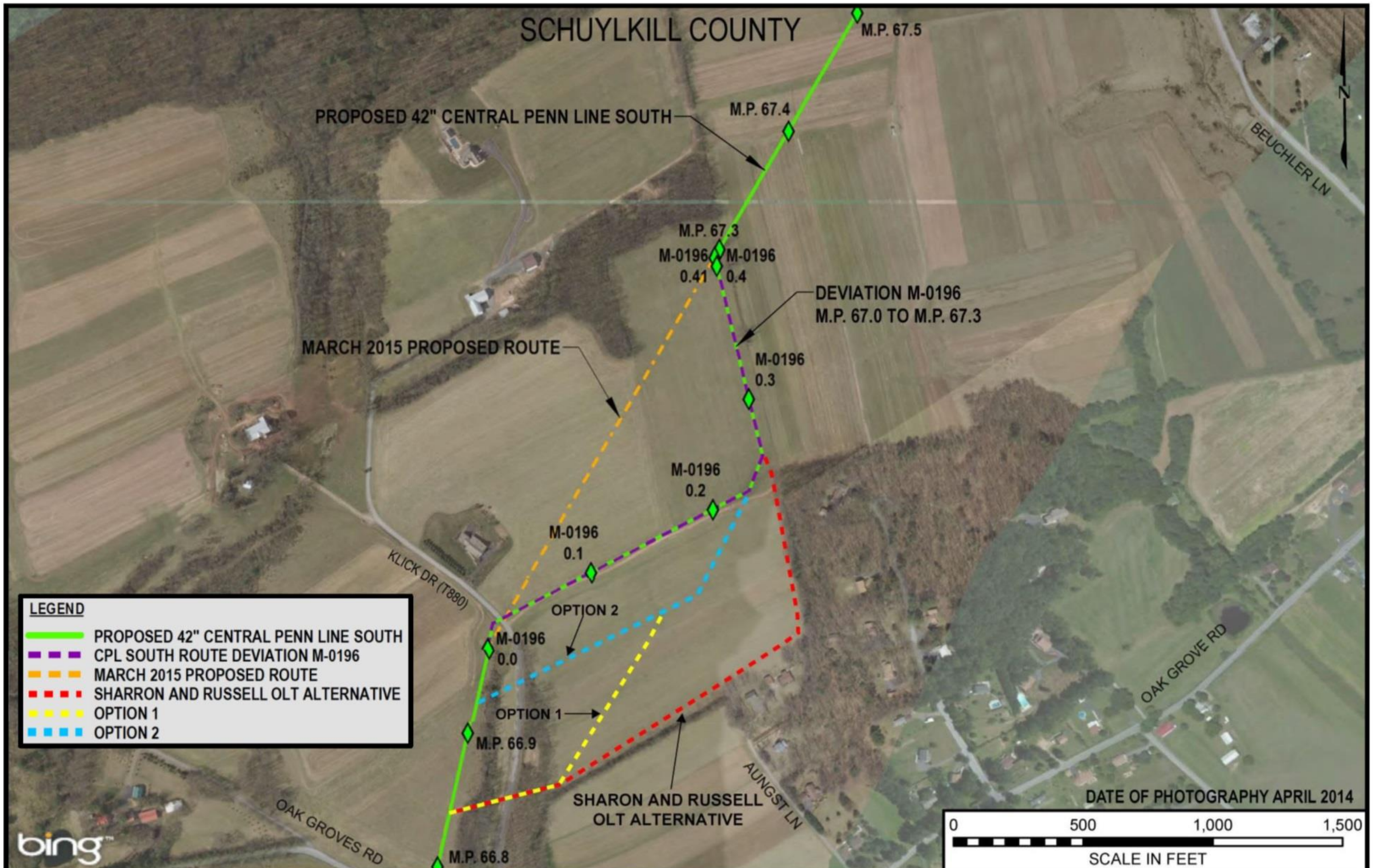

Figure 3.3.2-22
Atlantic Sunrise Project
Sharron and Russell Olt Alternative

The Sharon and Russel Olt Alternative would be about the same length as the proposed route, but would require the crossing of a waterbody, which would increase the amount of forestland clearing adjacent to Klick Drive. It would also be closer to residences along Aungst Lane and Pine Heights Drive, one of which would be within 100 feet of the alternative centerline. Another disadvantage is that the alternative would be difficult to construct across Klick Drive because of a waterbody on the west side and steep slopes on the east side of Klick Drive. Because the alternative does not offer a clear advantage and would increase forestland impacts, and because of the number of waterbodies crossed and the number of residences within 100 feet of the pipeline centerline, we do not find it preferable to the proposed route and are not recommending it.

The Option 1 Alternative would follow the same alignment as the Sharon and Russel Olt Alternative across Klick Drive. Because the Option 1 Alternative would involve crossing a waterbody, more forestland, and steep slopes adjacent to Kick Drive, we do not find it preferable to the proposed route and are not recommending it.

The Option 2 Alternative would deviate from the proposed route near MP 66.9 and proceed east across Klick Drive along an alignment 300 feet south of the proposed route. Because the Option 2 Alternative would address the landowner concerns, does not affect any new landowners, and only slightly increase forestland and emergent wetland impacts, **we recommend that:**

- **<u>Prior to construction</u>, Transco should file with the Secretary a revised alignment sheet that incorporates the Sharon and Russel Olt Option 2 Alternative between MPs 66.9 and M-0196 0.2 into the proposed route.**

3.3.3 Route Deviations Under Review

Table 3.3.3-1 identifies the route variations that Transco identified since filing its application and subsequently incorporated into the proposed route. Following is a discussion of the four route deviations that were being reviewed at the time the draft EIS was issued.

<u>Neil Bushong Deviation</u>

In a letter dated February 24, 2016, Neil Bushong provided comments and suggested an alternative to avoid crossing springs on his property that provide water for his dairy cattle operation (see figure 3.3.3-1). The alternative would deviate from the proposed route at CPL South MP 20.8 and proceed north across U.S. Route 30 and Indian Head Road. After crossing U.S. Route 30 and Indian Head Road, the alternative would turn and proceed 0.5 mile west where it would cross Indian Head Road and agricultural land before rejoining the proposed route near MP 21.4. In the draft EIS, we requested that Transco incorporate the Neil Bushong Deviation or identify measures to minimize impacts. In its May 2016 supplemental filing, Transco indicated that it had incorporated the Neil Bushong Alternative into the proposed route and made minor adjustments to the alignment to avoid crossing Indian Head Road twice. We agree with the modification and the adoption of the Neil Bushong Deviation as part of the proposed route. Accordingly, this routing and the associated environmental impacts are included in section 4 as a part of the proposed action.

TABLE 3.3.3-1

Summary of Route Variations Identified after Application Submittal and Subsequently Incorporated into the Proposed Route for the Atlantic Sunrise Project

Route Deviation	Milepost Location	Purpose of Route Deviation
CPL North Route Deviations		
M-0115	0.0–0.0	Minor realignment near West Diamond Regulator Station
M-0086	2.1–2.3	Avoid environmentally sensitive area
M-0056	8.4–9.0	Landowner request to parallel property line
M-0060	22.2–23.2	Landowner request to parallel property line
M-0071	30.5–34.3	Minor adjustments to pipeline centerline alignment
M-0120	M-0071 1.1– M-0071 1.2	Improve crossing angle at Schoolhouse Road
M-0054	42.6–43.0	Avoid two rock walls
M-0063	44.8–45.1	Adjust alignment within Compressor Station 605 footprint
M-0058	46.4–46.8	Improve waterbody crossing angle
M-0051	49.2–49.3	Improve Tunkhannock Creek crossing
M-0080	49.2–50.5	Avoid environmentally sensitive area
M-0067	53.9–54.0	Adjust alignment to avoid transmission line structure
M-0061	55.5–55.6	Eliminate pipeline bend in wetland
M-0062	55.8–56.1	Minor route adjustment
M-0119	57.3–57.3	Minor realignment near Zick Meter Station
CPL South Route Deviations		
M-0352	0.0–0.0	Minor realignment with River Road Regulator Station
M-0147	1.0–1.9	Potential bog turtle habitat
M-0224	2.4–2.7	Minor centerline and workspace adjustment
M-0184	3.1–4.0	Improve crossing of Tucquan Creek
M-0175	4.0–4.2	Landowner request to adjust alignment
M-0354	5.3–5.5	Adjust PI to avoid wetland
M-0227	7.3–7.5	Minor centerline and workspace adjustment
M-0152	13.0–13.4	Improve waterbody crossing angle
M-0248	13.0–M-0152 0.4	Reduce forestland impacts and reduce the number of waterbody crossings
M-0206	14.2–M-088 0.0	Landowner request to reduce impact on property and align with transmission line right-of-way
M-0188	14.3–14.6	Landowner request to parallel property line and minimize wetland impacts
M-0248	16.5–16.9	Landowner request to adjust alignment
M-0225	17.4–17.5	Minor centerline and workspace adjustment
M-0389	19.8–20.0	Avoid PPL transmission line structure
M-0396 (Neil Bushon g)	21.0–21.4	Landowner request to avoid crossing springs used in cattle operation
M-0192	22.7–22.8	Landowner request to adjust alignment
M-0209	23.1–23.6	Landowner request to adjust alignment
M-0162	28.1–29.0	Landowner request to adjust alignment
M-0350	28.1–M-0162 0.0	Landowner request to avoid future development
M-308	30.3–30.5	Minor adjustment to avoid culvert
M-0164	34.1–34.4	Minimize impact on drain tiles in agricultural land
M-0278	35.6-35.9	Landowner request to adjust alignment
M-0300	39.2–39.5	Minor centerline adjustment to avoid waterbody
M-0226	40.1–40.3	Minor centerline and workspace adjustment
M-0228	40.6–40.7	Minor centerline and workspace adjustment

TABLE 3.3.3-1 (cont'd)

Summary of Route Variations Identified after Application Submittal and Subsequently Incorporated into the Proposed Route for the Atlantic Sunrise Project

Route Deviation	Milepost Location	Purpose of Route Deviation
M-0211	M-0183 0.6– M-0183 0.9	Accommodate Highway 422 and Clear Springs Road expansion
M-0229	49.4–49.6	Minor centerline and workspace adjustment
M-0165	51.7–52.0	Increase separation from residence
M-0199	53.8–54.1	Landowner request to parallel property line
M-0388	54.3–54.7	Avoids stormwater management area
M-0168	55.3–55.4	Improve waterbody crossing angle
M-0180	55.9–56.0	Reduce impact on wetland
M-0230	57.0-57.4	Minor centerline and workspace adjustment
M-0176	59.4–59.8	Landowner request to adjust alignment
M-0200	59.8–60.6	PGC request to adjust alignment
M-0221	M-0177 0.1– M-0177 0.7	Improve location of Dark Woods Road crossing
M-0177	66.0–66.5	Landowner request to avoid spring
M-0196	67.0–67.3	Landowner request to parallel access road
M-0223	69.2–69.2	Minor centerline and workspace adjustment
M-0181	70.8–71.2	Avoids mobile home and improves road crossing angle
M-0198	71.6–72.2	Avoids pond
M-0201	74.2–74.6	Avoids locating permanent right-of-way on railroad property
M-0316	75.1–76.1	Adjust centerline to avoid mine tunnel entrance
M-0170	77.0–77.2	Increase separation from residence
M-0213	79.0–79.1	Minimize impacts on environmentally sensitive area
M-0247	M-0194 0.8– M-00194 1.2	Adjust centerline to collocate with existing transmission line right-of-way
M-0351	80.3–80.4	Adjust centerline to avoid Sunoco easement
M-0252	84.7-84.8	Avoid cultural resource site
M-0240	85.8–86.1	Improve Highway 901 crossing location
M-0372	M-0235 0.2–M-0235 0.5	Avoid planned development
M-0235	86.6–87.9	Reduce wetland and side slope impacts
M-0167	90.3–90.7	Landowner request to adjust alignment
M-0271	92.2–92.4	Adjust centerline to improve crossing at Happy Valley Road
M-0285	95.9–96.1	Landowner request to adjust alignment
M-0197	96.4–96.8	Landowner request to minimize impact on agricultural land
M-0174	98.1–98.7	Landowner request to minimize tree clearing
M-0390	M-0179 0.1–101.4	Landowner request to adjust alignment
M-0179	100.9–101.4	Increase collocation with powerline and avoid steep slope
M-0156	105.1–105.3	Avoid spring
M-0171	106.0–106.8	Landowner request to parallel field road
M-0214	107.3–M-0195 0.2	Landowner request to adjust alignment
M-0360	112.3–M-02707 0.2	Minor realignment with Compressor Station 610
M-0207	112.4–112.6	Adjust alignment within Compressor Station 610 footprint
M-0159	119.4–119.7	Landowner request to avoid tree clearing
M-0353	125.1–125.2	Minor realignment with West Diamond Regulator Station

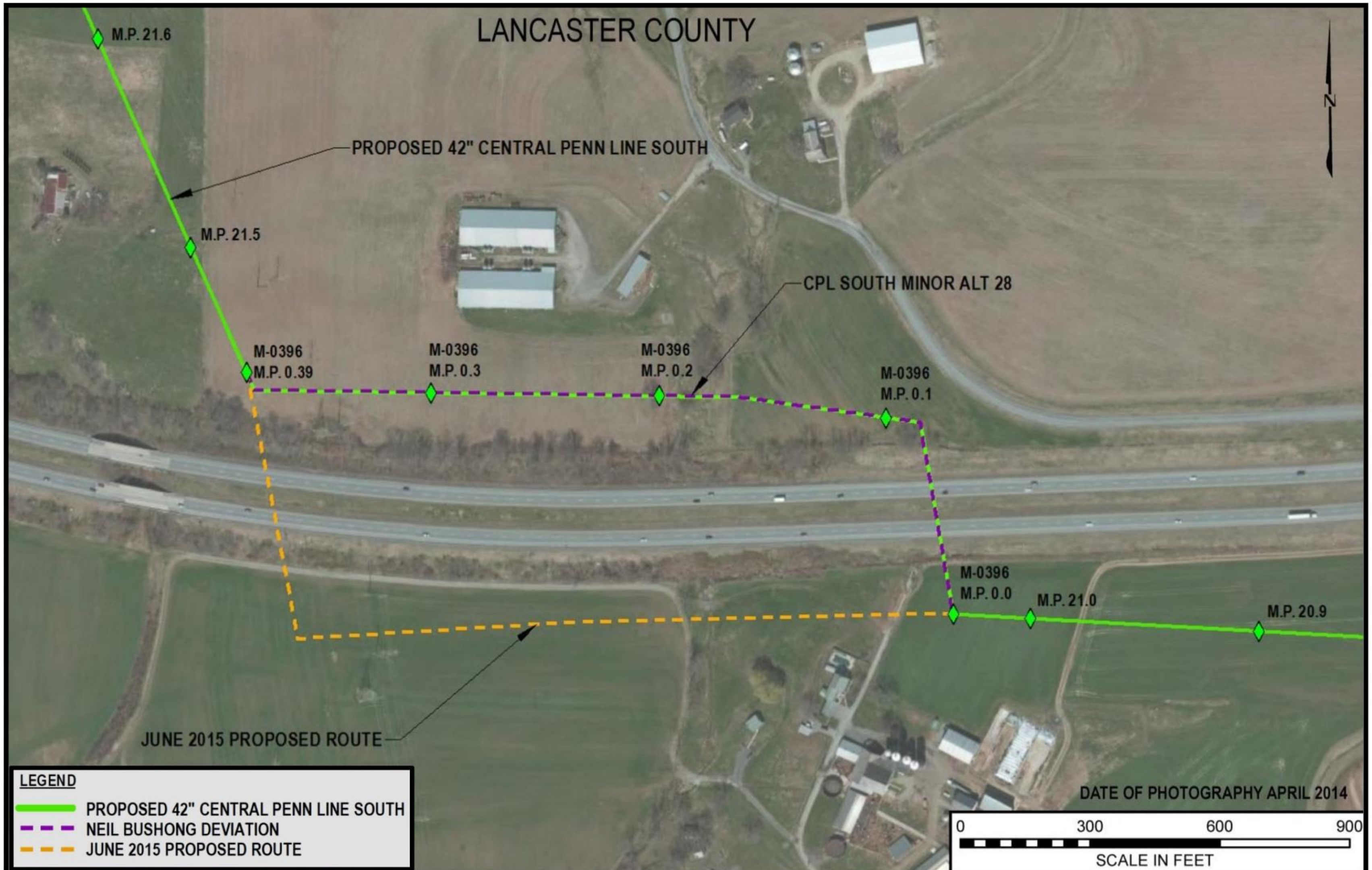

Figure 3.3.3-1
Atlantic Sunrise Project
Neil Bushong Deviation

Route Deviation M-0209

Route Deviation M-0209 was identified by Reaves Goehring to avoid crossing through the middle of his property between CPL South MPs 23.1 and 23.6 (see figure 3.3.3-2). Mr. Goehring indicated that his property has been used by the Columbia Marine Corps Reserve for bivouac camping maneuvers and that the property has hosted Civil War battle reenactments, 19th-century cannon and Kentucky rifle shoots, and various civic outings. Mr. Goehring suggested that the pipeline alignment be located west of his property line in an area that was recently clear cut to minimize impacts on old growth forest located on his property. While constructing the pipeline west of Mr. Goehring's property line would avoid forestland clearing, it would place the pipeline within 200 feet of a neighboring residence.

In the draft EIS, we recommended that Transco incorporate Route Deviation M-0209 following an alignment along the western boundary of the Goehring property. Transco incorporated Route Deviation M-0209 into the proposed route; however, based on revised alignments sheets filed with us, the construction workspace does not abut the western property boundary of the Goehring property. We believe that impacts on Mr. Goehring's old growth forest can be further minimized by shifting the alignment to the edge of the Goehring property boundary; therefore, **we recommend that:**

- **<u>Prior to construction</u>, Transco should file with the Secretary a revised alignment sheet that adjusts the construction workspace associated with Route Deviation M-0209 to abut Mr. Goehring's western property boundary.**

Route Deviation M-0169

Route Deviation M-0169 was identified by Transco to avoid affecting an environmentally sensitive area between CPL South MPs 57.0 and 57.1 (see figure 3.3.3-3). In the draft EIS, we requested that Transco provide additional information on how the environmentally sensitive area would be avoided or mitigated. In its June 2016 supplemental filing, Transco indicated that it had completed consultations with the Pennsylvania Historical and Museum Commission regarding the previously recorded archaeological resource. The Pennsylvania Historical and Museum Commission determined that the cultural resource site was not eligible for listing on the NRHP. As a result, Transco did not incorporate M-0169 into the proposed route. We concur with Transco's conclusions regarding Route Deviation M-0169 and do not recommend it be incorporated into the proposed route.

Route Deviation M-0248

Route Deviation M-0248 was identified by Patricia Griffin to minimize impacts on wetlands, forestland, and wildlife habitat on her property between CPL South MPs 13.0 and M-0152 0.4 (see figure 3.3.3-4). Based on our review, Route Deviation M-0248 reduces forestland clearing by 547 feet and avoids crossing any wetlands; however, it would be within 150 feet of a neighboring residence. In the draft EIS, we requested that Transco incorporate Route Deviation M-0248 or identify measures to minimize impacts. In its May 2016 supplemental filing, Transco indicated that it had incorporated Route Deviation M-0248 into the proposed route. We agree with the adoption of Route Deviation M-0248 as part of the proposed route. This routing and the associated environmental impacts are included in section 4 as a part of the proposed action.

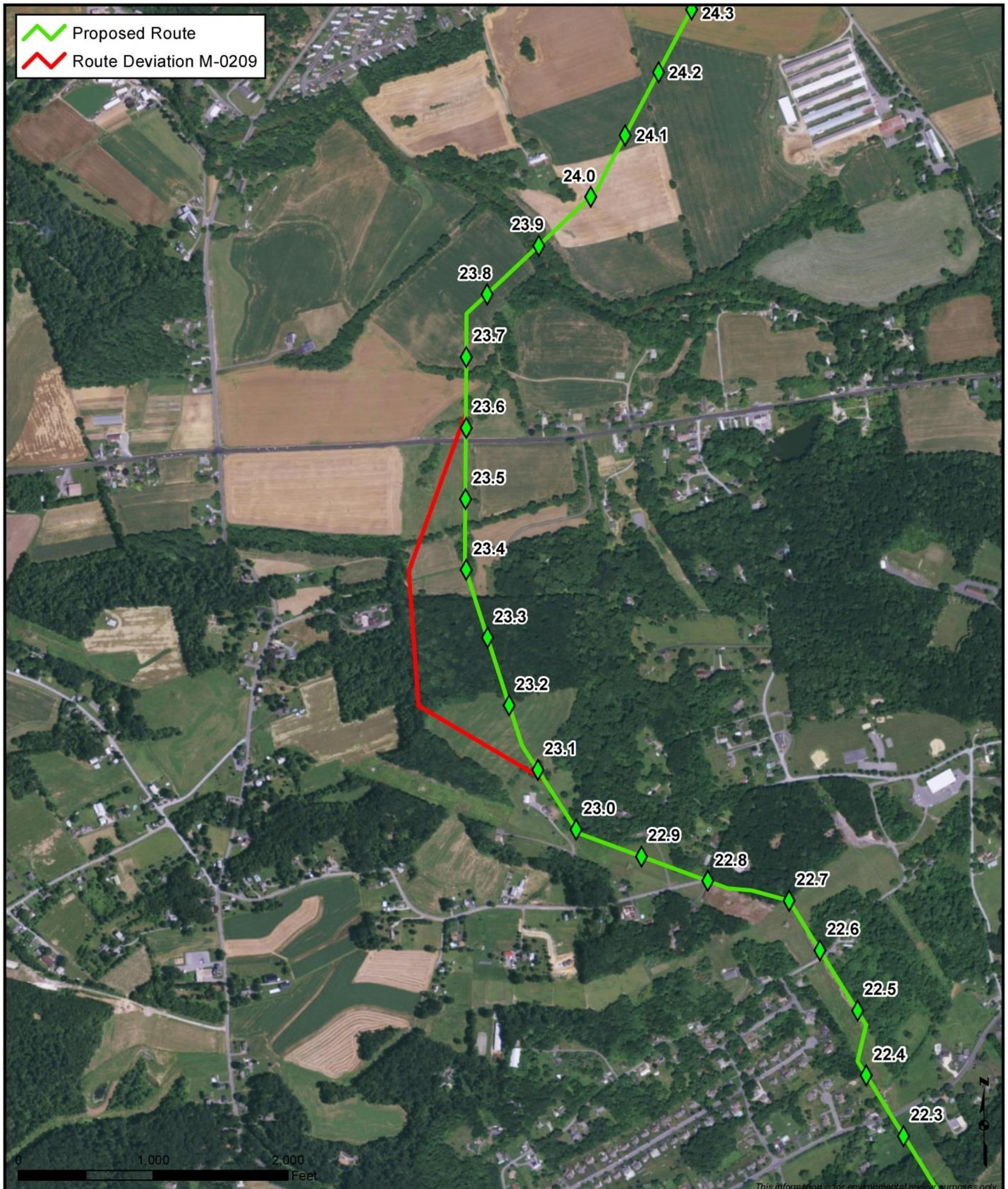

Figure 3.3.3-2
Atlantic Sunrise Project
Route Deviation M-0209

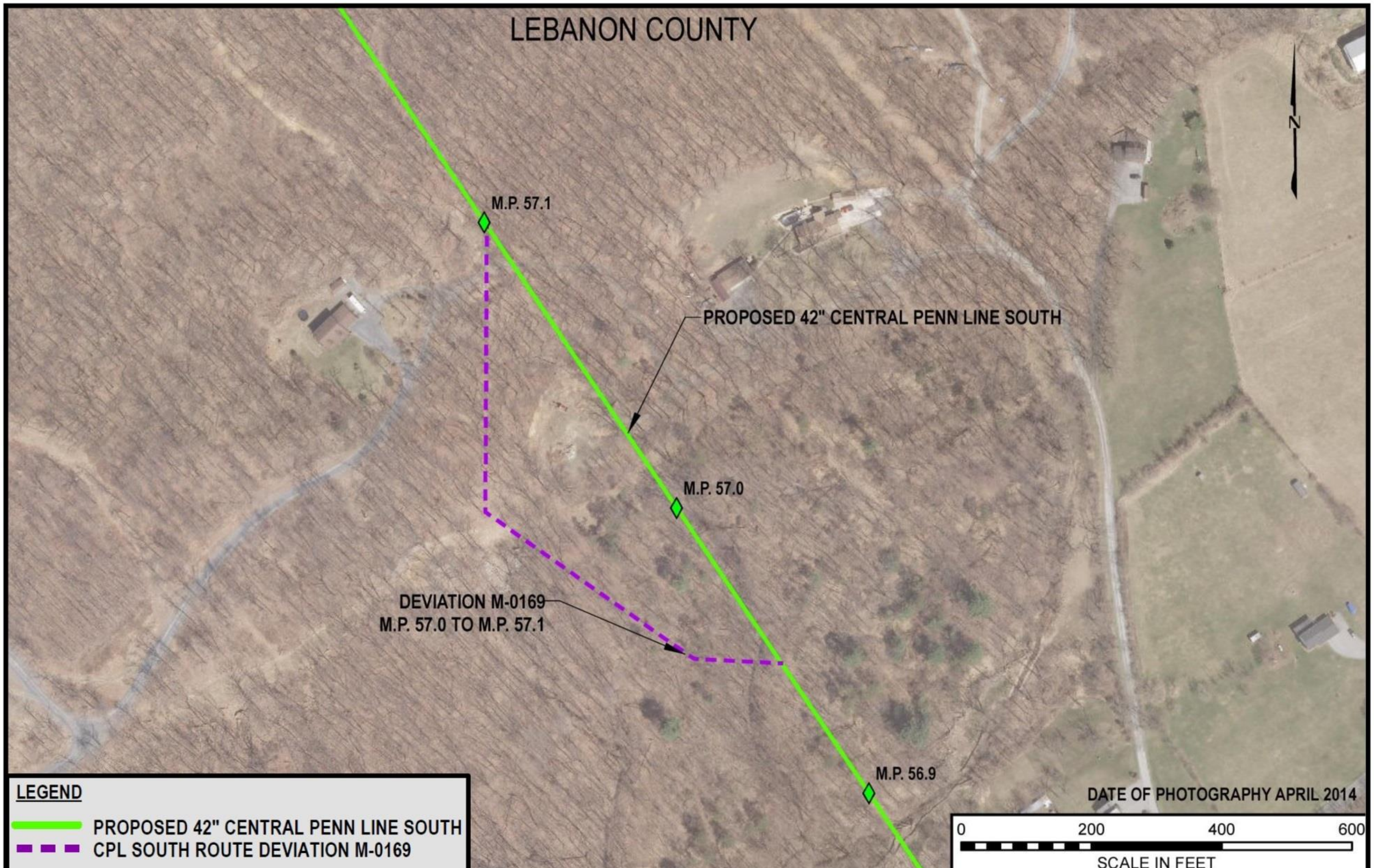

Figure 3.3.3-3
Atlantic Sunrise Project
Route Deviation M-0169

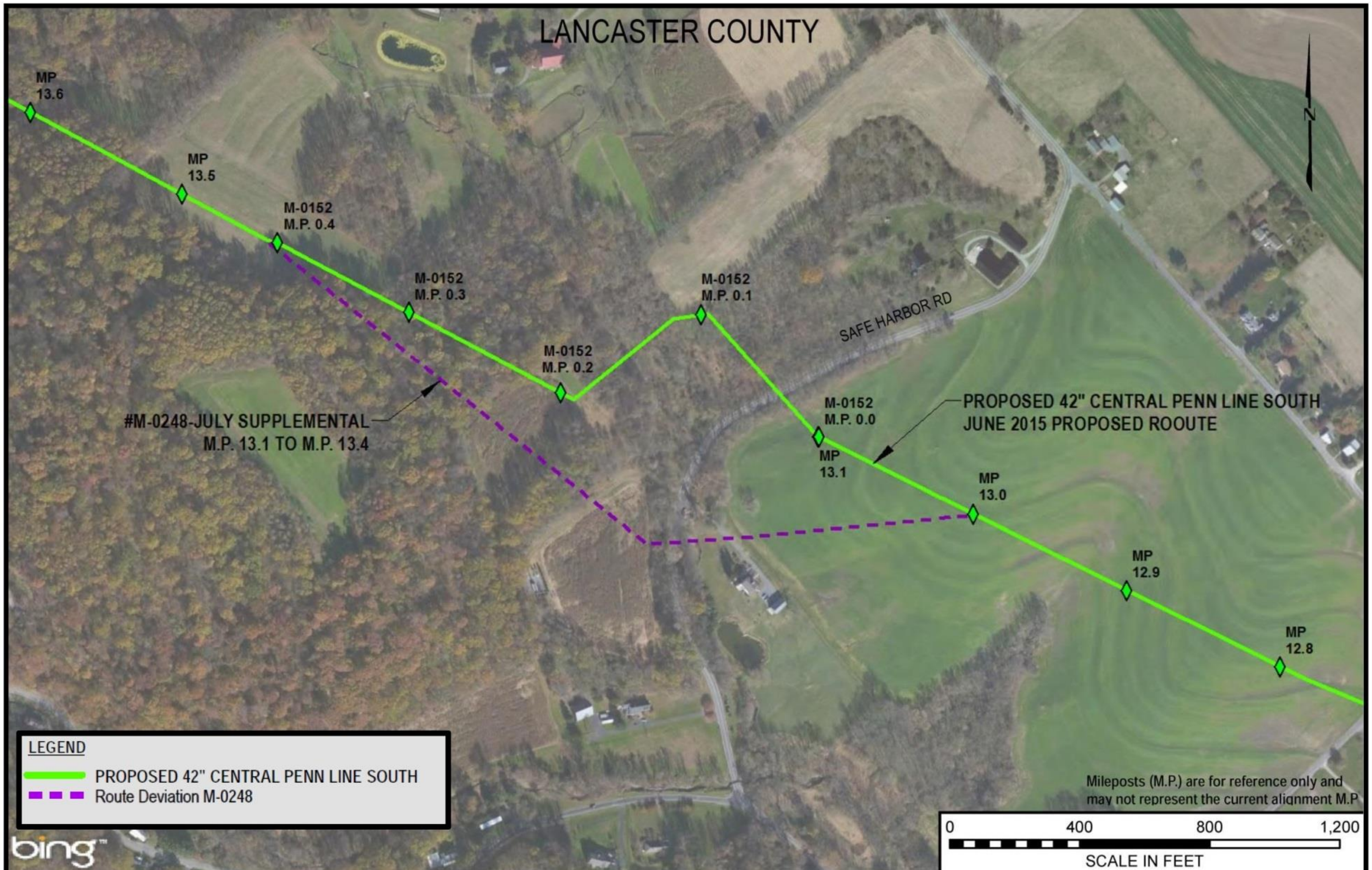

Figure 3.3.3-4
Atlantic Sunrise Project
Route Deviation M-0248

3.4 ALTERNATIVE ABOVEGROUND FACILITY SITES

We evaluated the locations of the proposed aboveground facilities to determine whether environmental impacts would be reduced or mitigated by the use of alternative facility sites. Our evaluation included review of desktop material as well as site visits along the project corridor.

Transco proposes to construct five new M&R facilities: the Zick and Springville Meter Stations and the North Diamond, West Diamond, and River Road Regulator Stations. These proposed facilities would be constructed within or directly adjacent to existing or proposed facility sites and most of the land required would be previously disturbed land that lacks sensitive resources. For these reasons, no alternative sites were identified or evaluated for the new M&R facilities.

The Project would involve modifications to 9 existing compressor stations in Pennsylvania, Maryland, Virginia, and North Carolina and 43 existing M&R stations in Pennsylvania, North Carolina, and South Carolina. The modifications at the compressor and M&R stations would primarily occur within or directly adjacent to existing facility sites. In addition, most of the land required would be industrial or previously disturbed land that lacks sensitive resources. Because no new permanent land would be required, the proposed facilities would be within or directly adjacent to existing facility sites, and/or no sensitive resources would be affected, no alternative sites were identified or evaluated for the proposed modifications at existing compressor and M&R stations.

We received comments regarding the process used to determine the number and locations of new compressor stations as well as alternative sites evaluated. During project planning, Transco completed hydraulic modeling to determine optimum horsepower and compressor station location requirements to transport the proposed natural gas volumes. Based on hydraulic modeling results, Transco evaluated potential sites based on site access and availability, land use, topography, and resources present. As part of its application, Transco evaluated six alternative sites for Compressor Station 605 and five alternative sites for Compressor Station 610. We reviewed the compressor station site alternatives and concluded that none of the alternative sites would be environmentally preferable to Transco's proposed compressor station sites. Therefore, we did not further evaluate alternative compressor station sites.

4.0 ENVIRONMENTAL ANALYSIS

This section describes the affected environment as it currently exists and the environmental consequences of the Project. The section is organized by the following major resource topics: geology; soils; water resources; wetlands; vegetation; wildlife and aquatic resources; special status species; land use, recreation, special interest areas, and visual resources; socioeconomics (including transportation and traffic); cultural resources; air quality and noise; reliability and safety; and cumulative impacts.

The environmental consequences of constructing and operating the Project would vary in duration and significance. Four levels of impact duration were considered: temporary, short term, long term, and permanent. Temporary impacts generally occur during construction with the resource returning to preconstruction condition almost immediately afterward. Short-term impacts could continue for up to 3 years following construction. Impacts were considered long term if the resource would require more than 3 years to recover. A permanent impact could occur as a result of any activity that modifies a resource to the extent that it would not return to preconstruction conditions during the life of the project. We considered an impact to be significant if it would result in a substantial adverse change in the physical environment.

Transco, as part of its proposal, developed certain mitigation measures to reduce the impact of the Project. In some cases, we determined that additional mitigation measures could further reduce project impacts. Our additional mitigation measures appear as bulleted, boldfaced paragraphs in the text of this section and are also listed in section 5.2. We will recommend to the Commission that these measures be included as specific conditions in any Certificate the Commission may issue to Transco for the Project.

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

- Transco would comply with all applicable laws and regulations;
- the proposed facilities would be constructed as described in section 2.0 and the recommendations listed in section 5.2 of the EIS, including our recommended alternatives; and
- Transco would implement the mitigation measures included in its application and supplemental submittals to FERC and the cooperating agencies, and in other applicable permits and approvals.

4.1 GEOLOGY

4.1.1 Physiographic Setting

The project facilities cover multiple physiographic provinces and varying geology. Table 4.1.1-1 lists each project facility along with the physiographic setting, typical rock types present in that setting, and the typical range of topographic relief.

TABLE 4.1.1-1

Physiographic Setting for the Atlantic Sunrise Project Facilities

State/Facility	County	Physiographic Province	Physiographic Section	Rock Types [a]	Local Relief (feet)
Pennsylvania					
CPL North	Columbia and Luzerne	Ridge and Valley	Susquehanna Lowland	Sandstone, siltstone, shale, and shale conglomerate	100 to 600
	Wyoming and Susquehanna	Appalachian Plateaus	Glaciated Low Plateau	Sandstone, siltstone, and shale	100 to 600
CPL South	Columbia	Ridge and Valley	Susquehanna Lowland	Sandstone, siltstone, shale, and shale conglomerate	100 to 600
	Lancaster	Piedmont	Piedmont Upland	Mainly schist, gneiss, and quartzite; some saprolite	100 to 600
	Lancaster and Lebanon	Piedmont	Gettysburg-Newark Lowland	Mainly red shale, siltstone, and sandstone; some conglomerate and diabase	100 to 600
	Lebanon	Ridge and Valley	Great Valley	Northwest: shale and sandstone; slate at east end; southeast: limestone and dolomite	100 to 600
	Lebanon and Schuylkill	Ridge and Valley	Blue Mountain	Sandstone, siltstone, and shale; some limestone and conglomerate	300 to 1,000
	Lebanon, Schuylkill and Northumberland	Ridge and Valley	Anthracite Upland	Sandstone, shale, conglomerate, and anthracite	100 to 1,000
Unity Loop	Lycoming	Ridge and Valley	Susquehanna Lowland	Sandstone, siltstone, shale, and shale conglomerate	100 to 600
Chapman Loop	Clinton	Appalachian Plateaus	Deep Valleys	Sandstone, siltstone, shale, and conglomerate	300 to >1,000
Compressor Station 605	Wyoming	Appalachian Plateaus	Glaciated Low Plateau	Sandstone, siltstone, and shale	100 to 600
Compressor Station 610	Columbia	Ridge and Valley	Susquehanna Lowland	Sandstone, siltstone, shale, conglomerate, limestone, and dolomite	100 to 600
Zick Meter Station	Susquehanna	Appalachian Plateaus	Glaciated Low Plateau	Sandstone, siltstone, and shale	100 to 600
Springville Meter Station	Wyoming	Appalachian Plateaus	Glaciated Low Plateau	Sandstone, siltstone, and shale	100 to 600
North Diamond Regulator Station	Luzerne	Ridge and Valley	Susquehanna Lowland	Sandstone, siltstone, shale, and shale conglomerate	100 to 600
West Diamond Regulator Station	Columbia	Ridge and Valley	Susquehanna Lowland	Sandstone, siltstone, shale, conglomerate, limestone, and dolomite	100 to 600
River Road Regulator Station	Lancaster	Piedmont	Piedmont Upland	Dominantly limestone and dolomite; some phyllitic shale and sandstone	0 to 100
Compressor Station 520	Lycoming	Ridge and Valley	Susquehanna Lowland	Sandstone, siltstone, shale, and shale conglomerate	100 to 600
Compressor Station 517	Columbia	Ridge and Valley	Susquehanna Lowland	Sandstone, siltstone, shale, conglomerate, limestone, and dolomite	100 to 600

TABLE 4.1.1-1 (cont'd)

Physiographic Setting for the Atlantic Sunrise Project Facilities

State/Facility	County	Physiographic Province	Physiographic Section	Rock Types [a]	Local Relief (feet)
Virginia					
Mainline A and B Replacements	Prince William	Piedmont	Mesozoic Lowlands	Underlain by Mesozoic sedimentary and igneous rocks	200 to 400
Compressor Station 185	Prince William	Piedmont	Mesozoic lowlands	Underlain by Mesozoic sedimentary and igneous rocks	200 to 400
Compressor Station 170	Appomattox	Piedmont	Outer Piedmont	Greenstone and gneiss	250 to 1000
Maryland					
Compressor Station 190	Howard	Piedmont Plateau	Piedmont Upland	Marble, schist, granulite, and gneiss	100 to 300
North Carolina					
Compressor Station 160	Rockingham	Piedmont	Milton Belt	Gneisses, schist, and metamorphosed intrusive rocks	300 to 800
Compressor Station 150	Iredell	Piedmont	Charlotte Belt	Granite, diorite, and gabbro	300 to 800
Compressor Station 145	Cleveland	Piedmont	Kings Mountain Belt	Moderately deformed and metamorphosed volcanic and sedimentary rocks	300 to 800

Sources: Sevon, 2000; Reger and Cleaves, 2008; Bailey, 1999; North Carolina Department of Natural Resources and Community Development, 1985

[a] "Rock types" is a brief summary of the types of rocks present in the physiographic section.

4.1.2 Geologic Setting

4.1.2.1 Surficial Geology

The surficial geology of the areas crossed by the Project was determined using information prepared by the USGS, NRCS Soil Survey, Pennsylvania Geologic Survey, Pennsylvania Department of Environmental Protection (PADEP), Pennsylvania Geological Survey or Virginia Department of Mines, Minerals, and Energy (VDMME), and the North Carolina Department of Environment and Natural Resources (NCDENR). The following sections summarize the surficial geology of the project facilities.

Pennsylvania

<u>CPL North</u>

The surficial geology of the CPL North area consists of a mixture of silty glacial till, sandy glacial till, and stratified sand and gravel (Sevon, 1989). Plateaus and deep valleys are characterized by flat surfaces to gently sloping uplands developed on mixed rock types. Uplands are dissected by steeply sloped valleys, which have some colluvium on hillsides, and alluvium in narrow valley bottoms. There are also areas where carbonate rocks underlie lowland areas with low relief and poorly developed surface drainage (Sevon, 1989).

Surficial geology in northeastern Pennsylvania is comprised mainly of glacial and re-sedimented till from the late-Wisconsinan and Illinoian glacial events. The portion of CPL North that would be within Columbia County contains glacial till from the late Illinoian and pre-Illinoian periods and Illinoian Lag, which is defined as having a mantle of discontinuous cobbles and boulders with subrounded sandstone clasts, some of which are erratic. In addition, the surface is underlain by less than 6 feet of matrix-supported diamict[1] derived from glacial deposits, which in turn is underlain by bedrock (Braun, 2012).

The project area in Luzerne, Wyoming, and Susquehanna Counties was affected by the late-Wisconsinan continental glaciation, which resulted in the deposition of sandy Olean till, partially or completely filling small gullies and valleys that were cut into hillsides prior to glaciation (Sevon et al., 1999). Stratified drift comprised of alluvial sand and gravel is present along major stream valleys in the project area (Sevon and Braun, 2000). Bedrock outcrops are located through many portions of the project area. In some areas, rivers deposited surficial materials such as stratified silt, sand, and gravel, with some boulders; subrounded to rounded clasts; and localized lenses of silty or sandy clay (Braun, 2006a).

CPL South

CPL South would cross several geologically distinct areas that influence surficial geology in diverse and complex ways. In middle Lancaster County, surface geology consists of alternating carbonate bedrock residuum and schist bedrock colluvium, with some quartzite bedrock colluvium. Undistinguished colluvium on hillsides and alluvium in stream valleys is present (Sevon, 1996).

In middle Lancaster County, where CPL South would pass through the Piedmont Upland Section of the Piedmont Province, surface geology consists mostly of residuum and colluvium from weathered schist bedrock on hilltops and hillsides, and undistinguished colluvium and alluvium in stream valleys. Schist bedrock may be exposed or thinly covered by weathered schist residuum or colluvium on some upland areas or steep hillsides (Sevon, 1996).

In the northern portion of Lancaster County and the southern portion of Lebanon County, CPL South would pass through surficial geology that consists mostly of in situ weathered bedrock of the Piedmont Lowlands and Gettysburg-Newark Lowlands Sections of the Piedmont Province. Alluvium consisting of clay, silt, sand, and gravel underlies narrow to broad, flat-surfaced floodplains of perennial streams and is generally less than 10 feet thick. Colluvium is typically unsorted and unstratified to crudely stratified debris derived from underlying bedrock, and consists of a poorly sorted mixture of clay, silt, sand, and rock fragments from local bedrock (Sevon, 1989, 1996, 2000).

The Piedmont Lowlands Section is characterized by lower elevations and was developed by weathering and erosion of carbonate rocks, mainly the Ordovician-Cambrian Conestoga Formation. The Piedmont Lowlands is characterized by weathered bedrock primarily consisting of carbonate residuum, which occurs almost everywhere except where erosion has exposed unweathered bedrock in valley bottoms. The weathered bedrock consists of silt, clay, and some rock fragments produced by dissolution of carbonate bedrock (Sevon, 1996).

Along much of the CPL South route through southern Lebanon County (at about MPs 42.1 to M-0183 1.5, 48.7 to 48.8, 48.9 to 49.0, 49.1 to 49.2, 51.5 to 51.8, and 57.8 to 58.0), surface geology consists mostly of residuum from carbonate bedrock. Due to significant karst topography and a relatively flat ground surface, streams are not typically well developed into defined channels and valleys. Open and filled sinkholes, underground caves, and areas of subsidence are common in this area where underlying limestone bedrock formations occur (Sevon, 1989, 1996, 2000).

[1] A diamict is an unconsolidated, nonsorted or poorly sorted, nonlayered or vaguely layered deposit consisting of sand and/or coarser particles dispersed throughout a mud matrix (Allaby, M., 1990; Sevon, 1989).

The central Lebanon County portion of CPL South would pass through the Lebanon Valley, a sub-valley within the Great Valley Section of the Ridge and Valley Province, which is characterized by sedimentary rock and primarily consists of large deposits of limestone. The northern portion of the Lebanon Valley contains extensive shale deposits (Sevon, 2000).

The northern Lebanon County/western Schuylkill County portion of CPL South would pass through the Blue Mountain Section of the Ridge and Valley Province, which is characterized by Silurian aged sandstone (Sevon, 2000).

Where CPL South would pass through northwestern Schuylkill County, southeastern Northumberland County, and south Columbia County, the surface geology chiefly consists of the residuum, colluvium, and alluvium formed by fluvial, glacial, and mass-wasting processes from the bedrock of the Anthracite Upland Section of the Ridge and Valley Province (folded sandstones, shale, conglomerates, and anthracite coal). Ridges are typically composed of relatively erosion-resistant sandstone bedrock capped with residuum. Valley sediments are chiefly composed of alluvium emplaced on, or formed from, more erodible siltstones. Hillsides, as expected, typically have a thicker mantle of colluvium deposits towards the base of the slope. Ridges and hillsides may also be exposed bedrock outcrops (Sevon, 1989, 2000).

Surficial geology in the rest of Columbia County is comprised of sandy to clayey glacial till from the late-Wisconsinan and Illinoian glacial events deposited on sandstone and shale bedrock within the Susquehanna Lowlands Section of the Ridge and Valley Province. Stratified glacial outwash sand and gravel deposits occur in stream valleys and depressions. Stream valley bottom deposits are typically well sorted from stream or outwash action. Valley side deposits are typically poorly sorted and formed as glacial kame terraces from meltwater streams along the edges of retreating glaciers. Late Wisconsinan terminus glacial deposits transition to late Illinoian glacial deposits to the south. Hilltops and higher elevations consist mostly of bedrock or clast-rich diamict, composed of interbedded red and gray sandstone and shale bedrock outcrops and typically less than 6 feet of clast-rich diamict of residuum and colluvium overlying bedrock. Bedrock in the valleys and toe-slopes consists of Illinoian Lag from the pre-Illinoian and late Illinoian periods, which is defined as having a mantle of discontinuous cobbles and boulders with subrounded sandstone clasts, some of which are erratic. In addition, the surface is underlain by less than 6 feet of matrix-supported diamict derived from glacial deposits, which in turn is underlain by bedrock (Braun, 2007a, 2012; Sevon, 1989, 2000).

Chapman Loop

The Chapman Loop would be in the Deep Valleys physiographic section, which consists of many very deep, steep-sloped valleys that are separated by narrow, flat to sloping uplands. The valley slopes are always steep in the main part of the valley. In most valleys, the slope is fairly uniform from top to bottom; in some valleys, the slopes have a large-scale, stair-step appearance. This appearance results from erosion of sandstones and shales, rocks with different resistances to erosion. The sandstones are resistant to erosion and form very steep slopes and flat steps on the slopes. The shales are much less resistant to erosion and form sloping risers between steps. The valleys have been eroded by the West Branch Susquehanna River and its tributaries (Pennsylvania Department of Conservation and Natural Resources [PADCNR], 2015). This area is characterized by resistant sandstones, siltstones, and conglomerates with medium-volatile bituminous coal present in narrow seams. The surficial geology is residuum derived from sandstone, acid sandstone, and shale. Sandstone, siltstone, and shale rock fragments make up to 35 percent of the soil and are dominantly angular or subangular (NRCS, 2014).

Unity Loop

The Unity Loop would be in the Ridge and Valley Province, which is characterized by rolling hills with a local relief of 200 to 400 feet. The surficial geology of the Unity Loop area consists of glacial and re-sedimented till from the late-Wisconsinan and Illinoian glacial events in the Lycoming County area. The overall deposition pattern in this area is characterized by steep bedrock ridges partly filled with 30 to more than 100 feet of glacial till. Glacial till consists of a mix of silty glacial diamict, sandy glacial diamict, and stratified sand and gravel. Hilltops and higher elevations consist mostly of bedrock or clast-rich diamict, consisting of interbedded red and gray sandstone and shale bedrock outcrops and typically less than 6 feet of clast-rich diamict of residual and colluvial material overlying bedrock. Valleys and toe-slopes in this area consist of Wisconsinan Till or Boulder Colluvium. Wisconsinan Till consists of discontinuous cobble to boulder-size rounded and/or angular fragments with a clayey, silty, or sandy matrix.

Boulder Colluvium consists of quartz sandstone or conglomerate boulders and cobbles concentrated at the surface of the deposit, with stony colluvium clasts typically supported by a silt matrix with lenses of clast-supported material. The surface is typically underlain by 15 feet of matrix-supported diamict derived from glacial deposits, which in turn is underlain by bedrock (Braun, 2006b).

New Aboveground Facilities

The surficial geology for Compressor Station 605 is similar to the Wyoming County portion of CPL North, and the surficial geology for Compressor Station 610 is similar to the northern Columbia County portion of CPL South. The surficial geology of these areas is described above. The surficial geology at the new meter stations and regulator stations along the CPL North and CPL South routes and the new aboveground facilities is comparable to the associated pipeline sections previously described.

Modifications to Existing Aboveground Facilities

Compressor Station 517 would be about 5 miles east of Unity Loop. Surficial geology in this area is similar to that described above for Unity Loop.

Compressor Station 520 is in the Susquehanna Lowland Section, in the west-central portion of Lycoming County. The surficial geology is formed from glacial till bedrock or residuum derived from red shale siltstone or fine-grained sandstone and is deep and well drained (NRCS, 2014). It is mapped as Altonian (early Wisconsinan substage) Ice-Contact Stratified Drift consisting of a few to several feet of a moderately to poorly sorted mixture of sand, gravel, cobbles, and boulders. This material is characterized by a high infiltration capacity that is easily excavated but with a low cut-slope stability. Alluvium and Altonian Outwash, Undifferentiated is in the vicinity along Larry’s Creek and consists of cobbles and boulders of gray sandstone mixed with silt, sand, and gravel. This material also has a high infiltration capacity and low cut-slope stability (Sevon, 1977).

Virginia

Mainline A and B Replacements

The Mainline A and B Replacements would be in north-central Virginia, within the Piedmont Province, near the boundaries of the Piedmont Upland and the Piedmont Lowland. The Piedmont Lowland, or the Mesozoic Lowlands Subprovince region, is characterized by minor relief and low slopes underlain by Mesozoic (66 to 252 million years old) sedimentary and igneous rocks (Bailey, 1999). Soils in this area of the Piedmont Province were formed in deeply weathered materials from siltstone and sandstone formed during the Triassic period (200 to 250 million years ago), and bedrock is generally buried under a thick (6 to 60 feet) blanket of saprolite (chemically weathered rock) (Furcron, 1939; NRCS, 1985a, 1985b).

Existing Aboveground Facilities

The surficial geology for Compressor Station 185 is the same as described for the Mainline A and B Replacements above.

The surficial geology for Compressor Station 170 consists of residuum weathered from igneous and metamorphic rock (NRCS, 2014). Depth to competent bedrock ranges from 60 to 80 inches or more.

Maryland

Existing Aboveground Facilities

Compressor Station 190 is in Howard County and within the Piedmont Plateau physiographic province and Piedmont Upland Section. The Piedmont in this area is composed of hard, crystalline, igneous, and metamorphic rocks. The surficial geology of the area is considered to be nearly level to strongly sloping, very deep, well-drained to poorly drained soils that were formed in residuum derived from marble and in colluvium derived from schist over marble residuum. In addition, areas of nearly level floodplains were formed in alluvium recently eroded from upland soils formed in material derived from mica and phyllite (NRCS, 2014).

North Carolina

Existing Aboveground Facilities

Compressor Station 160 is in the Piedmont physiographic province of Rockingham County. The Piedmont in this area is characterized by gently rolling, well-rounded hills and long, low ridges with a few feet of elevation difference between the hills and valleys. Compressor Station 160 is in the Carolina Slate Belt of the Piedmont, which consists of heated and deformed volcanic and sedimentary rocks (NCDENR, 2011). The surficial geology of this area is characterized by gently sloping to steep, well-drained soils that are residuum weathered from felsic crystalline rock or saprolite derived from granite and gneiss and/or schist. These areas have a loamy surface layer and a clayey subsoil on uplands and side slopes (NRCS, 2014).

Compressor Station 150 is in the Charlotte Belt of the Piedmont physiographic region, in Iredell County. The Charlotte Belt primarily consists of igneous rocks such as granite, diorite, and gabbro (NCDENR, 2011). Surficial geology of this location has been disturbed by human activities, and consists of imported fill sourced primarily from mine spoils (loamy and clayey material), or earthy fill derived from igneous, metamorphic, and sedimentary rock. The depth to bedrock is more than 80 inches. The parent material for this area is residuum weathered from mica schist and/or other micaceous metamorphic rock (NRCS, 2014).

Compressor Station 145 is in the Kings Mountain Belt of Piedmont physiographic region, in Cleveland County. The Kings Mountain Belt consists of moderately deformed and metamorphosed volcanic and sedimentary rocks (NCDENR, 2011). Surficial geology consists of thick soils covering bedrock in intervalley areas of low relief (Horton, 2008). The surficial geology was formed in residuum derived from schist or gneiss bedrock. The moderately deep soils are in convex landform positions and are gently and strongly sloped. These areas have a high content of mica on uplands (NRCS, 2014).

4.1.2.2 Bedrock Geology

To determine the bedrock geology of the areas crossed by the Project, geologic maps prepared by the USGS were reviewed. Tables 4.1.2-1 and 4.1.2-2 summarize the bedrock geology crossed by the proposed pipeline facilities and new and modified aboveground facilities, respectively.

TABLE 4.1.2-1

Classes of Parent Rock Types Crossed by the Pipeline Facilities Associated with the Atlantic Sunrise Project

Commonwealth/Facility	Sedimentary (miles) [a]	Metamorphic (miles) [b]	Igneous (miles) [c]
Pennsylvania			
CPL North	58.7	0	0
CPL South	111.6	14.8	0.9
Unity Loop	8.5	0	0
Chapman Loop	2.5	0	0
Virginia			
Mainline A and B Replacements	2.5	0	0

Source: USGS, 2005

[a] Sedimentary units include the following lithologies: arkose, conglomerate, dolomite, greywacke, sandstone, shale, mudstone, limestone, and siltstone.

[b] The metamorphic units crossed include phyllite, quartzite, and schist.

[c] The igneous rock unit crossed is a diabase.

TABLE 4.1.2-2

Major Rock Types Underlying the New and Modified Aboveground Facilities Associated with the Atlantic Sunrise Project [a]

State/Facility	County	Generalized Bedrock Descriptions
Pennsylvania		
Compressor Station 605	Wyoming	Sedimentary: sandstone, siltstone, shale, and mudstone
Compressor Station 610	Columbia	Sedimentary: siltstone and shale
Zick Meter Station	Susquehanna	Sedimentary: sandstone, siltstone, shale, and mudstone
Springville Meter Station	Wyoming	Sedimentary: sandstone, siltstone, shale, and mudstone
North Diamond Regulator Station	Luzerne	Sedimentary: sandstone, siltstone, shale, and mudstone
West Diamond Regulator Station	Columbia	Sedimentary: sandstone, siltstone, shale, and mudstone
River Road Regulator Station	Lancaster	Metamorphic schist, phyllite, some gneiss, and some granite
Compressor Station 520	Lycoming	Sedimentary: sandstone, siltstone, shale, and mudstone
Compressor Station 517	Columbia	Sedimentary: sandstone, siltstone, shale, and mudstone
Maryland		
Compressor Station 190	Howard	Metamorphic: schist, marble, gneiss, and granulite.
Virginia		
Compressor Station 185	Prince William	Sedimentary: shale and siltstone
Compressor Station 170	Appomattox	Metamorphic: greenstone and amphibolite gneiss
North Carolina		
Compressor Station 160	Rockingham	Metamorphic: biotite gneiss and mica schist
Compressor Station 150	Iredell	Metamorphic: biotite gneiss and amphibolite
Compressor Station 145	Cleveland	Metamorphic: mica schist and phyllite

Sources: USGS, 2005; Miles and Whitfield, 2001; Maryland Geological Survey, 1968; North Carolina Department of Natural Resources and Community Development, 1985; VDMME, 1993.

[a] Transco would perform modifications to existing aboveground facilities, including nine existing compressor stations (Compressor Stations 520, 517, 190, 185, 170, 160, 155, 150, and 145), 42 M&R stations, and 14 MLVs. The modifications to the 42 M&R stations, 14 MLVs, and Compressor Station 155 would require limited or no subsurface disturbance and are, therefore, excluded from this table.

4.1.2.3 Shallow Depth to Bedrock

Soils with bedrock present within 5 feet of the surface are considered to have shallow depth to bedrock. Areas with shallow bedrock classifications were identified using the NRCS' Soil Survey Geographic Database (SSURGO). Table 4.1.2-3 identifies the areas where shallow depth to bedrock may be encountered. No areas of shallow depth to bedrock have been identified along the Mainline A and B Replacements or at the new or existing aboveground facilities; therefore, proposed facilities in Virginia, Maryland, and North Carolina and aboveground facilities in Pennsylvania are not discussed further in this section. Appendix H identifies areas of shallow depth to bedrock, by milepost, for each of the pipeline facilities in Pennsylvania.

TABLE 4.1.2-3

Potential Areas of Shallow Bedrock Crossed by the Atlantic Sunrise Project [a, b]

Project Facility/County, Commonwealth		Total Crossing Length (miles)	Bedrock Type [c]	
			Lithic (miles)	Paralithic (miles)
CPL North				
Columbia County, PA		5.0	2.0	0.0
Luzerne County, PA		23.2	7.8	0.0
Wyoming County, PA		23.7	6.8	0.0
Susquehanna County, PA		6.7	0.7	0.0
	Subtotal	**58.7**	**17.3**	**0.0**
CPL South				
Lancaster County, PA		37.1	14.4	18.1
Lebanon County, PA		28.4	22.3	0.5
Schuylkill County, PA		18.5	13.2	0.3
Northumberland County, PA		9.0	4.4	0.1
Columbia County, PA		34.3	27.8	0.2
	Subtotal	**127.3**	**82.0**	**19.2**
Chapman Loop				
Clinton County, PA		2.5	1.8	0.7
	Subtotal	**2.5**	**1.8**	**0.7**
Unity Loop				
Lycoming County, PA		8.5	0.0	0.0
	Subtotal	**8.5**	**0.0**	**0.0**
TOTAL		**199.4**	**101.1**	**19.9**

[a] Based on analysis of the SSURGO database (Soil Survey Staff, 2015b).

[b] Installation of the Mainline A and B Replacements would occur within the existing trench; therefore, blasting is not anticipated.

[c] Paralithic refers to "soft" bedrock that would not likely require blasting during construction. Lithic refers to "hard" bedrock that could require blasting or other special construction techniques during pipeline installation.

About 121.0 miles (61 percent) of the Pennsylvania pipeline facilities would encounter shallow bedrock. Of this length, about 19.9 miles are classified as paralithic (i.e., weathered) bedrock that may not require blasting.

4.1.3 Blasting Effects and Mitigation

Transco anticipates that some rock removal may be required during construction of the pipeline facilities in areas of shallow depth to bedrock. The CPL North, CPL South, Chapman Loop, and Unity Loop combined would cross about 121.0 miles of shallow bedrock that could require blasting. The

Mainline A and B Replacements would not require blasting because construction would take place in the existing trench.

Potential impacts on water wells, springs, wetlands, nearby aboveground facilities, and adjacent pipelines and utility lines could result from blasting. Potential impacts on water wells and springs are addressed in section 4.3. Transco would offer both pre- and post-construction testing of water quality and quantity in wells within 150 feet of construction workspaces, and would mitigate any damages caused by construction. Any required blasting would be conducted in accordance with all federal, state, and local regulations. Transco would prepare site-specific blasting plans as may be required by local permitting. Transco has prepared a Blasting Plan as part of its ECP (see attachment 10 of Transco's ECP). As outlined in the Blasting Plan, Transco would:

- use the minimum charges needed;
- use blasting mats or padding where necessary to prevent the scattering of debris;
- use seismograph equipment to monitor the velocity of the blasts at all structures within 150 feet of blasting activities (peak particle velocity would not exceed 2 inches per second);
- inspect aboveground and underground facilities within 150 feet of blasting activities before and after blasting; and
- provide occupants of nearby buildings and residences at least 72 hour advance notice of blasting activities.

We have reviewed Transco's Blasting Plan and find it acceptable.

4.1.4 Mineral Resources

A review of the project area was conducted using publically available mineral resource information provided by the PADEP, USGS, Maryland Department of Environment (MDE), and the NCDENR, and in coordination with the Pennsylvania Office of Active and Abandoned Mines.

Mineral resources in the project area include quarries, peat production facilities, coal mines, oil and gas wells, and abandoned mines. Table 4.1.4-1 presents a summary of mineral resources that have been identified within 0.25 mile of project workspaces, and appendix I provides the milepost location of these mineral resources. No mineral resources were identified within 0.25 mile of the proposed workspaces associated with any of the aboveground facilities.

TABLE 4.1.4-1

Summary of Mineral Resources Within 0.25 Mile of the Project Workspaces for the Atlantic Sunrise Project

Commonwealth/Facility	Quarries [a]	Coal Mines	Abandoned Mines	Oil and Gas Wells
Pennsylvania				
CPL North	8	2	3	30
CPL South	2	12	55	0
Unity Loop	0	0	0	24
Chapman Loop	0	0	0	7
Virginia				
Mainline A and B Replacements	2	0	0	0
PROJECT TOTAL	**12**	14	58	61

[a] Includes one peat production facility.

Fifty-four of the mineral resources within 0.25 mile of project workspaces are currently active.

Inactive mineral resource sites include abandoned mine lands (AML). AMLs are present in areas of historic coal mining in Pennsylvania. AMLs refer to sites used for mining, mineral processing, and waste disposal that were abandoned or left inadequately reclaimed prior to the adoption of federal mining laws in 1977. AMLs are prevalent in the anthracite coal belts in Northumberland and Schuylkill Counties. AMLs present issues such as mine fires, mine subsidence, dangerous highwalls, open shafts and portals, mining-impacted water supplies, and other hazards (PADEP, 2014a). AMLs could present a significant hazard to the environment and worker safety if they are within or adjacent to the project workspaces. Fifty-five AMLs were identified within 0.25 mile of the proposed workspace for CPL South, three of which would be within the workspace. Two AMLs were identified within the workspace for CPL North.

Transco completed an abandoned mine investigation to identify existing mine features and to assess the relative risk of mine-related ground subsidence. The potential abandoned mine features investigated included trough subsidence, sinkholes, mine fires, mine pool discharge points, and mine waste and talus deposits associated with underground mines and mine entries that are adjacent to or underlie the pipeline. Categories of low, moderate, and high relative risk for subsidence were developed for the 3.9 miles of the pipeline route that crosses AMLs. Different methodologies have been applied by the mining industry and federal and state agencies to assess the relative risk of mine-related ground subsidence; however, no rigid guidelines have been established. Evaluation of relative risk is therefore made using professional judgment and experience based on assessment of the physical characteristics typically associated with abandoned mine lands. Common considerations that are used to evaluate relative risk include proximity to existing mine features (depressions, mine openings, drainage tunnels, etc.), geologic conditions (vein depth and configuration, lateral continuity, type of mining), and geophysical anomalies. The identified mine-impacted areas along the designated section of the project alignment are characterized by similar geologic conditions and are underlain by similar geologic units. Accordingly, geologic formation or conditions are not considered to be a primary factor influencing relative risk and have therefore not been used in the relative risk evaluation for this Project.

Based on this investigation, Transco estimates that the CPL South alignment would cross:

- 0.6 mile characterized as high relative risk for subsidence (15.4 percent of alignment in AML areas);
- 1.2 miles characterized as moderate relative risk for subsidence (30.8 percent of alignment in AML areas); and
- 2.1 miles characterized as low relative risk for subsidence (53.8 percent of alignment in AML areas).

The relative risk of future mine-related subsidence is identified by the occurrence of mine features. Mine subsidence is most likely to occur in regions where subsidence has occurred before and, similarly, in areas where abandoned mine features include entries, vent shafts, tunnels, and mined veins. Additional information on relative risk and AMLs is contained in Transco's *Abandoned Mine Investigation and Mitigation Plan*.[2]

4.1.5 Geologic Hazards

Geologic hazards are conditions or phenomena that present a potential risk to life and/or property, and can be either naturally occurring or man-made. Geologic hazards of potential concern in the project

[2] Transco's updated *Abandoned Mine Investigation and Mitigation Plan* can be accessed online at http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20150729-5077.

area include seismic risk and active faults, soil liquefaction, landslides (steep slopes and side slopes), karst topography and land subsidence, flash flooding, and AMLs.

4.1.5.1 Seismicity

Seismicity refers to the frequency, intensity, and distribution of earthquakes within a given area. Earthquakes generally occur when the two sides of a fault suddenly slip past each other. The movement creates ground motion, which can damage property and structures if the motion is sufficiently intense. The majority of earthquakes occur along boundaries of tectonic plates. The east coast of the United States is considered a passive tectonic plate boundary located on the trailing edge of the North American continental plate, which is relatively seismically quiet. The plate boundary nearest the project area, the Mid-Atlantic Ridge, is about 2,000 miles east of eastern North America (Scharnberger, 2003). Damaging earthquakes east of the Rocky Mountains are rare. Of those that do damage buildings or other man-made structures, most cause only slight, localized damage with few injuries (USGS, 2014c). Nevertheless, the eastern United States does experience some earthquake activity (Scharnberger, 2003). The measurement of ground motion is peak ground acceleration (PGA), generally expressed as a percentage of gravitational acceleration (g) for a generic bedrock condition. Typical bedrock PGA values with a 2 percent probability of being exceeded during a 50-year period are between 1 and 10 percent g for areas that are not seismically active. Seismically active areas such as the West Coast typically have corresponding bedrock PGA values of between 40 and 100 percent g. Table 4.1.5-1 presents project-area bedrock PGA values with a 2 percent probability of being exceeded during a 50-year period (USGS, 2008a).

TABLE 4.1.5-1

Potential Seismic Intensity for the Atlantic Sunrise Project

Facility	PGA with a 2-percent Probability of Exceedance in 50 Years (percent g)[a]
CPL North	6 to 8
CPL South	6 to 10
Unity Loop	4 to 6
Chapman Loop	6 to 8
Mainline A and B Replacements	6 to 8
Compressor Station 605	6.7
Compressor Station 610	6.7
Zick Meter Station	6.5
Owego Meter Station	6.5
Springville Meter Station	6.8
North Diamond Regulator Station	6.9
West Diamond Regulator Station	6.2
River Road Regulator Station	9.6
Compressor Station 520	5.2
Compressor Station 517	6.2
Compressor Station 190	5.9
Compressor Station 185	6.0
Compressor Station 170	9.6
Compressor Station 160	7.6
Compressor Station 150	10.1
Compressor Station 145	10.1

Source: USGS, 2008a

[a] The percent probability of exceedance in 50 years shown in percent g is identified as a range for the pipeline facilities because they cross multiple areas, whereas it is shown as an exact value for the aboveground facilities with respect to their exact location.

4.1.5.2 Active Faults

A fault is a fracture in the bedrock where movement has occurred relative to each side of the fracture (USGS, 2014c). Movement can range from just a few inches to tens of feet, depending on the earthquake magnitude. Generally, faults occur in various sizes and ages, and can extend to the ground surface or be buried deep within the Earth's crust and have no surface expression. East of the Rocky Mountains, faults are usually not visible to a person standing on the ground because thick soils at the surface obscure most fault lines. Mapped fault lines east of the Rocky Mountains are not particularly reliable guides to earthquakes or earthquake hazards because most of the faults are inactive. Accordingly, records of past earthquakes are probably the best guide to earthquake hazards east of the Rocky Mountains (USGS, 2014c).

Earthquakes can also cause damage by causing the ground surface to break along a fault line. For a fault to be considered active, displacement must have taken place in the last 10,000 years. The USGS has completed several studies to identify Quaternary (less than 2.6 million years old [Ma]) faults and other tectonic structures in the eastern United States (Crone and Wheeler, 2000; Wheeler, 2005), resulting in a database of Quaternary faults, liquefaction features, and other potential tectonic features (Quaternary Fault and Fold Database) (USGS, 2006b). These features are evaluated and classified into one of four categories (Class A, B, C, or D). Class A features have geologic evidence that demonstrates the existence of a Quaternary fault or tectonic origin either exposed by mapping or inferred deformational features. Class B features have geologic evidence that is indicative of a Quaternary deformation, but the fault is not deep enough to be a potential source for earthquakes or the evidence available is too significant to assign a fault as Class C, but not enough to assign as Class A. Class C features do not have sufficient evidence to demonstrate the existence of a tectonic fault, or Quaternary slip or deformation associated with the feature. Class D features are defined by the USGS as not to be of seismic origin (Crone and Wheeler, 2000). Identified faults, both active and inactive, in the project area are discussed below.

Pennsylvania

<u>CPL North</u>

A review of USGS fault data (USGS, 2005) indicated that CPL North would not cross any known, mapped, or inferred faults. The closest mapped faults are located about 5.6 miles southeast of MP 21.7.

<u>CPL South</u>

CPL South would cross the east-to-west trending Martic Fault near MP 7.4 in Lancaster County (Chester County, 2014). The Martic Fault is a geologically ancient thrust fault within the Martic Zone, a zone of imbricated thrust sheets (i.e., overlapping or shingled fault slices), that developed around 450 million years ago during the Taconic Orogeny (Wise and Ganis, 2009). The last major stage of tectonic deformation that deformed the Martic Zone occurred due to continental rifting during the Mesozoic Era.

The Martic Fault and the other thrust faults of the Martic Zone have been classified as a pre- to syn-metamorphic thrust in a high-grade metamorphic terrane (Odom and Hatcher, 1980). These faults were, for the most part, healed during metamorphism and not reactivated, but they were severely deformed later. The width/thickness of the faults may be inches to feet or tens of feet. Where folds are present, brittle fractures are likely, and mineralization and breccia (a rock type consisting of angular clasts) zones may be present.

A magnitude 4.1 earthquake occurred on April 23, 1984, about 1 mile from Conestoga, Pennsylvania. The USGS determined that the source of this earthquake, the "1984 Marticville earthquake" was an unmapped fault trending north-northeast, with a hypocenter more than 3 miles beneath the surface and an epicenter about 0.6 mile southwest of MP 9.6 in Lancaster County (Stover and Coffman, 1993). Based on the location of the epicenter and the trend of the fault responsible for this earthquake, the CPL South pipeline is projected to cross the fault north of MP 9.6.

A second known earthquake event, a 3.4-magnitude event occurred on December 27, 2008, with its epicenter about 2 miles from Landisville, Pennsylvania, which is about 13 miles north-northeast of Conestoga, and at a depth of 4 kilometers. We received comments on the draft EIS from a former State Geologist of Pennsylvania stating that the Project pipeline would be located between the epicenter of this event and the outcrop of a thrust fault in a nearby quarry.

The most recent event to occur was a 1.8-magnitude earthquake that occurred on January 8, 2014, with its epicenter about 1.2 miles from Conestoga, Pennsylvania and at a depth of 5 kilometers (Earthquake Track, 2014).

Although minor damage was recorded in Conestoga, Pennsylvania from the 1984 4.1-magnitude earthquake event, such as a garage shifting 0.5 inch off its foundation, plaster falling from a ceiling, and cracks formed in windows, concrete basements, and a cistern (Stover and Coffman, 1993), no surface rupture associated with displacement along the fault was noted to be associated with this earthquake.

The source of these relative recent seismic events in Lancaster County is believed to be the Lancaster Seismic Zone. It is the most active seismic zone in Pennsylvania, with earthquakes occurring once or twice per decade, with some decades having none and the 1990s having as many as six (PADCNR, 2007b; USGS, 2014c). Scharnberger (2006) states that the 11 epicenters since 1964 in the western part of the Lancaster Seismic Zone define a north-south trend that intersects the juncture between the Gettysburg and Newark subbasins that is a hinge around which the two sub-basins subside resulting in an east-to-west orientated tensile stress, and that seismicity is due to present-day northeast to southwest compressional stress activating Mesozoic fractures (Scharnberger, 2006).

Transco has designed and constructed pipelines in more seismically active sections of the United States where the maximum earthquake magnitudes can exceed those of the Lancaster Seismic Zone. In general, pipelines constructed using electric arc-welded techniques have performed well in all seismically active areas of the United States, such as California. A review of gas transmission line performance after a 1994 seismic event in Northridge, California showed that 91 percent of all pipeline damage occurred in areas with earthquakes greater than a Modified Mercalli Intensity of VIII (an approximate 7.0-magnitude event) (O'Rourke and Palmer, 1996).

Transco conducted a seismic analysis of the Lancaster Seismic Zone to estimate the peak ground acceleration, peak ground velocity, and resulting strains and curvatures and associated stresses on the pipeline (see appendix J). Results of the seismic analysis for the Lancaster Seismic Zone indicate that although it has higher ground motions than the surrounding region, based on this analysis, the ground motions still indicate a low seismic hazard for the pipeline.

<u>Chapman Loop</u>

Chapman Loop would not cross any known, mapped, or inferred faults (USGS, 2005). The closest mapped faults are over 15 miles southeast of MP L185.90.

Unity Loop

Unity Loop would not cross any known, mapped, or inferred faults (USGS, 2005). The closest mapped faults are about 12 miles west of MP L128.87.

Compressor Station 605

Compressor Station 605 would not be sited on any known, mapped, or inferred faults (USGS, 2005). The closest mapped faults are about 10 miles southeast of the site.

Compressor Station 610

Compressor Station 610 would not be sited on any known, mapped, or inferred faults (USGS, 2005). The closest mapped faults are about 5 miles south of the site.

Other New Aboveground Facilities

None of the five proposed new M&R stations would be sited on any known, mapped, or inferred faults (USGS, 2005). No mapped faults are within 4 miles of any of the new meter or regulator station sites.

Virginia

Mainline A and B Replacements

The Mainline A and B Replacements would not cross any known, mapped, or inferred faults (USGS, 2005). The closest mapped faults are 1.7 miles west of the Transco Mainline (at MP 1,578.7).

Existing Aboveground Facilities

Faults exist primarily in western (Valley and Ridge and Blue Ridge Provinces) and central (Piedmont Province) Virginia. These faults trend in a general northeast-southwest direction and are mostly associated with ancient (about 200 to 700 million-year-old) mountain-building events (Bailey, 2000). No faults are present beneath Compressor Stations 170 or 185. The nearest fault to Compressor Station 170 is about 1.8 miles to the southeast (USGS, 2005). Compressor Station 185 is situated between two faults located 2.0 miles to the southeast near Manassas National Battlefield Park and 3.0 miles to the northwest near Groveton (USGS, 2005).

Maryland

Existing Aboveground Facilities

Faults are known to be present in Maryland, but none are known or suspected to be active (Reger, 2003). The state is generally characterized by low earthquake activity. The USGS does not have mapped fault data publically available for Maryland.

North Carolina

Existing Aboveground Facilities

None of the existing compressor stations are situated on any mapped faults (USGS, 2005). The mapped fault closest to Compressor Station 145 is about 8.8 miles to the north-northeast. The fault closest to Compressor Station 150 is a short segment about 19 miles to the northwest. The fault closest to Compressor Station 160 is about 18 miles to the west of the facility.

The pipeline and associated facilities would be designed and constructed in accordance with applicable DOT regulations (49 CFR 192) and applicable federal and state standards and design requirements, which will allow the project facilities to withstand probable seismic risks based on the risk zones crossed by the Project. Even under much higher ground vibrations, the main risk to pipelines would be where the pipeline is buried along a hillside coupled with unstable soils that could become displaced laterally during an earthquake.

As discussed, O'Rourke and Palmer (1996) performed a review of the seismic performance of gas transmission lines in southern California and concluded that modern electric arc-welded gas pipelines perform well in seismically active areas of the United States.[3] Based on the low seismic risk and occurrence assigned to the project area, we find the potential risk of damage to pipeline facilities by earthquakes to be low.

4.1.5.3 Soil Liquefaction

Soil liquefaction is a process whereby earthquake shaking or other rapid loading reduces the strength and stiffness of a saturated sandy soil. The result is a transformation of soil to a liquid state. Typically, three general factors are necessary for liquefaction to occur and can be used as a liquefaction hazard screening (USGS, 2006b). These factors are:

- Loose, granular sediment – The presence of sands and silts with very low or no clay content, naturally deposited (beach or river deposits, windblown deposits), or man-made land (hydraulic fill, backfill).
- Saturation of the sediment by groundwater – In saturated soil, the space between individual particles is completely filled with water. The water pressure on the soil particles increases during ground shaking and can overcome the overburden pressure, and hence result in liquefaction. Soil deposits with a high susceptibility to liquefaction are most commonly found near bodies of water such as rivers, lakes, bays, oceans, and the associated wetlands.
- Severe shaking – The potential for liquefaction depends on the amplitude and duration of shaking at the site. Higher magnitude earthquakes produce longer duration shaking and higher ground motion amplitudes, which result in a higher liquefaction potential. The potential severity of an earthquake event is covered in section 4.1.5.1 above.

Considering that any significant deposits of loose, granular, and saturated sediments are likely confined to relatively shallow alluvial soils typically occurring along waterbodies and their associated wetlands, and that the potential, as described in section 4.1.5.1, for larger magnitude earthquakes is very low, the potential for soil liquefaction is deemed to be low for the entire Project.

4.1.5.4 Landslides

A landslide is generally described as the downslope movement of soil, rock, and organic materials under the effects of gravity (USGS, 2008b). Landslide hazards can be assessed in two different ways:

- landslide incidence – areas where landslides have occurred in the past; and
- landslide susceptibility – areas where previous landslides are susceptible to future landsliding.

[3] This study reviewed seismic performance of gas transmission lines during 11 major earthquakes ranging in magnitude from 5.8 to 7.7 with epicenters within the gas transmission system.

The digitally compiled Landslide Overview Map of the Conterminous United States (Landslide Map) (Radbruch-Hall et al., 1982 [digitally compiled by Godt, 2002]) shows landslide susceptibility and landslide incidence. Landslide susceptibility areas are determined by correlation to some of the principle factors that contribute to landsliding (i.e., steep slopes, weak geologic units that lose strength when saturated or disturbed, and poorly drained rock or soils) along with the past distribution of landslides. These areas identify the relative stability of slopes and do not make absolute predictions (USGS, 2008b). Susceptibility to landslides is rated from low to high, based on the percent of an area affected by landslides:

- low (less than 1.5 percent of the area affected by landslides);
- moderate (1.5 to 15 percent of the area affected); and
- high (greater than 15 percent of the area affected).

Only some of the project areas have landslide susceptibility; however, all areas have been documented for landslide incidences (Godt, 2002). Table 4.1.5-2 identifies the landslide incidence/susceptibility for the pipeline facilities.

Areas of steep slopes (greater than 30 percent) and steep side slopes (greater than 30 percent) are another indicator of landslide potential (see tables 4.1.5-3 and 4.1.5-4). No areas of steep slopes or steep side slopes are present along Chapman Loop, the Mainline A and B Replacements, or the new or existing aboveground facilities.

A review of aerial imagery did not indicate the presence of obvious existing landslide features along the pipeline alignment. Because a significant portion of the alignment in Pennsylvania is forested, Transco completed a *Landslide Hazard Investigation and Mitigation Plan*[4] to further evaluate the presence of and the potential for landslide occurrence. The desktop evaluation included the reviewing of available historic landslide information on a local and regional scale, geologic conditions, and publicly available Light Detection and Ranging (LiDAR) data.[5] We reviewed this information and found no evidence of historic landslide presence nor evidence of seismically induced landslides along the proposed centerline.

Based on Transco's desktop evaluation, 190 locations along the pipeline alignment were selected for site reconnaissance in order to further evaluate existing ground conditions. At the time of Transco's investigation, property access was not granted for 34 sites; therefore, 156 sites were investigated during the site reconnaissance to assess the visible evidence of potential landslide-related features. Of the 156 sites analyzed, 13 sites had high relative risk, 77 sites had moderate relative risk, and 66 sites had low relative risk for landslide activity. According to Transco, the highest relative risk sites visibly appeared unstable, the moderate relative risk sites exhibited at least one slow movement feature but visually appeared stable, and the lowest relative risk sites did not exhibit any movement features and also visually appeared stable.

[4] Transco's updated *Landslide Hazard Investigation and Mitigation Plan* can be accessed at http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20150729-5077.

[5] LiDAR uses light in the form of a pulsed laser from an airplane or helicopter to map the land surfaces and elevations.

TABLE 4.1.5-2

Summary of Landslide Susceptibility and Incidence for the Pipeline Facilities Associated with the Atlantic Sunrise Project

Commonwealth/Facility/County	Landslide Incidence and Susceptibility [a]	Milepost Range	Total Miles
Pennsylvania			
CPL North			
Columbia	Moderate	0 to 5.0	5.0
Luzerne	Moderate	5.0 to 6.3	1.3
Luzerne	Low	6.3 to 6.5	0.2
Luzerne	Moderate	6.5 to 11.4	5.0
Luzerne	Low	11.4 to 28.6	17.2
Wyoming	Low	28.6 to 43.1	14.5
Wyoming	Susceptibility Moderate	43.1 to 50.6	7.5
Susquehanna	Susceptibility Moderate	50.6 to 57.3	6.7
CPL South			
Lancaster	Low	0.0 to 36.5	38.0
Lebanon	Low	36.5 to 54.3	18.7
Lebanon	High-Moderate	54.3 to 64.3	10.0
Schuylkill	High-Moderate	64.3 to 82.7	18.4
Northumberland	High-Moderate	82.7 to 91.0	8.4
Columbia	High-Moderate	91.0 to 108.3.0	17.7
Columbia	Low	108.3 to 123.0	14.7
Columbia	Moderate	123.0 to 125.15	2.2
Chapman Loop			
Clinton	Susceptibility Moderate	186.0 to 188.5	2.5
Unity Loop			
Lycoming	Moderate	120.4 to 128.9	8.5
Virginia			
Mainline A and B Replacements			
Prince William	Low	0.0 to 2.5	2.5

[a] Susceptibility is not indicated where lower than incidence.

Notes:

High-Moderate = High susceptibility to landsliding and moderate incidence (1.5 to 15 percent of area is involved in landsliding).

High = High landslide incidence (greater than15 percent involved in landsliding).

Moderate = Moderate landslide incidence (1.5 to 15 percent of area is involved in landsliding).

Low = Low landslide incidence (less than1.5 percent of area is involved in landsliding).

Susceptibly Moderate = Moderate susceptibility to landsliding and low incidence.

TABLE 4.1.5-3

Summary of Steep Slopes [a] Crossed by the Pipeline Facilities Associated with the Atlantic Sunrise Project

Commonwealth/Facility/County	Distance (miles) [b]	Percent of Total Facility Length [b]
Pennsylvania		
CPL North		
Columbia	0.4	0.7
Luzerne	2.2	3.7
Wyoming	1.4	2.4
Susquehanna	0.3	0.5
CPL South		
Lancaster	1.4	1.1
Lebanon	0.7	0.6
Schuylkill	2.7	2.1
Northumberland	3.0	2.3
Columbia	6.8	5.4
Unity Loop		
Lycoming	0.1	1.2

Source: PADCNR, 2008

[a] Steep slopes (greater than 30 percent slope) are defined with the pipeline running perpendicular to the slope. The slope locations were identified utilizing 2-foot contours that were created from Light Detection and Ranging (LiDAR) survey data. The LiDAR survey was completed by the Pennsylvania Topographic and Geologic Survey Program (PAMAP). The locations indicate areas along the Project where the centerline would cross steep slopes greater than 30 percent (PADCNR, 2008). No areas of steep slopes are present along Chapman Loop or the Mainline A and B Replacements.

[b] The total may not match the sum of addends due to rounding.

TABLE 4.1.5-4

Summary of Steep Side Slopes [a] Crossed by the Pipeline Facilities for the Atlantic Sunrise Project

Commonwealth/Facility/County	Distance (miles) [b]	Percent of Total Facility Length [b]
Pennsylvania		
CPL North		
Columbia	0.0	0.0
Luzerne	0.2	0.3
Wyoming	0.0	0.0
Susquehanna	0.0	0.0
CPL South		
Lancaster	0.0	0.0
Lebanon	0.0	0.0
Schuylkill	0.1	0.1
Northumberland	0.1	0.1
Columbia	0.1	0.1
Unity Loop		
Lycoming	<0.1	<1.0

Source: PADCNR, 2008

[a] Steep side slopes (greater than 30-percent slope) are defined with the pipeline running perpendicular to the slope. The slope locations were identified utilizing 2-foot contours that were created from LiDAR survey data. The LiDAR survey was completed by the PAMAP. The locations indicate areas along the Project where the centerline would cross steep slopes greater than 30 percent (PADCNR, 2008). No areas of steep slopes are present along Chapman Loop or the Mainline A and B Replacements.

[b] The total may not match the sum of addends due to rounding.

4.1.5.5 Flash Flooding

Flash floods result from significant rapid increases in water volume and flow rate within waterbodies and onto adjacent floodplains. A flash flood follows heavy or excessive rainfall in a short period of time, generally less than 6 hours. They can occur within minutes or a few hours of excessive rainfall, based on the size of the rain event and/or contributing watershed after a levee or dam has failed (National Weather Service, 2006). Flash floods are more common in the western United States because the soil is generally dry, sandy, and unable to absorb large amounts of water in a short period of time. Heavy precipitation events can fill dry stream and river beds quickly, sending significant volumes of water downstream.

Precipitation events produce flash flooding less commonly in the northeastern United States as compared to other regions. The National Oceanic and Atmospheric Administration (NOAA), National Weather Service Flash Flood Guidance (National Weather Service, 2013) provides estimates of the amount of rainfall required over a given area and duration to cause waterbodies to flood. These estimates are based on the current soil moisture and stream flow conditions for the area.

Flash flooding is possible on waterbodies in the project area. Table 4.1.5-5 lists the average precipitation rate required to begin flash flooding within 6 hours. The effect of flash flooding on the Project applies only to the pipeline facilities because no waterbodies exist within the construction workspaces for the new or existing aboveground facilities. In addition, no new aboveground facilities or additions to existing facilities would be within mapped Federal Emergency Management Agency (FEMA) 100-year floodplains.

TABLE 4.1.5-5

Average Precipitation Rate Required for Flash Flooding for the Atlantic Sunrise Project [a,b]

Commonwealth/Facility/County	Precipitation Rate (inches per hour)
Pennsylvania	
CPL North	
Columbia	2.9
Luzerne	2.8
Wyoming	2.3
Susquehanna	2.6
CPL South	
Lancaster	2.5
Lebanon	2.3
Schuylkill	2.5
Northumberland	2.5
Columbia	2.9
Unity Loop	
Lycoming	2.2
Virginia	
Mainline A and B Replacements	
Prince William	2.3

Source: National Weather Service, 2015

[a] Based on conditions updated on February 9, 2015. These rates are updated daily based on current stream flow and soil moisture conditions.

[b] Based on a 6-hour time period.

4.1.5.6 Karst Topography/Land Subsidence

Karst topography forms from the dissolution of soluble rocks such as carbonates, limestone, and dolomite (or dolostone). Less commonly, karst forms in other soluble materials such as gypsum, halite, or anhydrite. Carbonate bedrock units at or near the land surface are subject to a process referred to as dissolution in which slightly acidic rain water dissolves the bedrock, resulting in large pore spaces, conduits, caverns, and sinkholes. The near surface of the carbonate bedrock can also weather, resulting in a network of rubble, pinnacles, fissures, and tubes referred to as epikarst, which can convey water laterally to seeps or springs, or further into the subsurface (USGS, 1999). Surficial karst features such as sinkholes can occur during or following periods of severe drought, heavy precipitation, or spring snowmelt, and can also be induced by changes in surface water drainage and infiltration resulting from natural or human-related activities.

The presence of karst terrain within the project area was determined through a review of Pennsylvania and USGS resources and the National Atlas of the United States karst geographic information system (GIS) data layer (USGS, 1999; Weary and Doctor, 2014).

Table 4.1.5-6 identifies, by milepost, the areas of karst terrain that would be crossed by CPL South. No areas of karst terrain would be crossed by CPL North, Chapman Loop, Unity Loop, or the Mainline A and B Replacements.

Karst topography was identified within about 7 acres of workspace for existing Compressor Station 190 in Howard County, Maryland, and about 9 acres for existing Compressor Station 145 in Cleveland County, North Carolina. No karst topography was identified within the footprint of new permanent facilities at either Compressor Stations 145 or 190. In addition, no karst topography was identified at the other aboveground facility sites (Weary and Doctor, 2014).

We received a comment from the Lebanon County Commissioners requesting that Transco complete a detailed study of karst features along the pipeline route, particularly in the area near State Route 422 and Clear Springs Road. We also received comments from the former State Geologist of Pennsylvania suggesting that Transco use earlier historical aerial imagery (1937 to 1942) to aid in identifying karst features during a timeframe of least cultural disturbance due to land development, and to use 1999 color infrared imagery for Lancaster County.

Transco developed a *Karst Investigation and Mitigation Plan* that identifies karst-related features (e.g., sinkholes) and specific mitigation measures to be implemented in these areas (see appendix J). The presence and incidence of existing karst features, manifested as ground surface subsidence, were investigated and identified based on review of published literature, geologic maps, aerial photography, LiDAR imagery, ground reconnaissance surveys, and the PADCNR's digital data set of mapped karst features. Transco states that the *Karst Investigation and Mitigation Plan* used historical aerial photographs including those that ranged from years 1947 to 1970, and LiDAR imagery from 2008. Transco also states that color infrared imagery, as a tool to identify karst, is most valuable during years of drought. The 1999 color infrared imagery was developed during a severe drought in Lancaster County. Transco would examine the following datasets and, if additional karst features are identified, the following features would be added in the final *Karst Investigation and Mitigation Plan* that would be submitted with Transco's Implementation Plan:

- 1937 to 1942 aerial photography;
- 2014 LiDAR imagery to see if additional features have developed since 2008; and
- 1999 color infrared imagery.

TABLE 4.1.5-6

Areas of Karst Terrain Along CPL South

Commonwealth/County	Begin Milepost	End Milepost	Total Linear Miles [a]
Pennsylvania			
Lancaster	0.0	0.1	0.1
	7.1	7.2	0.2
	M-0227 0.1	M-0227 0.1	<0.1
	7.5	8.0	0.5
	8.2	8.4	0.2
	M-0405 0.0	M-0405 0.1	0.1
	M-0405 0.8	M-0405 1.0	0.2
	M-0405 1.7	M-0405 1.7	<0.1
	10.0	10.1	0.1
	10.7	10.8	0.1
	10.8	13.0	2.2
	M-0248 0.0	M-0248 0.5	0.5
	13.5	13.8	0.3
	M-0188 0.2	M-0188 0.3	0.1
	14.6	14.8	0.2
	15.8	16.1	0.3
	M-0185 0.0	M-0185 0.2	0.2
	16.3	16.5	0.2
	M-0289 0.0	M-0289 0.4	0.4
	16.9	17.4	0.5
	M-0225 0.0	M-0225 0.1	0.1
	17.5	18.6	1.1
	18.8	18.9	0.2
	19.5	19.8	0.3
	M-0389 0.0	M-0389 0.2	0.1
	20.0	21.0	1.0
	M-0396 0.0	M-0396 0.4	0.4
	21.4	21.7	0.2
	M-0209 0.3	M-0209 0.7	0.3
	23.7	28.1	4.4
	M-0162 0.0	M-0162 1.0	1.0
	29.0	29.4	0.4
Lancaster Total			**19.1**
Lebanon	M-0183 0.0	M-0183 1.5	1.5
	M-0211 0.0	M-0211 0.23	0.2
	M-0165 0.0	M-0165 0.1	0.2
	M-0165 0.2	M-0165 0.3	0.1
	M-0230 0.3	M-0230 0.72	0.4
	42.0	45.5	3.5
	M-0183 0.9	M-0183 1.5	0.6
	M-0424 0.0	M-0424 1.6	1.6
	48.8	49.0	0.2
	49.1	49.2	0.1
	51.5	51.5	<0.1
	M-0165 0.0	M-0165 0.3	0.3
	M-0230 0.3	M-0230 0.7	0.4
	58.2	58.3	0.1
	M-0211 0.0	M-0211 0.2	0.2
Lebanon Total			**9.1**

TABLE 4.1.5-6 (cont'd)

Areas of Karst Terrain Along CPL South

Commonwealth/County	Begin Milepost	End Milepost	Total Linear Miles [a]
Schuylkill	-	-	0.0
Northumberland	-	-	0.0
Columbia	94.2	94.4	0.2
	M-0390 0.0	M-0390 0.1	0.1
	M-0179 0.1	M-0176 0.3	0.2
	101.4	102.2	0.8
	M-0432 0.0	M-0432 0.1	0.1
	M-0432 0.3	M-0432 3.4	3.1
	M-0432 3.8	M-0432 4.2	0.3
	113.1	115.6	2.4
Columbia Total			**7.3**
CPL South Total			**35.5**

Sources: Berg et al., 1980; Miles and Whitefield, 2001; Kochanov and Reese, 2003; Weary and Doctor, 2014

[a] Totals may not match the sum of addends due to rounding.

In addition, Transco completed geophysical surveys using the multichannel analysis of surface waves method and geotechnical borings to characterize karst features. Categories of low, moderate, and high relative risk for karst development were established for the 35.5-mile-long portion of the Project that would cross carbonate bedrock formations. Relative risk is characterized by the susceptibility of the geologic unit and proximity of project facilities and work areas to existing karst features.

Based on the geologic formation and our review of Transco's reported karst incidence data within each formation, 4.3 miles of the project alignment have a high relative risk, 7.8 miles have moderate relative risk, and 15.7 miles have low relative risk.

4.1.5.7 Mine Fires

We received a number of comments about mine fires near the Project. Transco completed an investigation of mine fires as part of its *Abandoned Mine Investigation and Mitigation Plan*. In its investigation, Transco used a number of sources to identify mine fires near the Project. These sources included information from the PADEP Bureau of Abandoned Mine Reclamation inventory database, a study of active mine fires prepared for the PADEP, and other published sources as identified in the references included with the *Abandoned Mine Investigation and Mitigation Plan*. Transco supplemented this information with a review of aerial photography and field reconnaissance to identify evidence of possible fires, such as smoke plumes, posted warning signs, burnt vegetation, visible flame, smoke, steam, and odor. Using these data, Transco identified six historic mine fires within 3 miles of the Project as shown on figure 4.1.5-1.

However, no visual evidence of smoke was observed in aerial imagery to indicate active mine fires within 3 miles of the Project. In addition, no visual evidence or odor associated with mine fires was observed during ground reconnaissance, and there is no evidence to suggest that mine fires are actively migrating from their identified locations because the majority of the area is covered with live trees and other vegetation.

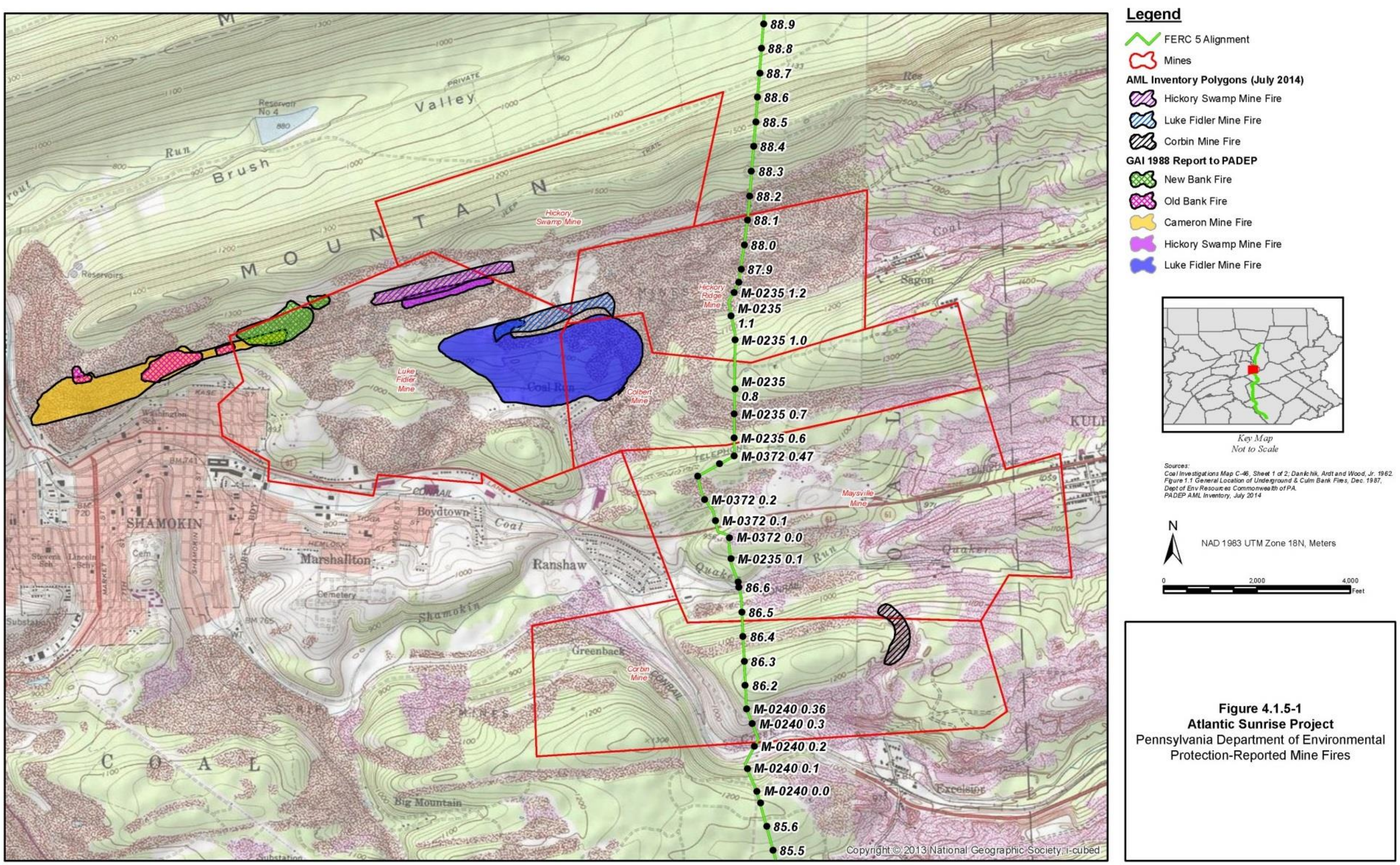

Figure 4.1.5-1
Atlantic Sunrise Project
Pennsylvania Department of Environmental Protection-Reported Mine Fires

No active mine fires are crossed by the Project. The closest historic mine fire, the Luke Fidler Mine Fire is about 0.4 mile west of the Project between MPs M-0235 0.8 and M-0235 1.0. A second historic but inactive mine fire, the Corbin Mine Fire, is about 0.6 mile east of the Project between MPs 86.3 and 86.5. A review of the PADEP Bureau of Abandoned Mine Reclamation website (PADEP, 2016) indicates that there are three active mine fires located near the project area in Northumberland County, Pennsylvania. Table 4.1.5-7 summarizes these active mine fires near the project area.

TABLE 4.1.5-7

Active Mine Fires Near the Atlantic Sunrise Project

Mine Fire Name	Fire ID	Milepost Location	Distance and Direction From Pipeline Centerline
Glen Burn Luke Fidler	2061-02	M-0235 0.9	0.4 mile west
Glen Burn Cameron	2068-03	M-0235 1.0	1.8 miles west
Glen Burn Hickory Swamp	2060-10	M-0235 1.1	1.1 miles west

Source: PADEP, 2016

Of the three active mine fires, the Glen Burn Luke Fidler Mine Fire is the closest to the project area (about 0.4 mile west). As described in the *Abandoned Mine Investigation and Mitigation Plan*, the Glen Burn Luke Fidler Mine Fire likely started in a strip mine portion of the No. 8 Coal Vein. The No. 8 Coal Vein crosses the Project between MPs M-0372 0.4 and 88.1 of the proposed route and is situated above flooded mine workings or mine pools between MPs M-0235 0.6 and M-0235 0.7; M-0235 1.2 and 87.9; and 88.0 and 88.1. Transco indicated that the No. 8 Coal Vein is between 50 to 900 feet deep at the pipeline crossing location and is missing due to bedrock folding and subsequent erosion between MPs M-0235 0.8 and M-0235 1.1, which is adjacent to the active mine fire locations identified in table 4.1.5-7. An intermittent stream valley (Coal Run) is located between the Glen Burn Luke Fidler Mine Fire and the project area, which may have eroded the near-surface portion of the No. 8 Coal Vein.

The rate and direction that mine fires burn cannot be accurately predicted due to differences in local geology (structure, stratigraphy, and surface topography), specific mining patterns, ventilation patterns, and collapsed areas.

4.1.6 Paleontological Resources

Paleontological resources including plant, invertebrates, and vertebrate fossils may be found in a variety of geologic formations but are most commonly found in sedimentary rocks; however, all sedimentary rocks are not necessarily fossiliferous. Igneous and metamorphic rocks form under conditions that do not commonly preserve paleontological resources. The existing aboveground facilities in Maryland and North Carolina that would be modified by Transco are in areas with igneous and metamorphic bedrock and have no potential to effect paleontological resources. The proposed CPL North, CPL South, Chapman Loop, Unity Loop, Compressor Station 185, and Mainline A and B Replacements are in areas of sedimentary bedrock. Potential impacts on paleontological resources associated with the proposed pipeline may occur in these areas as a result of construction. To minimize impacts on paleontological resources that may be uncovered during construction, Transco would follow the procedures provided in its *Unanticipated Discovery Plan for Paleontological Resources* (Discovery Plan) (see attachment 5 of Transco's ECP).

As part of the Discovery Plan, Transco's EIs would be trained by project geologists to identify paleontological resources. If paleontological materials are identified, construction would be halted at that location, the EI would be notified, and the Pennsylvania Bureau of Topographic and Geologic Survey and/or the VDMME Division of Geology and Mineral Resources would be contacted to determine the significance of the findings. Paleontologists from the Pennsylvania Geological Survey or VDMME Division of Geology and Mineral Resources would decide whether the specimen(s) should be saved or discarded. If the decision were made to collect and save the fossil(s), a plan to properly excavate, remove, and safeguard the fossil(s) would be developed in consultation with the appropriate state scientists. We find the Discovery Plan to be acceptable.

4.1.7 General Impacts and Mitigation

The overall effect of the Atlantic Sunrise Project on geologic resources would be minor. The primary effect of construction on geologic resources would be disturbances to steep topographic features found along the construction right-of-way. As described in section 2.3, all areas disturbed during construction including those considered rugged terrain would be graded and restored as closely as possible to preconstruction contours during cleanup and restoration.

There are 54 active mineral resources within 0.25 mile of the proposed facilities. The CPL South pipeline would cross an active railroad and adjacent to an active stone quarry near M-0183 MP 1.0. We received comments from the Lebanon County Commissioners and Michael Schroeder identifying concerns related to ground vibration from blasting activities at this quarry from passing trains. The PADEP regulates the storage, handling, and use of explosives in Pennsylvania, including blasting at coal mines, quarries, and construction and demolition sites. Pennsylvania's blasting regulations have been developed to minimize adverse effects of blasting to protect people and property. Ground vibration is wave energy transmitted through the ground as a result of a blast, which decreases with distance from the blast site. Permanent movement or permanent displacement of the ground only occurs in the immediate area of the blast, about 15 feet from where the explosives are placed. PADEP's blasting regulations limit ground vibration to widely accepted safe levels established through scientific research by the former U.S. Bureau of Mines to reduce annoyance and prevent property damage. Ground vibration at levels below the legal limit can cause residential properties to shake; however, the regulatory limit has been established to prevent cosmetic damage to properties. Major cracking of interior walls, foundation damage, or other structural damage would not occur unless ground vibration levels exceed the legal limits by a considerable amount.

Pipelines located greater than 12 feet from a blast site are not usually susceptible to blast damage (PADEP, 2015d). Based on our review of recent aerial photography, the active face of the quarry where blasting occurs is located about 2,000 feet west of the pipeline (see figure 4.1.7-1). The area between the active face of the quarry and the pipeline is currently used for material storage and handling. If the mining activities were to expand further east, blasting activities would be a minimum of 150 feet from the Project, which would be a safe distance based on the PADEP's blasting regulations.

Pipeline construction would be completed in accordance with DOT regulations, which address issues related to the safe construction and operation of pipelines that cross railroads.

Figure 4.1.7-1 Stone Quarry With Material Storage and Handling Area Near CPL South Milepost M-0183 1.0

We also received comments identifying concerns related to vibration from artillery training exercises at Fort Indiantown Gap near MP 56.9 of CPL South. The nearest artillery firing range at Fort Indiantown Gap is about 3 miles west of CPL South, where Fort Indiantown Gap fires up to 155-millimeter artillery. The point of explosion for artillery fired at this location is about 8 miles west of CPL South. Fort Indiantown Gap also operates demolition sites that are 5 to 8 miles west of CPL South. Vibration from training exercises could result from pressure waves associated with firing weapons or ground vibration from surface or near surface explosions. As described above, mining blasting activities would not be expected to adversely affect pipelines located greater than 12 feet from the blast site. Mining industry blasting activities differ from military activities, especially in the use of large explosive charge sizes spread over a relatively large area. In contrast, military activities usually involve point sources much smaller in explosive size (Albert et al., 2013). Fort Indiantown Gap provided background information to Transco regarding its artillery range operations and indicated that noise attenuation tests were conducted as part of the Fort's NEPA analysis to ensure that residents that live within the Fort Indiantown Gap boundaries would not experience excessive noise and vibration. Fort Indiantown Gap states that it has not received any reports of vibration damage from nearby residents or existing natural gas utilities, some of which are located closer to the artillery firing range and demolition sites than CPL South (Fluck, 2016). Due to the distance from the firing range and recent data from the Fort's activities, vibrations from military exercises are not expected to adversely affect the pipeline.

We do not anticipate that the Project would be adversely affected by seismic activity due to the low probability and low incidence/susceptibility of significant magnitude earthquakes within the project area. The pipeline and associated facilities would be designed and constructed in accordance with applicable DOT regulations (49 CFR 192) and applicable federal and state standards and design requirements, which would allow the project facilities to withstand probable seismic risks based on the risk zones crossed. In addition, the Project is not expected to be adversely affected by soil liquefaction because conditions prone to soil liquefaction are not common in the project area. Moreover, existing pipelines in the project area, extant for many years, have not been adversely affected to date as a result of seismic activity, active faults, or soil liquefaction.

Ground subsidence could occur in areas where AMLs are crossed. Transco developed mitigation measures for the low, moderate, and high relative risk of subsidence areas. The mitigation measures are designed to reduce the potential for stormwater infiltration that could initiate or accelerate subsidence, eliminate actual soft ground or void features associated with geophysical anomalies detected in relative high risk areas, and provide for long-term monitoring to identify any potential developing mine-related features following construction Investigations to assess AMLs are pending for some properties, and secondary investigations are necessary to further characterize potential mine-related features and identify site-specific mitigation measures. Therefore, **we recommend that:**

- **<u>With its Implementation Plan</u>, Transco should file with the Secretary, for review and written approval by the Director of OEP, a final *Abandoned Mine Investigation and Mitigation Plan*. The final plan should include the results of all AML investigations, the results of secondary investigations to further characterize potential mine-related features, and site-specific mitigation and monitoring measures Transco would implement when crossing AML lands, including measures to manage and dispose of contaminated groundwater.**

To address concerns related to slope stability and construction on steep/side slopes, Transco would implement BMPs to manage surface water and maintain slope stability. These measures are described in its *Landslide Hazard Investigation and Mitigation Plan*. Some of the measures that Transco would implement include:

- minimizing the potential for surface water ponding along the right-of-way and in open trenches by removing direct surface water runoff away from work areas, removing ponded water, and dewatering the trench;
- providing slope protection for falling rock on steep slopes containing boulders;
- removing unstable excavated material (e.g., coal refuse), where necessary; and
- compacting soft subsoils.

Flash flooding in the area could potentially occur if rainfall amounts of 2.2 to 2.9 inches per hour are realized. Federal regulations administered by the DOT-PHMSA (49 CFR 192.317) require that the pipeline "operator must take all practicable steps to protect each transmission line or main from washouts, floods, unstable soil, landslides, or other hazards that may cause the pipeline to move or to sustain abnormal loads." Transco has designed waterbody crossings to minimize potential impacts from flash flooding, scouring, and high flow velocities during pipeline construction and operation. High flow mitigation measures during construction include providing equipment to handle increased flow such as standby pumps at dam-and-pump locations and sizing flume pipes to be able to accommodate storm level flows. Additionally, a concrete coating would be applied to the pipeline where installed beneath waterbodies to reduce the buoyancy of the pipe and prevent surfacing of the pipeline during a flooding event. Flash flood events in areas cleared of vegetation could cause sedimentation and erosion. Transco's Plan requires the inspection and maintenance of temporary erosion control measures on at least a daily basis in areas of active construction or equipment operation, on a weekly basis in areas with no construction or equipment operation, and within 24 hours of each 0.5-inch rainfall event. At waterbody crossings the pipeline would be buried to a greater depth allowing for a minimum of 60 inches of soil cover or 24 inches of cover in consolidated rock.

Sinkholes can occur during or following periods of severe drought, heavy precipitation, or spring snowmelt. Sinkholes can be induced by changes in surface water drainage and infiltration resulting from natural or human-related activities. Sinkhole development can affect permanent (post-construction) soil stabilization in the project area, resulting in erosion of soils and exposure of subsurface structures. Transco has developed karst mitigation measures to:

- reduce the potential for stormwater infiltration that could initiate or accelerate the development of karst conditions;
- eliminate soft ground or void features associated with geophysical anomalies detected in relative high risk areas; and
- provide for long-term monitoring that would identify any potential developing karst features following project construction.

In order to minimize the potential for adverse effects in karst terrain, Transco would:

- design the pipeline to maximize its intrinsic ability to span sinkholes;
- minimize the extent and time that open-cut trench excavations for pipeline installation are left open, to the extent practicable;
- reduce the potential for surface water run-on and ponding in open trenches by directing surface water runoff away from work areas and removing ponded water from open excavations as soon as practicable;
- direct stormwater runoff away from any known or exposed karst feature during construction;
- direct refueling activities away from any known or exposed karst feature;
- evaluate the geologic and geotechnical characteristics for each stream crossing within karst areas and develop procedures to be implemented during pipeline construction, such as the placement of low-permeability backfill soil or a geosynthetic barrier (e.g., geosynthetic clay liner) beneath the pipeline to limit surface water infiltration;
- provide for testing of wells within karst areas, particularly at HDD crossings for both yield and quality; and
- monitor the pipeline alignment on a regular basis during construction to observe for signs of potentially developing sinkhole features. If found, these features would be monitored on a more frequent/enhanced basis. Transco would implement measures to further evaluate these features (e.g., settlement monitoring via fixed survey points) and, based on evaluation results, implement any necessary remediation measures.

The *Karst Investigation and Mitigation Plan* is included in appendix J of this EIS. The investigations to assess karst areas are pending for some properties, and secondary investigations are necessary to further characterize karst features and identify site-specific mitigation measures. Therefore, **we recommend that:**

- **<u>With its Implementation Plan</u>, Transco should file with the Secretary, for review and written approval by the Director of OEP, a final *Karst Investigation and Mitigation Plan*. The final plan should include the results of missing karst survey areas and any additional karst features identified through examination of the 1937 to 1942 aerial photography, 2014 LiDAR imagery, and 1999 color infrared imagery.**

Underground mine fires can pose public safety and health concerns from smoke, heat, haze, or venting of hazardous gases. In addition, mine fires can gradually consume coal seams that remain intact following active mining and create void spaces, which can increase the potential for subsidence, ignite brush or forest fires on the ground surface, and pose an integrity risk to underground natural gas pipelines. The void space created by mine fires can also fill with groundwater and become mine pools. As groundwater levels rise, these mine pools can result in discharges of mine water with impaired water quality (e.g., acid mine drainage [AMD]) from shafts or mine entries to the ground surface that could potentially have adverse long-term impacts on the environment.

In order to further characterize the location of mine fires near the Project, Transco is planning to collect thermal infrared imagery to identify heat sources at the ground surface. The thermal imaging data would establish the presence of heat at the ground surface. Transco would then investigate to determine if the heat is residual from past inactive mine fires or from active mine fires. To determine if the fires are active, information on the temperature range, shape of anomalies, and pattern of temperature decline over distance would be evaluated. If it is determined that fires are active, then Transco would compare the recently collected thermal imagery with thermal imagery from previous investigations (GAI Consultants, Inc.'s 1988 Report) to determine the movement of the fire.

During construction, Transco indicated that it would remove combustible material from the excavated trench, backfill with low thermal conductivity soil, and use thicker walled pipe and thermal insulation, as necessary. During operations, Transco plans to conduct thermal imaging and aerial and pedestrian patrols of the right-of-way to assess vegetation changes. Transco indicated that these measures would be included in its *Mine Fire Investigation and Mitigation Plan* (Mine Fire Plan). Because the Mine Fire Plan has not been provided to us with the results of Transco's ongoing investigation, **we recommend that:**

- **<u>With its Implementation Plan</u>, Transco should file with the Secretary, for review and written approval by the Director of OEP, a Mine Fire Plan that:**

  a. identifies methods and surveys completed to define the locations of existing mine fires near the Project and the depth and extent of coal seams that could pose a risk to the project facilities;

  b. identifies any mitigation measures that Transco would implement to protect the integrity of the pipeline from underground mine fires during the lifetime operation of the Project; and

  c. provides for revisions to the pipeline route if it is found that pipeline integrity could be compromised anytime during the lifetime operation of the Project due to the current and future predicted location of the mine fires.

4.2 SOILS

4.2.1 Existing Soil Resources

The descriptions and characteristics of soils described in this section were compiled from a variety of data sources including soil surveys and website databases published and maintained by the NRCS. Websites used include the NRCS Official Series Description and Web Soil Survey websites (Soil Survey Staff, 2015a, 2015b).

Soils within the project area were mapped using the NRCS digital SSURGO, which includes geospatially referenced GIS soil map unit polygons at a scale of 1:24,000. SSURGO data contain the most detailed level of soil mapping performed by the NRCS, and correspond with or supersede the original county soil survey mapping.

4.2.1.1 Pipeline Facilities

Soils along the proposed pipeline segments were evaluated to identify prime farmland and major soil characteristics that could affect construction or increase the potential for construction-related soil impacts. The soil characteristics evaluated were erosion potential, prime farmland, hydric soils, compaction-prone soils, shallow bedrock, stony/rocky soils, and soils with poor revegetation potential. Additional soil-related impacts could include disruption of agricultural drainage or irrigation systems and impacts on soils from an inadvertent release of fuel or fluids during construction. Table 4.2.1-1 summarizes the significant soil characteristics that would be crossed by the pipeline facilities. Individual soil characteristics and the potential mitigation measures that would be employed by Transco are described below.

Soil Erosion

Erosion is a continuing natural process that can be accelerated by human disturbance. Factors such as soil texture, structure, slope, vegetation cover, rainfall intensity, and wind intensity can influence the degree of erosion. Soils most susceptible to erosion by water are typified by bare or sparse vegetation cover, non-cohesive soil particles with low infiltration rates, and moderate to steep slopes. Soils typically more resistant to erosion by water include those that occupy low relief areas, are well vegetated, and have high infiltration capacity and permeability. Wind erosion processes are less affected by slope angles than water processes. Wind-induced erosion often occurs on dry soil where vegetation cover is sparse and strong winds are prevalent.

The potential for soils in the project area to be eroded by water was evaluated based on the land capability subclass and slope class assigned to the map units by the NRCS. Map units with a land capability subclass designation of 4e through 8e, which are considered to have severe to extreme erosion limitations for agricultural use, and/or an average slope greater than 8 percent, were identified as susceptible to water erosion. Based on this analysis, about 27.6 miles (14 percent) of the proposed pipeline routes are highly water erodible.

Susceptibility to wind erosion was based on the wind erodibility group (WEG) as designated by the NRCS. WEG is a grouping of soils that have similar surface-soil properties affecting their resistance to soil blowing, including texture, organic matter content, and aggregate stability. WEGs may range from 1 to 8, with 1 being the highest potential for wind erosion, and 8 the lowest. Based on these WEG designations, none of the soils along the pipeline segments are considered highly wind erodible.

TABLE 4.2.1-1

Summary of Soil Characteristics Along the Pipeline Facilities Associated with the Atlantic Sunrise Project (miles)

Pipeline Facility	Total Length [a]	Highly Erodible		Prime Farmland [d]	Hydric	Compaction Prone [e]	Shallow Bedrock [f, g]		Revegetation Concerns [h]
		Water [b]	Wind [c]				Hard	Soft	
New Pipeline									
CPL North	58.7	1.8	0.0	24.3	11.1	0.0	17.3	0.0	1.0
CPL South	127.3	22.2	0.0	77.5	6.7	0.1	82.0	19.2	4.6
Loop Extension									
Chapman Loop	2.5	0.0	0.0	0.0	0.0	0.0	1.8	0.7	0.8
Unity Loop	8.5	3.0	0.0	3.4	0.5	0.0	0.0	0.0	<0.1
Replacement Pipeline									
Mainline A	1.3	0.3	0.0	0.4	0.4	0.3	n/a	n/a	0.0
Mainline B	1.3	0.3	0.0	0.4	0.4	0.0	n/a	n/a	0.0
TOTAL [i]	**199.4**	**27.6**	**0.0**	**106.0**	**19.1**	**0.4**	**101.1**	**19.9**	**6.5**

Source: Soil Survey Staff, 2015a, 2015b

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

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

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

[d] As designated by the NRCS. Includes soils that are considered prime if a limiting factor is mitigated (e.g., artificial drainage) and Farmlands of Statewide Importance.

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

[f] Paralithic (soft) bedrock would not likely require blasting during construction. Lithic (hard) bedrock could require blasting or other special construction techniques during installation of the pipeline.

[g] Installation of the Mainline A and B Replacements would occur within the existing trench; therefore, blasting is not anticipated.

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

[i] Totals may not match sum of addends due to rounding.

Prime Farmland

The USDA defines prime farmland as “land that is best suited to food, feed, fiber, and oilseed crops.” This designation includes cultivated land, pasture, woodland, or other lands that are either used for food or fiber crops or are available for these uses. The fact that a particular soil is considered prime farmland does not mean that it is currently in agricultural use; some prime farmland soils may be in forested, open, or residential areas. 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). The numbers presented in table 4.2.1-1 and the paragraph below include Farmland of Statewide Importance and Unique Farmlands.

About 106.0 miles (53 percent) of the soils along the proposed pipeline segments are considered prime farmland, and about 89.9 miles of these prime farmland soils are active agricultural land. The land uses for the remaining 93.4 miles along the proposed pipeline segments consist of forest/woodland, industrial/commercial, transportation, open land, open water, and residential areas.

Hydric Soils

Hydric soils are defined as “soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part” (Federal Register, 1994). Soils that are artificially drained or protected from flooding (e.g., by levees) are still considered hydric if the soil in its undisturbed state would meet the definition of a hydric soil. Generally, hydric soils are those soils that are poorly and very poorly drained. Hydric soils may indicate the presence of wetlands. Wetland areas containing hydric soils were delineated within the entire project area as described in section 4.4.1. Due to extended periods of saturation, hydric soils can be prone to compaction and rutting. In addition, high groundwater levels associated with hydric soils could create a buoyancy hazard for the pipeline. Detailed information about the location of wetlands affected by the Project is provided in section 4.4.

About 19.1 miles (10 percent) of the soils along the proposed pipeline segments are considered hydric.

Compaction Potential

Soil compaction modifies the structure and reduces the porosity and moisture-holding capacity of soils. Construction equipment traveling over wet soils could disrupt the soil structure, reduce pore space, increase runoff potential, or cause rutting. The degree of compaction depends on moisture content and soil texture. Fine-textured soils with poor internal drainage that are moist or saturated during construction are most susceptible to compaction and rutting.

The degree of compaction was evaluated based on the drainage class and surface horizon texture of the soils. Somewhat poor, poor, and very poorly drained soils with surface horizon textures of sandy clay loam or finer were considered to have a high potential for compaction.

Soils with a high potential for compaction and structural damage in the project area are typically very poorly drained soils located in wetlands with an organic soil component. Special construction procedures within wetlands are described in sections 2.3.2 and 4.4.3 and Transco’s Procedures.

About 0.4 mile (less than 1 percent) of the soils along the proposed pipeline segments are soils with a high compaction potential.

Revegetation Potential

The ability of soils within the project area to support successful revegetation was determined by NRCS official series descriptions and county soil surveys. The drainage class, slope class, and erosion potential of each soil type within the project area was evaluated to determine revegetation potential. Other considerations included whether or not the mapped soils were natural, human transported material (anthropogenic soils), or disturbed.

Droughty soils that have coarse-textured surface layers and are moderately well to excessively drained may prove difficult to revegetate. The drier soils have less water to aid in the germination and eventual establishment of new vegetation. The coarser textured soils also have a lower water holding capacity following precipitation, which could result in moisture deficiencies in the root zone, creating unfavorable conditions for many plants. Droughty soils along the Project were identified by querying the SSURGO database for component soils series that have a surface texture of sandy loam or coarser, and are moderately well to excessively drained. In addition, steep slopes along the Project may make the reestablishment of vegetation difficult. Soils that occur on slopes greater than 8 percent are also considered areas with a revegetation concern.

About 6.5 miles (3 percent) of the soils along the proposed pipeline segments are soils with a revegetation concern.

Shallow Bedrock

Bedrock may be encountered when the depth of trench excavation exceeds the soil cover. Introducing stones and other rock fragments to surface soil layers may reduce soil moisture-holding capacity, resulting in a reduction of soil productivity. Additionally, some agricultural equipment may be damaged by contact with large rocks and stones. Rock fragments at the surface and in the surface layer may be encountered during grading, trenching, and backfilling. Construction through soils with shallow bedrock could result in the incorporation of bedrock fragments into surface soils. Table 4.1.2-3 summarizes the potential areas of shallow bedrock that would be crossed by the Project (see section 4.1.2.3).

A large portion of the soils to be affected along the pipeline segments is considered stony/rocky soils. The potential to introduce stone and rock into surface soils in those areas could be significant. However, many of the soils in those areas already contain surface layers with significant quantities of rock fragments. The potential for introducing rock into the topsoil was evaluated based on bedrock depth. SSURGO data were used to identify soil map units where depth to bedrock is generally anticipated to be less than 5 feet (60 inches) from the soil surface.

About 121.0 miles (61 percent) of soils that would be affected along the proposed pipeline segments have shallow depth to bedrock. Of these, about 19.9 miles are paralithic (i.e., weathered) bedrock that may not require blasting.

4.2.1.2 Aboveground Facilities

Table 4.2.1-2 summarizes the soil characteristics potentially affected during construction of the aboveground facilities. Modifications to existing meter and/or regulator stations and MLVs would require only minimal workspace within or outside of the existing fence lines. Modifications to the existing compressor stations in Virginia and North Carolina would require only minimal workspace outside of the existing fence lines. In addition, the majority of workspace associated with these facilities would cross soils previously disturbed during development of the existing facilities. Therefore, soils information for these modifications is not addressed herein.

Of the 294.7 acres that would be disturbed during construction of the aboveground facilities, about 109.0 acres would be permanently converted to industrial use. This includes about 84.3 acres of permanently converted prime farmland, the majority of which is currently actively cultivated or open land.

4.2.1.3 Pipe/Contractor Yards and Staging Areas

Transco has identified 14 temporary contractor yards and 48 temporary staging areas that would be using during construction. Use of the contractor yards and staging areas would temporarily affect about 402.6 acres of land. If necessary, rough grading and vegetation clearing of temporary construction yards would be conducted. Areas used for contractor yards and staging areas would be restored after construction in accordance with landowner lease agreements. No significant impacts on soils in the contractor yards and staging areas are anticipated.

TABLE 4.2.1-2

Summary of Soil Characteristics Potentially Affected During Construction of the Aboveground Facilities Associated with the Atlantic Sunrise Project (acres)

Facility	Total	Highly Erodible Water	Highly Erodible Wind [a]	Prime Farmland [b]	Hydric	Compact Prone [c]	Shallow Bedrock	Revegetation Concerns [d]
New Compressor Stations								
Compressor Station 605	50.1	40.0	0.0	27.9	4.1	22.2	10.7	43.0
Compressor Station 610	33.5	1.0	0.0	32.6	0.1	0.0	31.4	8.0
Subtotal	**83.6**	**41.0**	**0.0**	**60.5**	**4.2**	**22.2**	**42.0**	**51.0**
Existing Compressor Station Modifications								
Compressor Station 517	32.0	8.0	0.0	4.7	0.0	0.0	0.0	8.0
Compressor Station 520	36.1	28.7	0.0	31.6	0.0	0.0	36.1	4.5
Compressor Station 190	30.0	0.0	0.0	20.3	4.8	0.0	0.0	0.0
Subtotal	**170.9**	**36.7**	**0.0**	**56.6**	**4.8**	**0.0**	**36.1**	**12.5**
New M&R Stations								
Zick Meter Station	9.1	0.0	0.0	9.0	0.8	3.3	0.0	16.0
Springville Meter Station	4.8	0.9	0.0	4.9	<0.1	0.0	3.7	14.0
North Diamond Regulator Station	2.3	0.0	0.0	2.3	0.1	0.0	0.0	5.0
West Diamond Regulator Station	4.8	0.3	0.0	4.6	0.0	0.0	4.7	9.0
River Road Regulator Station	2.4	0.5	0.0	2.0	0.0	0.0	2.4	5.0
Subtotal	**23.4**	**1.7**	**0.0**	**22.8**	**0.9**	**3.3**	**10.9**	**49.0**
TOTAL	**294.7**	**77.7**	**0.0**	**139.9**	**9.9**	**25.5**	**89.0**	**112.5**

Sources: Soil Survey Staff, 2015a, 2015b

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

[b] As designated by the NRCS. Includes soils that are considered prime if a limiting factor is mitigated (e.g., artificial drainage) and Farmlands of Statewide Importance.

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

[d] Includes coarse-textured soils (sandy loams and coarser) that are moderately well to excessively drained and soils with an average slope greater than 8 percent.

4.2.1.4 Access Roads

Transco has identified a total of 115 temporary access roads and 42 permanent access roads that would be used for construction and operation of the Project. One hundred twenty of the permanent and temporary access roads are existing roads, or would be a combination of existing and new roads, and would either require no modifications or improvements (19) or involve some modifications or expansions (101). The remaining 37 access roads would be newly constructed (see section 4.8.1.5 for more information regarding access roads). Temporary access roads would be restored to preconstruction conditions following completion of construction and restoration. Transco would maintain permanent access roads for the life of the respective facility. Access roads (including temporary and permanent) would occupy a total of 210.1 acres of land, of which 25.1 acres would be associated with the permanent access roads (see appendix D).

4.2.2 General Impacts and Mitigation

Construction activities, such as clearing, grading, trench excavation, backfilling, and the movement of construction equipment along the right-of-way may affect soil resources. Clearing removes protective vegetation cover and exposes the soil to the effects of wind and rain, which increases the potential for soil erosion and sedimentation of sensitive areas. Grading, spoil storage, and equipment traffic can compact soil, reducing porosity and increasing runoff potential. Excess rock or fill material brought to the surface during trenching operations could hinder restoration of the right-of-way.

To reduce the effects of construction on soils, Transco would implement its project-specific Plan, Procedures, and Agricultural Plan (see appendix E and attachments 6, 17, and 18 of Transco's ECP), which identify baseline mitigations measures Transco and its contractors would implement to minimize soil disturbance and transportation of sediments off the right-of-way or into sensitive resources (e.g., wetlands, streams, and residential areas). The procedures presented in these plans represent BMPs and are designed to accommodate varying field conditions while maintaining strict minimum standards for the protection of soil resources and environmentally sensitive areas.

4.2.2.1 Soil Erosion

Transco would implement the measures specified in its Plan and Procedures to avoid or minimize potential effects of soil erosion and sedimentation. As outlined in the Plan and Procedures, Transco would have an EI monitoring all phases of construction to ensure project plans are followed and would use erosion control devices and construction practices to minimize erosion during and after construction. Wetland and waterbody crossings would be designed to minimize erosion. At the end of construction, Transco would return surface contours and drainage patterns to as close to original conditions as practicable and would reestablish vegetation as soon as possible following final grading. Transco would inspect the right-of-way and maintain erosion and sediment controls as necessary until final stabilization is achieved. Once revegetation is satisfactory, temporary erosion control measures would be removed. With implementation of these measures and those described in Transco's Plan and Procedures, significant soil erosion is not expected during construction or operation of the Project.

4.2.2.2 Prime Farmland

Construction activities such as clearing, grading, and equipment movement can result in soil compaction and an increased susceptibility to erosion. The loss of topsoil from erosion or the mixing of topsoil with the subsoil during construction could result in a loss of soil fertility and impaired revegetation.

Drain tiles are subsurface structures used in some agricultural areas to improve the productivity of the land by increasing drainage of the soils. Drain tile damage could occur by operation of heavy construction equipment causing rutting in wet soils, and during excavation of the pipeline trench.

Transco would implement the following measures for maintaining soil fertility in active agricultural lands temporarily affected by construction activities. Transco would:

- segregate up to 12 inches of topsoil to maintain surface horizons with higher organic matter content;
- backfill rock fragments to only the top of the natural bedrock profile (excess fragments would be disposed of in locations approved by the landowner and would not interfere with agricultural activities);
- test topsoil and subsoil for compaction at regular intervals (severely compacted topsoil would be plowed or a green manure such as alfalfa would be planted and plowed to decrease bulk density and improve soil structure); and
- where drain tiles would be crossed, maintain flow to the drainage system during construction. Drain tile systems would be probed beyond the trenchline to determine if any damage occurred beyond the excavation area. Any damage to or temporary manipulation of a drain tile system would be repaired to a level of function that meets or exceeds the original condition.

We received several comments regarding the thermal effects of pipeline operation on soil moisture and agricultural productivity. Few studies have addressed the effects of heat from pipelines on crop growth; however, it has been documented that heat from oil and gas pipelines warms the surrounding soil (Naeth et al., 1993; Burgess and Smith, 2001; Dunn et al., 2008).

The compression of natural gas creates heat and results in a temperature gradient along the pipeline, where the temperatures are highest at the outlet of a compressor and lowest at the inlet of the next compressor. Dunn et al. (2008) showed gas temperatures ranged from about 105 degrees Fahrenheit (°F) at the outlet of a compressor to approximately 60 °F at the inlet of a compressor. This study recorded soil temperature, soil moisture, and crop productivity from 2002 to 2004 during operation of a newly constructed 36-inch-diameter pipeline in Alberta, Canada. The interim results of this study indicated that while heat from the pipeline was measurable in the upper 24 inches of soil over the pipeline for a distance of approximately 120 miles downstream of compressor stations, there were no effects on available water for plants in the rooting zone or overall yield of annual crops.

Naeth et al. (1993) recorded soil temperatures at various depths ranging from 2 to 42 inches along a 42-inch-diameter natural gas pipeline in a mixed-prairie rangeland in Alberta, Canada. During the winter months, soil temperatures above the pipe were higher than undisturbed areas at depths of 24 inches or greater. During the summer months, heat effects from the pipeline were minimal even at lower depths. Mid-summer shallow soil temperatures were high at all locations and appeared to be less affected by the pipe than by the ambient air temperatures. The study hypothesized this may be due to decreased summertime gas flow and compression during times of low demand. The study did not examine the effects of temperature on plant growth above the right-of-way.

Burgess and Smith (2001) examined ground temperatures along a 13-inch-diameter oil pipeline in Alberta, Canada and noted the permafrost line around the pipeline was 3 to 10 feet deeper than off right-of-way areas. The study attributed warm pipeline operating temperatures, vegetation and terrain disturbance, and trench subsidence as compounding factors leading to higher ground temperatures on the right-of-way.

Several studies have noted that warmer soil temperatures reduce the time for seedling emergence in crops such as corn and wheat (Stone et al., 1999; McMaster et al., 2003). Rykbost et al. (1975a, 1975b) compared crop yields in an irrigated agricultural field with cooling water discharge pipelines from a power plant (water temperature ranged from 95 to 100 °F) buried 3 feet below the surface to yields in an irrigated field without any buried pipelines. They observed that crop yields increased by 19 percent for plants such as bush beans and tall fescue, to 100 percent for broccoli in the field with the buried water pipelines. The increases in soil temperate had the greatest effect early in the growing season, where germination and seedling development time was reduced. The study also showed that crops in the field with the buried water pipelines depleted the available soil water faster than crops in the field without buried water pipelines.

Transco proposes to bury the pipeline with a minimum depth of cover of 4 feet in active agricultural areas, which is deeper than the pipelines noted above, further minimizing temperature effects on the rooting zone. Based on this burial depth, our review of the available research studies, and our experience with existing natural gas pipeline projects, we do not anticipate the Project would have a significant effect on crop yield due to increases in soil temperature or reduced soil moisture. Transco would compensate farmland owners and/or tenants for crop loss and would conduct crop yield monitoring at the request of the landowner until the reclamation process has resulted in crop growth and vigor similar to adjacent undisturbed portions of the same field.

4.2.2.3 Hydric Soils and Compaction Potential

Somewhat poor, poor, and very poorly drained soils with fine surface textures are prone to compaction and structural damage if disturbed due to permanent or frequent saturation at or near the soil surface (see section 4.2.1.1). Transco's Procedures provide detailed descriptions of wetland and waterbody crossing techniques designed to minimize damage to saturated soils, as well as other soils that may be vulnerable to such damage when wet. Wetland and waterbody construction methods are described in sections 2.3.2, 4.3.2, and 4.4.3. Measures to mitigate effects on wetlands and waterbodies during construction and operation of the Project are described in sections 4.3.2.6 and 4.4.4.

To the extent practicable, Transco would avoid construction during periods of heavy rainfall, snowmelt, or unusual soil saturation. Topsoil would be segregated in wetlands and residential areas and then later returned as the surficial layer. Timber mats would be used to minimize rutting and compaction within saturated wetland soils. Grading to restore natural site contours and repair rutted areas would be completed before final revegetation, seeding, and mulching, which would help initiate natural restoration of soil structure and bulk density.

4.2.2.4 Post-Construction Revegetation

As described in Transco's Plan and Agricultural Plan, soils disturbed by the Project would be revegetated using a seed mix composed primarily of grasses, herbaceous plants, and legumes, or as specified by landowners. Transco would also segregate topsoil, where required, to optimize revegetation potential as described in its Plan and Agricultural Plan. These procedures were developed based on the guidelines and recommendations from FERC, the NRCS, Pennsylvania State University, and the PADEP. Sections 6.5 and 6.11 of the Agricultural Plan contain seed mix recommendations (see attachment 6 of Transco's ECP).

Soils in the project area typically exhibit characteristics sufficient for successful revegetation; where limitations exist, they would be overcome by implementing appropriate BMPs. Standard revegetation measures include fertilizer and pH amendments (except in wetlands), seedbed preparation, use of a proven seed mix, consideration of seasonal constraints, and mulch application. Where necessary, erosion control fabric or matting would be used on steep slopes to ensure that soils successfully revegetate. Transco would monitor all disturbed areas for a minimum of two growing seasons after construction to evaluate revegetation success in accordance with the Plan. Areas that have not revegetated successfully would be corrected to ensure the right-of-way conditions are similar to the surrounding undisturbed areas. Based on previous experience with revegetation of pipeline facilities, and with adherence to the protocols outlined in Transco's Plan and Agricultural Plan, we do not anticipate significant issues with successful revegetation.

4.2.2.5 Shallow Bedrock

Areas of soils with shallow bedrock would be encountered throughout the project area. As a result, Transco anticipates that rock excavation and/or rock blasting during construction activities would be necessary.

Regarding the segments of the pipeline to be replaced, a trench was previously excavated to install the existing pipelines so substantial bedrock removal in these locations is not anticipated. However, it is possible that limited bedrock removal may be required with blasting to widen or deepen the trench to accommodate the installation of the larger diameter replacement pipeline (see section 4.1.3).

The introduction of subsoil rocks into agricultural topsoil would be minimized by segregating topsoil from trench spoil and replacing topsoil in agricultural areas after cleanup. Transco would remove excess rock from surficial soils to the extent practicable in cultivated and rotated croplands, hayfields, pastures, residential areas, and at the landowner's request in other areas. Transco would remove excess rock from surface soils disturbed by construction such that the size, density, and distribution of rock on the construction right-of-way would be similar to adjacent non-right-of-way areas. Transco would not remove rocks from backfilled areas if the rock in the backfill is consistent in size and density with conditions in adjacent undisturbed areas. If bedrock is encountered, Transco would take precautions to minimize the mixing of excavated bedrock with backfill and would replace rock in the trench to a level that is not higher than the original bedrock profile. If blasting is required, Transco would use the minimum explosive charge necessary to fracture bedrock and minimize shot-rock from leaving the construction right-of-way (see section 4.1.3). Where necessary, excess rock would be hauled off the right-of-way or left on the right-of-way, subject to landowner approval and applicable permit conditions.

In the event that bedrock is encountered within the trench depth in residential or agricultural lands, several measures to prevent incorporation of rock into the topsoil would be implemented. These measures include topsoil segregation and protection along the trench, rock backfill in residential and agricultural areas only to the top of bedrock, and disposal of excess rock fragments in an approved manner so as to not incorporate rock fragments into topsoil layers. Through adherence to these measures, no significant increase in the rock content of topsoil in residential or agricultural areas is anticipated.

4.2.2.6 Soil Contamination

Soil contamination along the Project may result from at least two sources: hazardous material or fuel spills during construction and/or those occurring before construction in pre-existing contaminated areas that are encountered during construction. Contamination from spills or leaks of fuels, lubricants, and coolant from construction equipment could adversely affect soils. The effects of such contamination are typically minor because of the low frequency and volumes of spills and leaks. Transco has developed a Spill Plan that specifies cleanup procedures to minimize the potential for soil contamination from spills or leaks of fuel, lubricants, coolants, or solvents. Transco and its contractors would use the Spill Plan to minimize accidental spills of materials that may contaminate soils, and to ensure that inadvertent spills of fuels, lubricants, or solvents are contained, cleaned up, and disposed of as quickly as possible and in an appropriate manner. Transco evaluated internal records, reviewed environmental databases, and completed an abandoned mine investigation to identify potential sources of soil and groundwater contamination within 0.25 mile of the Project. The results of these investigations for each state are summarized below in section 4.3.1.6.

In the event that contamination is encountered during construction, Transco would implement the protocols in its *Unanticipated Discovery of Contamination Plan* (see attachment 8 of Transco's ECP). If contaminated soils are encountered during construction, all personnel would stop work, leave the contaminated area, and notify the chief inspector on site. Additional notifications would then be made including outside agencies if required. Transco would transport excavated soil to designated soil staging areas, characterize the soils for waste disposal, and ensure that all soils are managed in accordance with state and federal regulations and implement the following measures:

- limit personnel working within the contamination area during cleanup operations to individuals with current Hazardous Waste Operations and Emergency Response (HAZWOPER) training;
- stockpile material on impermeable sheeting;
- rope off the stockpiled area to prevent unauthorized entry; and
- place contaminated material in appropriately labeled and stored containers.

We have reviewed the *Unanticipated Discovery of Contamination Plan* and find it acceptable.

4.3 WATER RESOURCES

4.3.1 Groundwater Resources

4.3.1.1 Existing Groundwater Resources

Bedrock Aquifers

In Pennsylvania, groundwater resources in the project area include five principal aquifer systems:

- the Valley and Ridge bedrock aquifers composed of permeable Paleozoic sandstones, shales, and carbonate rocks;
- the Piedmont and Blue Ridge early Mesozoic basin bedrock aquifers composed of sedimentary rocks including sandstone, arkose, and conglomerate;
- the Piedmont and Blue Ridge carbonate-bedrock aquifers composed of limestone, dolomite, and marble from the Paleozoic and Precambrian eras;
- the Piedmont and Blue Ridge crystalline-bedrock aquifers composed of crystalline-rock (gneisses and schists) and undifferentiated sedimentary-rock that are tightly cemented, predominantly clastic rocks; and
- the Mississippian aquifers composed of sandstone and carbonate-rock that include unconsolidated glacial and alluvial deposits (Trapp and Horn, 1997).

There are also minor types of bedrock aquifers in the project area that are not considered principal aquifers or confining units. Areas underlain by these minor aquifers may be small or large and for the most part consist of geologic deposits that yield only small volumes of water due to the low permeability of the aquifer material or the aerial extent of the aquifer (Trapp and Horn, 1997).

The Piedmont and Blue Ridge crystalline-rock aquifers and the early Mesozoic basin aquifers also underlie the project facilities in Virginia, Maryland, North Carolina, and South Carolina (USGS, 2014b).

The limestone and dolomitic limestone of the Valley and Ridge carbonate-rock aquifers are the most productive portions of the Valley and Ridge aquifers and are used primarily for domestic and commercial supplies. The limestone and dolomitic limestone of the Waynesboro Formation through the St. Paul Group geologic units have high water yields within the Valley and Ridge aquifers. Water yields from these units range from 25 to 210 gallons per minute (gpm). Water quality from the upper (shallow) aquifers is suitable for drinking and most other uses. The deeper portions of the aquifers can contain saline or brackish water (Trapp and Horn, 1997). Recharge generally occurs from precipitation that falls on the tops of ridges or valley floors where it moves downgradient and discharges to streams or springs.

The early Mesozoic bedrock aquifers are used for public water supply. Other uses of groundwater withdrawn from the Mesozoic formation include industrial use, mining, thermoelectric power, and agriculture. The highest well yields from the Mesozoic aquifers come from wells with completion depths of 200 to 550 feet. The water is generally suitable for drinking and other uses, but some sedimentary rocks contain minerals that, when weathered, can contribute iron and manganese to groundwater, particularly if the water is slightly acidic (Trapp and Horn, 1997).

The Piedmont and Blue Ridge crystalline-rock aquifers are the most widespread aquifers within the Piedmont and Blue Ridge Provinces. Carbonate-rock aquifers are formed of rocks that become soluble in weak acid solution. Water moving through these formations becomes weakly acidic and increases the permeability and porosity of the rocks. These formations are significant local sources of water and are primarily used for domestic and commercial supplies, but iron, manganese, and sulfate locally occur in objectionable concentrations (Trapp and Horn, 1997). One such formation is centered in the Hanover-York-Lancaster Valley area of Pennsylvania. Most of the recharge in the Piedmont and Blue Ridge aquifers occurs from precipitation that enters the aquifers from the land surface where it moves laterally and discharges to nearby streams.

Water from the Mississippian aquifers is generally acceptable for municipal or other uses and is used for domestic and commercial purposes. However, in some areas the water near the surface of Mississippian aquifers is saline or briny (Trapp and Horn, 1997). Groundwater recharge occurs from precipitation that moves downward through the unsaturated zone where it then flows downgradient before discharging to springs and streams, usually under unconfined conditions.

Where mature karst topography is developed, there may be a discernable lack of perennial surface streams because water is lost rapidly to the subsurface network of karst conduits. In these areas, significant volumes of recharge waters originate as gaining streams in upland, non-karstic areas and recharge lower-lying karst groundwater systems through swallets or infiltration through valley-train deposits (alluvium) along stream beds; recharge also occurs within the karst terrain by direct infiltration of recharge waters through overburden soils and alluvium or funneled through swallets or sinkholes.

Surficial Aquifers

Surficial unconsolidated aquifers in Pennsylvania consist of alluvial sand and gravel aquifers and aquifers comprised of significant deposits of glacial outwash material that tend to be deposited in valleys associated with major streams. Well yield is variable in the region, but can be as high as 1,300 gpm in northeastern Pennsylvania, and a few wells along the Susquehanna River have yields as high as 3,000 gpm (Trapp and Horn, 1997). Many sand and gravel surficial aquifers are thin and near the ground surface. Water chemistry varies but the water from the surficial aquifers is generally suitable for municipal supplies and other uses, and many Pennsylvania residents rely on private water wells within these surficial aquifers as their primary source of drinking water (Fleeger, 1999). Surficial aquifers receive most of their recharge from runoff of precipitation that falls on the surrounding uplands. Surficial aquifers primarily discharge to streams. No surficial aquifers would be crossed by the pipeline in Virginia and no surficial aquifers are present within the proposed workspaces for the aboveground facilities. Additional details about bedrock and surficial aquifers underlying the pipeline are described in table 4.3.1-1.

4.3.1.2 Sole Source Aquifers

The EPA defines a sole or principal source aquifer (SSA) area as one that supplies greater than 50 percent of drinking water consumed in the area overlying the aquifer and where there are no alternative water sources available that would physically, legally, and economically supply the drinking water for all those who rely on it (EPA, 2014a).

Based on a review of the EPA's designated SSA maps for Regions 3 and 4, none of project facilities would be within areas designated as SSAs (EPA, 2014a, 2014b). According to the National Sole Source Aquifer GIS Layer, the nearest SSA to the Project is the Seven Valleys Aquifer, which is about 17 miles west of CPL South MP 0.0 (EPA, 2015a).

TABLE 4.3.1-1

Bedrock and Surficial Aquifers Crossed by the Atlantic Sunrise Project[a]

State/Facility	Aquifer	Begin Milepost [b]	End Milepost	Depth (feet) [c]	Well Yield (gpm) [d]
Pipeline Facilities					
Pennsylvania–bedrock aquifers					
CPL North	Valley and Ridge	0.0	40.8	0–155	2–215
	Other rock [d]	40.8	M-0119 0.0	0–535	0–900
CPL South	Piedmont and Blue Ridge crystalline-rock	0.0	7.1	0–275	0–550
	Piedmont and Blue Ridge carbonate-rock	7.1	21.6	0–300	0–1,810
	Piedmont and Blue Ridge Early Mesozoic basin	33.4	42.6	0–363	0–800
	Valley and Ridge	42.6	125.2	0–584	0–1,300
Chapman Loop	Mississippian	L186.1	L188.5	5.5–228	0.18–400
Utility Loop	Valley and Ridge	L120.4	L128.9	0–245	0–215
Pennsylvania–surficial aquifers					
CPL North	Unconsolidated sand and gravel	0.0	M-0119 0.0	20–200	100–1,000
CPL South	Unconsolidated sand and gravel	90.0	M-0353 0.1	20–200	100–1,000
Chapman Loop	Unconsolidated sand and gravel	L186.0	L188.5	20–200	100–1,000
Unity Loop	Unconsolidated sand and gravel	L120.3	L128.9	20–200	100–1,000
Virginia					
Mainline A and B Replacements	Early Mesozoic basin	1,578.7	1,580.9	0–60	0–80
New Aboveground Facilities					
Pennsylvania					
Compressor Station 605	Other rock [e]	Not applicable	Not applicable	0–535	0–900
Compressor Station 610	Valley and Ridge	Not applicable	Not applicable	0–230	1–1,300
Zick Meter Station	Other rock [e]	Not applicable	Not applicable	0–535	0–900
Springville Meter Station	Valley and Ridge	Not applicable	Not applicable	0–535	0–900
North Diamond Regulator Station	Valley and Ridge	Not applicable	Not applicable	0–155	2–215
West Diamond Regulator Station	Valley and Ridge	Not applicable	Not applicable	0–155	2–215
River Road Regulator Station	Piedmont and Blue Ridge crystalline-rock	Not applicable	Not applicable	0–275	0–550
Existing Aboveground Facilities					
Pennsylvania					
Compressor Station 517	Valley and Ridge	Not applicable	Not applicable	0–155	2–215
Compressor Station 520	Valley and Ridge	Not applicable	Not applicable	0–155	2–215
Maryland					
Compressor Station 190	Piedmont and Blue Ridge crystalline-rock	Not applicable	Not applicable	0–70	0–60
Virginia					
Compressor Station 170	Piedmont and Blue Ridge crystalline-rock	Not applicable	Not applicable	0–60	0–80
Compressor Station 185	Early Mesozoic basin	Not applicable	Not applicable	0–60	0–80
North Carolina					
All facilities	Piedmont and Blue Ridge crystalline-rock	Not applicable	Not applicable	0–75 0–335	0–23 [f] 0–200 [g]

TABLE 4.3.1-1 (cont'd)
Bedrock and Surficial Aquifers Crossed by the Atlantic Sunrise Project

Sources: Dine et al., 1992; Huffman, 1996; NCDENR, 2015b; NRCS et al., 2014; PADCNR, 2010a; Trapp and Horn, 1997; USGS, 2014b, 2015; Wachob et al., 2009

[a] These aquifers are considered underground sources of drinking water under the Safe Drinking Water Act.

[b] The proposed CPL North and CPL South pipelines have mileposts beginning at their start points from the existing Leidy Line system and Mainline system, respectively, and continuing north to their endpoints. The two pipeline loops are numbered according to their location along the Transco Leidy Line system. All mileposts starting with "L" refer to locations along the existing Transco Leidy Line system. References are also made to mileposts of existing facilities along the Transco Mainline system.

[c] Depth is measured as feet below ground surface.

[d] Well yield is based on actual minimum and maximum yields reported for bedrock aquifers by PADCNR Pennsylvania Geologic Survey Ground Water Inventory System database of private and public groundwater wells. The database includes well records collected from various sources within a given geologic unit. Data from the well records, including yield, are aggregated into defined geologic units, and summary statistics including minimum, maximum, and percentile averages of the data parameters are reported.

[e] "Other rock" includes minor aquifers that yield small quantities of water; they are not principal aquifers or confining units.

[f] Includes all facilities that would be in the following North Carolina counties: Cleveland, Iredell, Davidson, Rockingham, Gaston, Lincoln, Rowan, Guilford, Mecklenburg, and Forsyth.

[g] Includes all facilities that would be in Cherokee County, North Carolina.

4.3.1.3 State-Designated Aquifers

In addition to the EPA-designated SSA program, individual states may enact regulations protecting significant aquifer recharge areas where excessive use of groundwater poses a threat to the long-term integrity of a water-supply source, or preservation areas to protect natural resources including public water supply sources. There are no state/commonwealth-designated aquifers in Pennsylvania, Maryland, Virginia, North Carolina, or South Carolina.

4.3.1.4 Water Supply Wells and Springs

According to information provided by the PADEP and individual Pennsylvania counties, townships, and non-municipal public water suppliers; the MDE; the NCDENR; the South Carolina Department of Health and Environmental Control; and the Virginia Department of Health, there are no public water supply wells or springs within 150 feet of the proposed construction workspaces.

Transco collected information from landowners regarding the locations of private wells and springs along the proposed route. This effort identified 126 private wells or springs within 150 feet of proposed construction areas in Pennsylvania, including 7 private wells located within areas of known karst (see table 4.3.1-2). No private wells or springs were identified in Virginia.

Because the surveys along the project route have not yet been completed, there is a potential that other private water supply wells and springs may be identified within 150 feet of the construction work areas. To ensure the identification of these features, **we recommend that:**

- **<u>Prior to construction</u>, Transco should file with the Secretary, for review and written approval by the Director of OEP, a revised table 4.3.1-2 that includes an updated list of water wells and springs within 150 feet of construction workspaces based on completed surveys. This table should indicate any water wells and springs that are within 500 feet of construction workspaces in areas of known karst.**

TABLE 4.3.1-2

Private Water Supply Wells and Springs Within 150 Feet of the Construction Work Area for the Atlantic Sunrise Project

Facility/Nearest Milepost	Township	County [a]	Supply Type	Distance from Workspace (feet)	Direction from Workspace
CPL North					
1.1	Sugarloaf	Columbia	Private well	70	North
1.1	Sugarloaf	Columbia	Private well	125	South
1.4	Sugarloaf	Columbia	Private spring	51	South
2.3	Sugarloaf	Columbia	Private spring	Within	Not applicable
8.2	Fairmount	Columbia	Private well	79	South
9.7	Fairmount	Luzerne	Private well	23	South
11.3	Ross	Luzerne	Private spring	17	North
12.2	Ross	Luzerne	Private spring	Within	Not applicable
13.1	Ross	Luzerne	Private spring	Within	Not applicable
13.4	Ross	Luzerne	Private well	70	North
13.6	Ross	Luzerne	Private spring	Within	Not applicable
16.1	Lake	Luzerne	Private well	61	South
17.3	Lake	Luzerne	Private well	122	North
19.8	Lehman	Luzerne	Private spring	71	North
19.8	Lehman	Luzerne	Private spring	104	North
19.8	Lehman	Luzerne	Private spring	112	North
20.0	Lehman	Luzerne	Private well	120	South
20.8	Lehman	Luzerne	Private well	110	South
21.6	Lehman	Luzerne	Private spring	Within	Not applicable
M-0060 1.0	Dallas	Luzerne	Private spring	Within	Not applicable
M-0060 1.0	Dallas	Luzerne	Private spring	128	North
M-0060 1.0	Dallas	Luzerne	Private spring	Within	Not applicable
24.9	Dallas	Luzerne	Private spring	17	East
M-0071 1.2	Northmoreland	Wyoming	Private well	51	West
M-0071 2.5	Eaton	Wyoming	Private well	95	West
35.1	Falls	Wyoming	Private spring	74	South
35.8	Falls	Wyoming	Private well	74	West
37.1	Falls	Wyoming	Private spring	41	North
38.0	Overfield	Wyoming	Private well	58	West
38.0	Overfield	Wyoming	Private well	66	East
39.6	Overfield	Wyoming	Private well	15	North
M-0051 0.1	Nicholson	Wyoming	Private well	101	East
M-0080 1.1	Nicholson	Wyoming	Private spring	63	East
52.0	Lenox	Susquehanna	Private spring	127	East
54.8	Lenox	Susquehanna	Private well	107	West
56.8	Lenox	Susquehanna	Private spring	Within	Not applicable
M-0062 0.2	Lenox	Susquehanna	Private spring	15	East
57.0	Lenox	Susquehanna	Private well	102	West
CPL South					
2.0	Martic	Lancaster	Private well	145	South
M-0184 0.9	Martic	Lancaster	Private well	86	East
4.4	Martic	Lancaster	Private well	67	South
11.4	Conestoga	Lancaster	Private well	94	East
12.4 [b]	Manor	Lancaster	Private well	90	North
12.7 [b]	Manor	Lancaster	Private well	98	South
M-0248 0.1 [b]	Manor	Lancaster	Private well	18	South
15.5	Manor	Lancaster	Private well	Within	Not applicable
17.4	Manor	Lancaster	Private well	104	East
18.4 [b]	Manor	Lancaster	Private well	88	West
18.4 [b]	Manor	Lancaster	Private well	138	West
22.6	West Hempfield	Lancaster	Private well	55	East
22.6	West Hempfield	Lancaster	Private well	134	North
M-0192 0.1	West Hempfield	Lancaster	Private well	90	North
22.8	West Hempfield	Lancaster	Private well	139	South
23.0	West Hempfield	Lancaster	Private well	2	East
23.0	West Hempfield	Lancaster	Private well	29	East
23.1	West Hempfield	Lancaster	Private well	45	East
25.3 [b]	Rapho	Lancaster	Private well	73	East
29.7	Rapho	Lancaster	Private well	63	West
31.6	Rapho	Lancaster	Private well	73	West
37.4	South Londonderry	Lebanon	Private well	75	North
37.5	South Londonderry	Lebanon	Private well	54	South
37.5	South Londonderry	Lebanon	Private well	55	South
37.5	South Londonderry	Lebanon	Private well	57	South

TABLE 4.3.1-2 (cont'd)

Private Water Supply Wells and Springs Within 150 Feet of the Construction Work Area for the Atlantic Sunrise Project

Facility/Nearest Milepost	Township	County [a]	Supply Type	Distance from Workspace (feet)	Direction from Workspace
37.5	South Londonderry	Lebanon	Private well	58	South
42.0	South Annville	Lebanon	Private spring	Within	Not applicable
42.7	South Annville	Lebanon	Private well	145	East
M-0183 1.5	North Annville	Lebanon	Private well	137	North
M-0183 1.8	North Annville	Lebanon	Private well	136	West
47.6	North Annville	Lebanon	Private well	108	East
47.9	North Annville	Lebanon	Private well	80	West
51.1	East Hanover	Lebanon	Private well	25	West
52.6	East Hanover	Lebanon	Private well	123	East
52.7	East Hanover	Lebanon	Private well	144	East
52.7	East Hanover	Lebanon	Private well	110	East
53.4	Union	Lebanon	Private well	80	East
53.8	Union	Lebanon	Private well	11	East
53.8	Union	Lebanon	Private well	32	East
M-0199 0.2	Union	Lebanon	Private well	148	East
54.9	Union	Lebanon	Private well	Within	Not applicable
54.9	Union	Lebanon	Private well	44	East
58.5	Union	Lebanon	Private spring	62	West
58.7	Union	Lebanon	Private well	44	East
58.7	Union	Lebanon	Private well	65	East
58.7	Union	Lebanon	Private well	Within	West
62.0	Union	Lebanon	Private well	92	South
62.1	Union	Lebanon	Private well	87	North
63.4	Union	Lebanon	Private springs	18	South
65.2	Pine Grove	Schuylkill	Private well	22	North
65.2	Pine Grove	Schuylkill	Private well	125	South
65.2	Pine Grove	Schuylkill	Private well	120	North
65.3	Pine Grove	Schuylkill	Private well	13	South
65.4	Pine Grove	Schuylkill	Private well	142	North
67.8	Pine Grove	Schuylkill	Private well	139	East
68.9	Pine Grove	Schuylkill	Private springs	72	East
M-0223 0.0	Pine Grove	Schuylkill	Private well	100	North
M-0181 0.0	Tremont	Schuylkill	Private well	56	East
M-0181 0.0	Tremont	Schuylkill	Private well	42	East
M-0181 0.0	Tremont	Schuylkill	Private well	80	West
M-0181 0.1	Tremont	Schuylkill	Private well	Within	Not applicable
M-0181 0.2	Tremont	Schuylkill	Private spring	Within	Not applicable
M-0181 0.3	Tremont	Schuylkill	Private well	138	East
M-0170 0.0	Hegins	Schuylkill	Private well	Within	West
M-0170 0.0	Hegins	Schuylkill	Private well	Within	Not applicable
M-0170 0.1	Hegins	Schuylkill	Private well	90	East
78.4	Hegins	Schuylkill	Private well	87	West
80.5	Eldred	Schuylkill	Private well	49	East
88.9	Coal	Northumberland	Private spring	Within	West
89.1	Coal	Northumberland	Private spring	Within	East
95.0	Cleveland	Columbia	Private well	93	West
M-0285 0.1	Franklin	Columbia	Private well	47	West
M-0197 0.5	Franklin	Columbia	Private well	123	East
101.8	Montour	Columbia	Private well	65	West
104.6 [b]	Hemlock	Columbia	Private well	Within	Not applicable
M-0214 0.2	Mount Pleasant	Columbia	Private spring	110	East
M-0214 0.2	Mount Pleasant	Columbia	Private spring	123	East
109.7	Mount Pleasant	Columbia	Private well	118	East
110.2	Mount Pleasant	Columbia	Private springs	30	West
110.2	Mount Pleasant	Columbia	Private springs	11	West
112.5	Greenwood	Columbia	Private well	112	East
116.0	Greenwood	Columbia	Private spring	80	West
116.2	Greenwood	Columbia	Private well	90	West
Chapman Loop					
L185.9	Chapman	Clinton	Private well	73	Northeast
L187.5	Chapman	Clinton	Private well	Within	Not applicable
Unity Loop					
L123.2	Franklin	Lycoming	Private well	26	North
L125.4	Penn	Lycoming	Private well	88	North
L125.5	Penn	Lycoming	Private well	10	South

[a] All counties are in Pennsylvania.
[b] Well is within areas of known karst.

4.3.1.5 Wellhead Protection Areas

Under the Safe Drinking Water Act, each state is required to develop and implement a Wellhead Protection Program in order to identify the land and recharge areas contributing to public supply wells and prevent contamination of drinking water supplies. An amendment to the Safe Drinking Water Act requires the development of a broader-based Source Water Assessment Program, which includes the assessment of potential contamination to both groundwater and surface water through a watershed approach.

Pennsylvania

Pennsylvania divides wellhead protection areas (WHPA) into 3 zones: Zone I immediately surrounds a public water system (PWS) well and has a radius between 100 and 400 feet, depending on site-specific source and aquifer characteristics. Zone II is typically defined as the area within 0.5 mile of a PWS well and is the capture zone or the region that directly contributes groundwater to a PWS well during pumping. Zone III includes the remaining draining area contributing surface water and groundwater beyond Zone II. Transco consulted with the PADEP regional offices, reviewed the PADEP website, and determined that the Project would cross nine Zone II WHPAs in Pennsylvania. Table 4.3.1-3 identifies the pipeline facility, PWS name, PWS ID, distance and direction from the Project, county, and water supply type.

TABLE 4.3.1-3

Zone II Wellhead Protection Areas Crossed by the Atlantic Sunrise Project

Facility/PWS Name	PWS ID	Milepost Location	Crossing Length (mi.)	Water Supply Type [a]
CPL North				
Grassmere Park Campground	4190383	0.9 to 1.9	1.0	Transient non-community
CPL South				
Hurricane Pizza Grill and Tavern	7360387	20.1 to M-0396 0.3	1.2	Transient non-community
Columbia Drive In	7360572	20.3 to 21.5	1.2	Transient non-community
Lawn Fire Company	7380410	36.9 to 38.0	1.1	Transient non-community
Countryside Christian Community	7380001	47.4 to 48.4	1.0	Transient non-community
Ono Fire Company	7380326	M-0165 0.1 to 52.8	1.4	Transient non-community
Dela Ches Canteen	7380369	38.8 to 39.1	0.3	Transient non-community
Mays Drive-In	4190349	101.2 to 102.2	1.0	Transient non-community
The Links at Hemlock Creek	4190916	104.2 to M-0156 0.0	0.9	Transient non-community

[a] A “transient non-community” water supply services locations where people do not remain for long periods (e.g., campgrounds, gas stations).

Other States

In Virginia, none of the proposed facilities would be within 0.25 mile of any Zone 1 well (1,000-foot radius of a potable well). Based on consultations with state agencies in Maryland, North Carolina, and South Carolina, the proposed facilities would not be within 0.25 mile of designated WHPAs.

4.3.1.6 Contaminated Groundwater

Transco evaluated internal records, reviewed environmental databases, and completed an abandoned mine investigation to identify potential sources of groundwater contamination within 0.25 mile of the Project. The results of these investigations for each state are summarized below.

Pennsylvania

No areas of contaminated groundwater were identified along CPL North, Chapman Loop, or Unity Loop. Transco identified 1 location near CPL South where state records indicate heating oil was released and 17 locations listed on PADEP's AML Inventory Sites where AMD may have contaminated groundwater. Transco's abandoned mine investigation identified 22 other sites of potential mine pool discharges within or near the pipeline route.

In 2012, a heating oil release occurred on a property about 820 feet northwest and upgradient of the pipeline right-of-way near MP 97.3. The site is currently listed as an active Voluntary Cleanup Program site. The same property has four violations listed in 2012 for discharging industrial waste without a permit that has the potential to reach the Waters of the Commonwealth.

Table 4.3.1-4 identifies the location, distance, and direction of the 17 AMDs from the pipeline route. AMD discharges from anthracite coal mining are typically acidic and dissolve heavy metals such as copper, lead, and mercury into both ground and surface water. These drainage discharges have been attributed to numerous environmental problems, including contamination of surface and groundwater drinking supplies (EPA, 2012a). Six of the 17 AMDs are upgradient of the pipeline route. There is potential that Transco could encounter contaminated groundwater associated with these discharges during construction. The remaining 11 locations are downgradient of the Project and are not expected to have an effect on groundwater along the pipeline route. Topographic maps were used to infer general flow direction of groundwater.

TABLE 4.3.1-4

Acid Mine Drainage Discharges Within 0.25 Mile of the Atlantic Sunrise Project [a]

Facility/Nearest Milepost	County [b]	Distance from Workspace (feet)	Direction from Pipeline Right-of-Way	Discharge in Relation to Workspace
CPL South				
M-0198 0.5	Schuylkill	673	Northeast	Downgradient
M-0198 0.5	Schuylkill	427	Northeast	Downgradient
M-0198 0.5	Schuylkill	701	Northeast	Downgradient
72.5	Schuylkill	1,038	Northeast	Downgradient
72.6	Schuylkill	1,303	Northeast	Downgradient
73.4	Schuylkill	317	Northeast	Downgradient
74.1	Schuylkill	34	Southwest	Upgradient
74.1	Schuylkill	402	Northeast	Upgradient
M-0201 0.0	Schuylkill	1066	Northeast	Downgradient
M-0201 0.0	Schuylkill	416	Northwest	Downgradient
M-0201 0.0	Schuylkill	746	Northeast	Downgradient
M-0201 0.1	Schuylkill	1,132	Northwest	Downgradient
M-0201 0.2	Schuylkill	240	Southeast	Upgradient
M-0201 0.3	Schuylkill	41.3	Southeast	Upgradient
75.2	Schuylkill	92	Northeast	Upgradient
75.2	Schuylkill	122	Southwest	Upgradient
84.9	Northumberland	1,069	Northeast	Downgradient

a Sources: PADEP 2014a, 2014b
b All counties are in Pennsylvania.

Table 4.3.1-5 identifies the location, distance, and direction of 19 potential mine pool drainages areas. Nine of these mine pool drainages would be within the proposed workspace. Some of these are on or very close to the proposed pipeline centerline. Most of the remaining mine pool drainages are within 400 feet of the workspace. Construction within or near these areas could encounter contaminated groundwater.

TABLE 4.3.1-5

Potential Mine Pool Drainage Locations Within 0.25 Mile of the Atlantic Sunrise Project

Facility/County	Milepost	Feature	Distance From Workspace (feet)	Direction From Workspace
CPL South				
Schuylkill	M-0181–0.2	Lorberry Creek	Within	Within
Schuylkill	73.3	New Lincoln Drainage Tunnel	283	East
Schuylkill	73.5	Lower Rausch Creek	Within	Within
Schuylkill	74.1	Acid Stream and Discharge Point	Within	Within
Schuylkill	M-0201 0.3	Affected Water Source	Within	Within
Schuylkill	M-0201 0.3	USGS Mine Discharge	1,027	South
Schuylkill	M-0201 0.3	Basin Pond	677	North
Schuylkill	74.7	Good Spring Creek	Within	Within
Schuylkill	74.9	Breaker Plant Discharge	872	Southeast
Schuylkill	75.0	Tailings Basin	330	East
Schuykill	M-0316 0.1	Penag Mine Tunnel Discharge	90	West
Northumberland	83.4	Mahanoy Creek	Within	Within
Northumberland	M-0240 0.2	Shamokin Creek	Within	Within
Northumberland	M-0235 0.1	Quaker Run	Within	Within
Northumberland	86.6	Acid Stream	Within	Within
Northumberland	M-0235 0.5	Settling Basin	388	East
Northumberland	M-0235 0.5	Settling Basin	291	East
Northumberland	87.9	Settling Basin	173	West
Northumberland	88	Settling Basin	127	West

Transco would minimize the potential for impacts associated with encountering acid mine and mine pool drainages by implementing the measures in its *Abandoned Mine Investigation and Mitigation Plan*. These measures include sealing openings and/or diverting discharges.

Virginia

No areas of known groundwater contamination were identified within 0.25 mile of the Mainline A and B Replacements; however, one site with the potential for groundwater contamination was identified about 1,000 feet southwest of Compressor Station 185 (EPA, 2015b). The site is a Sunoco bulk storage facility for petroleum liquids and has had reported releases of petroleum-related compounds in recent years. Although the volume and area affected from past releases are not known, the chance of encountering contaminated groundwater associated with this site is low due to the separation distance and the fact that the site is downgradient of the compressor station.

Maryland

No areas of potential groundwater contamination were identified within 0.25 mile of Compressor Station 190 (EPA, 2015b).

North Carolina

No areas of groundwater contamination were identified within 0.25 mile of the project facilities in North Carolina (EPA, 2015b).

South Carolina

No areas of potential groundwater contamination were identified within 0.25 mile of the project facilities in South Carolina (EPA, 2015b).

4.3.1.7 Groundwater Impacts and Mitigation

Construction activities are not likely to significantly affect groundwater resources because the majority of construction would involve shallow, temporary, and localized excavation. Shallow aquifers could sustain minor, indirect effects from changes in overland sheet flow and recharge caused by clearing and grading of the right-of-way. Near-surface soil compaction caused by heavy construction equipment could reduce the ability of soils to absorb water in isolated areas. Aboveground facilities could add minor impervious surfaces; however, they are unlikely to affect groundwater recharge beyond the boundaries of each facility. Local water table elevations could be affected by trenching and backfilling. These effects would be minor and temporary and are not anticipated to significantly affect groundwater resources. Upon completion of construction, Transco would restore the ground surface as closely as practicable to original contours and revegetate the right-of-way to ensure restoration of preconstruction overland flow and recharge patterns.

In areas where groundwater is near the surface, trench excavation may intersect the water table. Dewatering of trenches may result in temporary fluctuations in local groundwater levels. Trench water would be discharged into well-vegetated upland areas to allow infiltration and to minimize effects on the water table. These potential effects would be avoided or further minimized by use of the construction techniques described in Transco's ECP, such as the use of temporary and permanent trench plugs. After installation of the pipeline and aboveground facilities, the ground surface would be restored as close as practicable to original contours, and any exposed soils would be revegetated to ensure restoration of preconstruction overland flow and recharge patterns. Therefore, these minor, direct, and indirect impacts would be temporary and would not significantly affect groundwater resources.

Transco has developed a *Karst Investigation and Mitigation Plan* to address risks associated with karst terrain identified prior to or during construction (see appendix J). Section 4 of the plan provides information regarding locations where karst terrain is encountered within the project area. Transco would implement the BMPs described in the plan as necessary to mitigate the risks associated with construction in karst terrain. Transco would also ensure that erosion and sedimentation measures adjacent to exposed karst areas are installed in accordance with all applicable standards and specifications and that they are installed in a manner that would prevent direct discharge of runoff into known karst features. If possible, Transco would locate trench spoil piles on the downhill side of the karst feature to prevent direct runoff into uncovered features.

Transco proposes to cross two waterbodies using the HDD method near areas of known karst along CPL South (the Susquehanna River HDD at MP 99.6 and the Conestoga River HDD at MP 12.3). Transco has conducted geotechnical investigations and HDD feasibility studies at each of these HDD locations and developed site-specific HDD crossing plans. The geotechnical investigation and HDD feasibility study identified no karst or rock units prone to karst that would be affected by the drill path at the Susquehanna River HDD crossing site. Limestone bedrock was identified at the Conestoga River

HDD crossing site. In the event that there is an inadvertent release of drilling fluids, Transco would follow the HDD Contingency Plan.

Accidental Spills of Hazardous Materials

Unconfined aquifers and shallow groundwater areas could be vulnerable to contamination caused by inadvertent surface spills of hazardous materials used during construction. Accidental spills associated with refueling or storage of fuel, oil, or other fluids pose the greatest risk to groundwater resources. If not cleaned up, contaminated soil could continue to leach and add pollutants to groundwater long after a spill has occurred. Effects associated with spills or leaks of hazardous liquids would be avoided or minimized by restricting the locations of refueling and storage facilities and by cleaning up the hazardous material in the event of a spill.

Implementation of the measures in Transco's Spill Plan (attachment 9 of the ECP) would minimize the potential for groundwater effects associated with an inadvertent spill of hazardous material during construction. The Spill Plan identifies preventive measures to reduce the likelihood of a spill, such as use of secondary containment for the storage of petroleum products, routine inspections of containers and tanks for leaks, and restricting refueling and transferring of liquids to pre-designated locations away from sensitive areas. The Spill Plan also specifies measures to contain and clean up a spill should one occur.

We have reviewed Transco's Spill Plan and find that it adequately addresses the storage and transfer of hazardous materials and the response to be implemented in the event of a spill. As described in section 2.5.2, Transco would employ EIs to ensure compliance with the Spill Plan and other specifications during construction and restoration. The EIs would have authority to stop work and order corrective actions for activities that violate the environmental conditions of any Certificate that may be issued by FERC if the Project is approved.

Blasting

Transco identified several areas along the proposed pipeline right-of-way where blasting may be required for pipeline construction (see section 4.1.3). Blasting could affect groundwater quality by temporarily affecting yields of springs and/or wells in close proximity to the blast area and/or increasing groundwater turbidity near the construction right-of-way; however, rock particles and sedimentation would be expected to settle out quickly. Transco would utilize specialized excavation methods where practicable, including ripping or the use of hydraulic hammers or rock saws to minimize the amount of blasting that may be required. If these methods prove to be ineffective or inefficient, and blasting is necessary to achieve the required trench depth, Transco would minimize impacts, including impacts on groundwater, through implementation of its Blasting Plan (see section 4.1.3 and attachment 10 of Transco's ECP). As stated in the Blasting Plan, Transco would obtain all the necessary permits and would employ licensed blasting contractors to conduct the blasting activities in accordance with applicable federal, state, and local regulations.

We anticipate that impacts on nearby wells and springs (such as increases in turbidity) from blasting would be temporary and would likely dissipate shortly after blasting or after a well has been flushed several times. Transco has committed to testing water supply wells and springs within 150 feet of the construction workspace for water quality and quantity parameters prior to and after construction, subject to landowner permission. Water samples would be collected and analyzed for specific conductivity, temperature, pH, turbidity, nitrate, volatile organic compounds, and total petroleum hydrocarbons. Transco would provide an alternate water source or reach another mutually agreeable solution with the well owner in the event that a construction-related activity impacts the yield or water quality of a well. We conclude that this would minimize and mitigate the potential impacts of blasting on groundwater wells and springs.

Water Use and Quality

As stated above, Transco has agreed to perform pre- and post-construction monitoring for well yield and water quality for private wells and springs within 150 feet of the construction workspace, subject to landowner approval. To date 126 private wells and/or springs have been identified within 150 feet of the construction workspace (see table 4.3.1-2). For water wells within the construction workspace, Transco would install safety fence around these wells to exclude contractors from entering the well area. Transco would also install sediment barriers to divert flow away from the wellhead if rain events cause erosion around the wells. Additionally, any refueling would occur at least 200 feet from private wells and springs.

To ensure that impacts on wells are minimized, and given the number of private wells and springs within 150 feet of the construction workspace associated with the project facilities, **we recommend that:**

- **<u>Prior to construction</u>, Transco should file with the Secretary, for review and written approval by the Director of OEP, a *Well and Spring Monitoring Plan* for the pre- and post-construction monitoring of well yield and water quality of wells within 150 feet of the construction workspace and, in areas of known karst terrain, of wells within 500 feet of the construction workspace. <u>Within 30 days of placing the project facilities in service</u>, Transco should file with the Secretary a report describing any complaints it received regarding water well yield or quality, the results of any water quality or yield testing performed, and how each complaint was resolved.**

Contaminated Groundwater

Contaminated groundwater resulting from AMD and mine pool discharges could be encountered during construction. Transco developed mitigation measures to minimize impacts from AMD and mine pool discharges. At locations where the pipeline trench is near, but outside of, the mine land, the mitigation measures may include sealing openings associated with relatively small mine pool discharges, and diversion berms or flumes of larger discharges. Other options may include a cut-off wall (i.e., sheetpile) or well point to discharge the pumped water to the ground surface through a filter bag if permissible, or collecting the pumped water and disposing of it at an appropriate off-site location. Trench plugs would also be used as appropriate.

If the pipeline trench crosses a surface mine area and no potential exists for contaminant migration to extend outside the mine land, a wet trench method, if feasible, would be used to install the pipeline. If groundwater levels must be temporarily lowered (e.g., via well point system) to facilitate trench construction and backfilling, ground surface monitoring would be conducted as appropriate to monitor settling adjacent to the pipeline workspace. Transco has consulted with the PADEP regarding the management of mine pool groundwater and potentially contaminated soil associated with mine tailings. The PADEP indicated that there is a low potential to encounter either form of contamination at the proposed depth of excavation required for the Project in Schuylkill and Northumberland Counties. The PADEP Northeast Regional Office Department of Clean Water indicated that there is a slightly greater risk of encountering contamination in Northumberland County. Transco will continue to consult with the PADEP Northeast Regional Office Department of Clean Water to develop a plan for treatment and discharge of contaminated groundwater during construction. This information would be provided to FERC as part of Transco's Implementation Plan prior to the start of construction.

Aboveground Facilities

Transco's proposed measures to minimize the potential effects of pipeline construction on groundwater (adherence to the measures included in Transco's ECP and Spill Plan) also apply to the aboveground facilities, access roads, and contractor yards. Although some clearing and grading activities would be necessary for the contractor yards and access roads, trenching and drilling activities would not take place at these locations, reducing the potential for effects on groundwater. Additionally, no blasting is anticipated to be necessary at any aboveground facility sites.

The construction of some aboveground facilities would involve the conversion of vegetation cover to impervious surface. This conversion could affect the recharge area of surficial aquifers in various regions. However, effects on recharge areas would be highly localized and not likely to result in adverse impacts. For these reasons, we do not expect the construction or use of the aboveground facilities, access roads, and contractor yards to affect groundwater resources.

4.3.1.8 Conclusion

No long-term impacts on groundwater are anticipated from construction and operation of the Project because disturbances would be temporary, erosion controls would be implemented, natural ground contours would be restored, and the right-of-way would be revegetated. Implementation of Transco's ECP and Spill Plan, as well as our recommendations, would limit impacts from construction on groundwater resources.

4.3.2 Surface Water

4.3.2.1 Existing Surface Water Resources

Transco identified surface water resources in the majority of the project area during field surveys conducted in 2014. For areas where surveys could not be completed, Transco delineated waterbodies using various sources including aerial photography, LiDAR, NWI data, National Hydrography Dataset (NHD), and soils data.

The pipeline facilities would cross nine watersheds or drainage basins. The name, 8 digit hydrologic unit code, drainage area, and the approximate location of each watershed are provided in table 4.3.2-1.

In total, the Project would involve 388 waterbody crossings (370 crossings associated with the pipeline facilities and workspace and 18 crossings associated with access roads). Table K-1 in appendix K includes the unique identification number, waterbody name, milepost, crossing width, fishery type, FERC classification, state water classification, and proposed crossing method for each waterbody. The proposed crossings include 208 perennial waterbodies, 84 intermittent waterbodies, 41 ephemeral waterbodies, 2 ponds, and 1 area of open water. In addition to these, another 21 perennial waterbodies, 20 intermittent waterbodies, 10 ephemeral waterbodies, and 1 pond would be within construction workspaces (not crossed or intersected by the pipeline trench) or crossed by access roads. No waterbodies would be affected at the proposed aboveground facility sites or along proposed access roads for the aboveground facilities.

Table 4.3.2-2 lists the flow regime of the waterbodies that would be affected by construction.

TABLE 4.3.2-1

Watersheds Crossed by Pipeline Facilities Associated with the Atlantic Sunrise Project [a]

Commonwealth/Facility/ Watershed	8 Digit Hydrologic Unit Code	Approximate Milepost Range [c]	Drainage Area (square miles)
PENNSYLVANIA [b]			
CPL North			
Upper Susquehanna – Lackawanna	02050107	0.0–23.9	1,760
Upper Susquehanna – Tunkhannock	02050106	23.9–M-0119 0.0	1,980
CPL South			
Lower Susquehanna	02050306	0.0–36.7	2,440
Lower Susquehanna – Swatara	02050305	36.7–M-0316 0.3	1,850
Lower Susquehanna – Penns	02050301	75.4–88.5 90.1–90.2 90.3–90.3	1,430
Upper Susquehanna – Lackawanna	02050107	88.5–90.1 90.2–90.3 90.3–M-0353 0.1	1,760
Chapman Loop			
Middle West Branch Susquehanna	02050203	L186.0–L188.5	768
Unity Loop			
Lower West Branch Susquehanna	02050206	L120.4–L128.9	1,810
VIRGINIA			
Mainline A and B Replacements			
Middle Potomac-Anacostia-Occoquan	02070010	1578.7–1581.0	1,280

Source: USGS, 2014b

a Pipeline facilities include the construction and operation rights-of-way, ATWS, access roads, new MLVs, contractor staging areas, and contractor/pipe yards.

b The watersheds crossed by the pipeline facilities in Pennsylvania discharge to the Chesapeake Bay.

c The proposed CPL North and CPL South pipelines have mileposts beginning at their starting points from the existing Leidy Line system and Mainline system, respectively, and continuing north to their endpoints. The two pipeline loops are numbered according to their location along the Leidy Line system. All mileposts starting with "L" refer to locations along the existing Leidy Line system.

TABLE 4.3.2-2

Summary of Waterbodies Crossed by the Atlantic Sunrise Project

Commonwealth/Facility	Perennial Waterbody Crossings	Intermittent Waterbody Crossings	Ephemeral Waterbody Crossings	Total
Pennsylvania				
CPL North	82	36	21	139
CPL South	135	60	27	222
Chapman Loop	1	1	1	3
Unity Loop	12	7	1	20
Virginia				
Mainline A and B Replacements	3	0	1	4
Project Total	233 [a]	104	51	388

a Total includes 229 perennial waterways and 3 ponds.

Transco provided site-specific crossing plans for the five major[6] waterbody crossings. These include the Susquehanna River and Tunkhannock Creek along the CPL North segment of the Project and the Conestoga River, Swatara Creek, and Susquehanna River crossings along the CPL South segment. Transco proposes to cross Tunkhannock Creek using the dam-and-pump method and would cross Swatara Creek using the flume method. Transco has proposed the HDD method for both Susquehanna River crossings and the Conestoga River. Additional information regarding the feasibility of using the HDD technique at these crossings is provided in section 4.3.2.6.

4.3.2.2 Source Water Protection Areas and/or Public Watersheds

Pennsylvania

Transco contacted the PADEP, individual townships, and public water supply operators to identify surface water intakes within 3 miles downstream of waterbody crossings and to identify the locations of source water protection areas.

Based on these consultations, four potable surface water intakes within 3 miles downstream of waterbody crossings were identified. Table 4.3.2-3 identifies the facility, waterbody I.D., waterbody name, milepost location, distance to intake structure, water intake operator, and the primary use of the four surface water intakes.

TABLE 4.3.2-3

Potable Surface Water Intake Structures Within 3 Miles Downstream of Waterbody Crossings for the Atlantic Sunrise Project

Facility [a]/Waterbody ID	Waterbody Name	Milepost	Distance to Intake Structure [b]	Water Intake Operator	Primary Water Use of Intake
CPL North					
WW-T12-19002	Unnamed Tributary to Beaver Creek	40.0	0.7	Scranton Canoe Club	Commercial [c]
CPL South					
WW-RS-2002	Unnamed Tributary to Shawnee Run	21.8	2.2	City of Lancaster	Community
WW-T10-2004	Shawnee Run	22.4	2.0	City of Lancaster	Community
WW-T10-6002	Unnamed Tributary to Swatara Creek	53.7	2.6	City of Lebanon Water Authority	Community

a All facilities are in Pennsylvania.
b Distance measured as miles downstream from waterbody crossing.
c Water intake is classified as a transient non-community water supply, but is a potable water source for the Scranton Canoe Club (PADEP, 2015b).

In Pennsylvania, source water protection areas are divided into regions or zones to enable a water system operator to implement different management strategies based on separation distances between a potential contaminant source and surface water intake. The most stringent protection area is defined as Zone A, which is an area 0.25 mile wide on either side of the creek or stream and extends from an area 0.25 mile downstream of the surface water intake to an area that is 5-hour time of travel upstream of the surface water intake. The Project would cross two waterbodies within Zone A source water protection areas. Table 4.3.2-4 identifies the waterbody name, milepost location, and surface water intake operator associated with the Zone A source water protection area.

6 A "major" waterbody is greater than 100 feet wide at the water's edge at the time of crossing.

TABLE 4.3.2-4 **Zone A Source Water Protection Areas Crossed by the Atlantic Sunrise Project**		
Waterbody Name	Milepost	Surface Water Intake Operator
Swatara Creek and tributaries	53.7	City of Lebanon Water Authority
		Pennsylvania American Water Company
Susquehanna River and tributaries	99.7	Chester Water Authority
		City of Lancaster Water Authority
		Columbia Water Authority
		Red Lion Borough Water Authority
		Safe Harbor Power Corporation
		Wrightsville Borough Municipal Authority

We contacted the PADEP South Central Regional Office and reviewed PADEP guidance document 383-5000-001, *Source Water Assessment and Protection Program,* to determine if the Zone A source water protection area applied to any tributaries of Swatara Creek and the Susquehanna River. Based on the PADEP's review, the tributaries to the Susquehanna River between MPs 1.4 and 37.7 and the tributaries to Swatara Creek between MPs 42.4 and 64.2 are also designated as Zone A source water protection areas (Havice, 2015). The PADEP does not prescribe specific mitigation measures for activities within Zone A source water protection areas. Source water protection areas are a tool provided to intake operators to help in their development of source water protection plans for each drinking water source. Transco contacted the operators within the project area that have Source Water Assessment and Protection Programs and received responses from the City of Lebanon Water Authority and the Red Lion Borough Water Authority. Their plans did not identify construction impacts as a concern. For each surface water intake operator with a Zone A source water protection area crossed by the Project, Transco would develop a notification plan in coordination with the operator to be used in the event of an unanticipated spill or release during construction. The notification plans would contain specific points of contact and procedures to be implemented in the event of a spill and would be provided to FERC for approval prior to construction.

Virginia

There are no surface water protection areas or potable surface water intakes within 3 miles downstream of the project facilities.

North Carolina

Compressor Station 155 and the West Lexington M&R station are within the Yadkin River water supply watershed. Compressor Station 150 is within the Lake Norman water supply watershed. The surface waters in these watersheds are used as sources of water supply for drinking, culinary, and food processing purposes (NCDENR, 2015b).

Maryland and South Carolina

No surface waters would be affected by construction of the Project in Maryland or South Carolina, and there are no surface water protection areas within 3 miles of the project facilities.

4.3.2.3 Water Classifications

CWA section 303(d) requires that each state review, establish, and revise water quality standards for all surface waters within the state. In order to ensure water standards meet their designation, each state develops a classification system and monitoring and mitigation programs. Waters that fail to meet their designated use are considered impaired and are listed under a state's 303(d) list of impaired waters.

Pennsylvania

Pennsylvania Code Title 25, Chapter 93 establishes water quality standards for each waterbody according to use. Pennsylvania surface water uses are classified as:

- coldwater fishes (CWF) – maintenance or propagation, or both, of fish species and additional flora and fauna indigenous to a cold water habitat;
- warmwater fishes (WWF) – maintenance and propagation of fish species and additional flora and fauna indigenous to a warm water habitat;
- migratory fishes – passage, maintenance, and propagation of anadromous[7] and catadromous[8] fishes and other fishes that move to or from flowing waters to complete their life cycle in other waters; and
- trout stocked – maintenance of stocked trout from February 15 to July 31 and maintenance and propagation of fish species and additional flora and fauna indigenous to a warm water habitat.

Selected waterbodies are further classified as Exceptional Value (EV) or High Quality (HQ) and given special protection. In order for a surface water to be classified as HQ, the waterbody must meet water quality or biological parameters outlined in Pennsylvania Code Title 25 Chapter 93b. In order to quality as an EV waterbody, the surface water must meet the criteria for an HQ waterbody and at least one of the following:

- is located in a national wildlife refuge or a state game propagation and protection area;
- is located in a designated state park natural area or state forest natural area, national natural landmark, federal or state wild river, federal wilderness area, or national recreation area;
- is a surface water of exceptional recreational significance;
- is a surface water of exceptional ecological significance;
- is a surface water that scores at least 92 percent in the appropriate biological assessments; or
- is designated as a wilderness trout stream.

Virginia

Title 9 of Virginia Administrative Code (VAC) Agency 25, chapter 260, section 30 (9 VAC 25-260-30) outlines an antidegradation policy that establishes three classes for all waters of the Commonwealth of Virginia (Virginia's Legislative Information System, 2014). The three classes are defined as:

- Tier 1 – waters where existing water quality and uses need to be maintained;
- Tier 2 – waters that are exceeding water quality standards; and
- Tier 3 – exceptional waters where no new discharges of pollution are allowed; these waters are required to be listed in the VAC.

[7] Anadromous refers to fish that migrate up rivers from the sea to spawn.

[8] Catadromous refers to fish that either migrate downstream to spawn or from fresh water to the sea to spawn.

Under 9 VAC 25-260-10, all Commonwealth of Virginia waters, including wetlands, are designated for recreational uses; propagation and growth of a balanced, indigenous population of aquatic life; wildlife; and the production of edible and marketable natural resources. Subcategories have been established for the propagation and growth of a balanced indigenous population of aquatic life in Chesapeake Bay and its tidal tributaries.

4.3.2.4 Sensitive Waterbodies

Waterbodies that may be considered sensitive to pipeline construction, include, but are not limited to:

- waters that do not meet the water quality standards associated with the state's designated beneficial uses;
- surface waters that have been designated for intensified water quality management and improvement;
- waterbodies that contain threatened or endangered species or critical habitat;
- waters that support fisheries of special concern (e.g., trout streams);
- waterbodies that are designated as an outstanding resource water; and
- waterbodies on or designated to be added to the Nationwide Rivers Inventory or a state river inventory.

Additional factors that can provide a basis for sensitivity include waterbodies within sensitive and protected watersheds, waterbodies, and intermittent drainages that have steep banks and other characteristics that might contribute to high risk of erosion effects, and surface waters that have important riparian areas. Waterbodies with steep banks and/or actively eroding banks are listed in table K-2 in appendix K. High-quality coldwater fishes waterbodies are listed in table 4.3.2-5.

Impaired Surface Waters and Contaminated Sediments

Thirty-eight waterbodies along the pipeline route in Pennsylvania are listed as impaired for their designated use. Of these, two waterbodies (the Susquehanna River at both the CPL North and CPL South crossings and the Conestoga River) have confirmed contaminated sediments, including the presence of mercury and/or polychlorinated biphenyls (PCBs). Table 4.3.2-6 lists the impaired waterbodies that would be crossed by the Project, their milepost location, impaired designated uses, pollutants, and crossing method. The Mainline A and B Replacements would not cross any impaired waterbodies in Virginia, and there are no waterbodies within the proposed project workspaces in Maryland, North Carolina, or South Carolina.

Stewards of the Lower Susquehanna, Inc. commented that the Chesapeake Bay TMDL has no growth allocation for Pennsylvania, and any temporary or permanent sources of pollution must be offset. The PADEP has a Watershed Implementation Plan for the portion of the Chesapeake Bay basin in Pennsylvania, which identifies regulatory waste load allocations and load allocations of nitrogen, phosphorus, and total suspended solids (PADEP, 2012). The Chesapeake Watershed Implementation Plan is implemented at the county level in Pennsylvania and targets loads from agriculture, stormwater, and forestry changes that can be reduced through BMPs. As described in Transco's Procedures, Transco would implement BMPs and install and maintain erosion and sediment control devices, such as trench plugs and sediment barriers, during construction to minimize the amount of sediment and runoff entering waterbodies within the Chesapeake Bay basin.

TABLE 4.3.2-5

High-Quality Coldwater Fishes Waterbodies Crossed by the Atlantic Sunrise Project

Facility [a]/Waterbody ID	Waterbody Name	Milepost	State Water Quality Designated Use	Proposed Crossing Method [b]
CPL North				
WW-T92-15002	UNT to Coles Creek	4.2	HQ-CWF, MF	Not applicable
WW-T02-15017	Maple Run	6.0	HQ-CWF, MF	Dam-and-pump
WW-T02-15017A	Unnamed Tributary to Maple Run	6.0	HQ-CWF, MF	Dam-and-pump
WW-T02-15018	Kitchen Creek	7.3	HQ-CWF, MF	Dam-and-pump
WW-T24-15001	Crooked Creek	7.5	HQ-CWF, MF	Dam-and-pump
WW-T02-16001	Unnamed Tributary to Phillips Creek	9.2	HQ-CWF, MF	Dam-and-pump
WW-T02-16002	Phillips Creek	9.3	HQ-CWF, MF	Dam-and-pump
WW-T05-16003	Lick Branch	10.2	HQ-CWF, MF	Dam-and-pump
WW-T11-16001D	Unnamed Tributary to Arnold Creek	11.2	HQ-CWF, MF	Dam-and-pump
WW-T11-16001	Arnold Creek	11.2	HQ-CWF, MF	Dam-and-pump
WW-T11-16001B	Unnamed Tributary to Arnold Creek	11.2	HQ-CWF, MF	Not applicable
WB-T13-16002	Unnamed Tributary to Shingle Run	11.5	HQ-CWF, MF	Not applicable
WW-T13-16002	Unnamed Tributary to Shingle Run	11.8	HQ-CWF, MF	Flume
WW-T13-16001	Shingle Run	12.2	HQ-CWF, MF	Dam-and-pump
WW-T05-16002	Unnamed Tributary to Mitchler Run	12.9	HQ-CWF, MF	Dam-and-pump
WW-T90-16002	Unnamed Tributary to Mitchler Run	13.1	HQ-CWF, MF	Dam-and-pump
WW-T05-16001	Mitchler Run	13.1	HQ-CWF, MF	Dam-and-pump
WW-T05-16001A	Unnamed Tributary to Mitchler Run	13.1	HQ-CWF, MF	Dam-and-pump
WW-T90-16001	Unnamed Tributary to Mitchler Run	13.1	HQ-CWF, MF	Dam-and-pump
WW-T03-16003C	Unnamed Tributary to Huntington Creek	13.9	HQ-CWF, MF	Conventional bore
WW-T03-16004	Unnamed Tributary to Huntington Creek	13.9	HQ-CWF, MF	Not applicable
WW-T03-16003F	Unnamed Tributary to Huntington Creek	14.4	HQ-CWF, MF	Not applicable
WW-T65-16001	Unnamed Tributary to Huntington Creek	14.4	HQ-CWF, MF	Not applicable
WW-T03-16003B	Huntington Creek	14.5	HQ-CWF, MF	Dam-and-pump
WW-T03-16003	Unnamed Tributary to Huntington Creek	14.5	HQ-CWF, MF	Dam-and-pump
WW-T03-16002A	Unnamed Tributary to Huntington Creek	14.9	HQ-CWF, MF	Dam-and-pump
WW-T03-16002	Unnamed Tributary to Huntington Creek	15.0	HQ-CWF, MF	Dam-and-pump
WW-T03-16001	Fades Creek	15.8	HQ-CWF, MF	Dam-and-pump
WW-T03-17008	Pikes Creek	16.6	HQ-CWF, MF	Conventional bore
WW-T03-17007	Unnamed Tributary to Pikes Creek	16.7	HQ-CWF, MF	Dam-and-pump
WW-T03-17006	Unnamed Tributary to Paint Spring Run	17.2	HQ-CWF, MF	Dam-and-pump
WW-T03-17005	Paint Spring Run	17.6	HQ-CWF, MF	Dam-and-pump
WW-T03-17004	Harveys Creek	18.1	HQ-CWF, MF	Dam-and-pump
WW-T03-17003	Unnamed Tributary to Harveys Creek	18.8	HQ-CWF, MF	Dam-and-pump
WW-T03-17001	Unnamed Tributary to Harveys Creek	19.4	HQ-CWF, MF	Dam-and-pump
WW-T03-17002	Unnamed Tributary to Harveys Creek	19.8	HQ-CWF, MF	Dam-and-pump
WW-T03-17002A	Unnamed Tributary to Harveys Creek	19.8	HQ-CWF, MF	Dam-and-pump
WW-T03-17002B	Unnamed Tributary to Harveys Creek	19.8	HQ-CWF, MF	Dam-and-pump
WW-T49-17003	Unnamed Tributary to Harveys Creek	19.9	HQ-CWF, MF	Flume

TABLE 4.3.2-5 (cont'd)

High-Quality Coldwater Fishes Waterbodies Crossed by the Atlantic Sunrise Project

Facility [a]/Waterbody ID	Waterbody Name	Milepost	State Water Quality Designated Use	Proposed Crossing Method [b]
WW-T07-17003	Unnamed Tributary to Leonard Creek	M-0150 0.0	HQ-CWF, MF	Dam-and-pump
WW-T07-17004	Unnamed Tributary to Leonard Creek	M-0141 0.5	HQ-CWF, MF	Dam-and-pump
WW-T17-18001	Unnamed Tributary to Leonard Creek	25.6	HQ-CWF, MF	Dam-and-pump
WW-T65-18001	Unnamed Tributary to Leonard Creek	M-0142 0.3	HQ-CWF, MF	Dam-and-pump
WW-T61-18001	Unnamed Tributary to Leonard Creek	26.7	HQ-CWF, MF	Dam-and-pump
WW-T56-18002	Unnamed Tributary to Leonard Creek	M-0088 1.1	HQ-CWF, MF	Dam-and-pump
WW-T56-18004	Unnamed Tributary to Leonard Creek	M-0088 1.8	HQ-CWF, MF	Dam-and-pump
CPL South				
WW-T10-004	Tucquan Creek	3.9	HQ-CWF, MF	Dam-and-pump
WW-T62-001	Unnamed Tributary to Trout Run	5.3	HQ-CWF, MF	Dam-and-pump
WW-T44-11002	Unnamed Tributary to South Branch Roaring Creek	88.9	HQ-CWF, MF	Dam-and-pump
WW-T45-11001	South Branch Roaring Creek	91.0	HQ-CWF, MF	Dam and Pump
WW-T51-11001	Unnamed Tributary to South Branch Roaring Creek	91.0	HQ-CWF, MF	Dam-and-pump
WW-T47-11001	Unnamed Tributary to South Branch Roaring Creek	91.7	HQ-CWF, MF	Dam-and-pump
WW-T47-11002	South Branch Roaring Creek	91.8	HQ-CWF, MF	Dam and Pump
WW-T44-11001C	Unnamed Tributary to South Branch Roaring Creek	M-0271 0.1	HQ-CWF, MF	Flume
WW-T44-11001A	Unnamed Tributary to South Branch Roaring Creek	M-0271 0.1	HQ-CWF, MF	Dam-and-pump
WW-T44-11001	South Branch Roaring Creek	91.8	HQ-CWF, MF	Dam-and-pump
WW-T31-11001	Unnamed Tributary to Mugser Run	94.1	HQ-CWF, MF	Dam-and-pump
WW-T04-11001	Mugser Run	94.4	HQ-CWF, MF	Dam-and-pump
WW-T04-11001A	Unnamed Tributary to Mugser Run	94.4	HQ-CWF, MF	Dam-and-pump
Chapman Loop				
WW-T21-27002	Post Hollow	186.3	HQ-CWF, MF	Dam-and-pump
WW-T21-27001	Unnamed Tributary to Mudlick Run	187.2	HQ-CWF, MF	Dam-and-pump
WW-T30-27001	Unnamed Tributary to Mudlick Run	187.4	HQ-CWF, MF	Dam-and-pump
Unity Loop				
WW-T01-22006B	Unnamed Tributary Big Run	125.3	HQ-CWF, MF	Dam-and-pump
WW-T01-22007	Big Run	125.3	HQ-CWF, MF	Dam-and-pump
Access Road – CPL North				
WW-T03-17008A	Unnamed Tributary to Pikes Creek	N/A	HQ-CWF, MF	
WW-T03-17005	Paint Spring Run	N/A	HQ-CWF, MF	

[a] All facilities are in Pennsylvania.

[b] "Not applicable" indicates waterbodies that are not crossed by the centerline but would be within the construction workspace or may be crossed by an access road.

Notes:

HQ-CWF = high-quality coldwater fishes

MF = migratory fishes

TABLE 4.3.2-6

Impaired Waterbodies Crossed by the Pipeline Facilities for the Atlantic Sunrise Project

Facility [a]/Waterbody ID	Waterbody Name	Milepost	Impaired Designated Use(s) – 305(b) List	Pollutant(s) – 303(d) List	Proposed Crossing Method
CPL North					
WW-T21-19001	Susquehanna River	35.0	Fish consumption	Mercury, PCBs	HDD
WW-T14-20003	South Branch Tunkhannock Creek	43.7	Recreational	Pathogens	Dam-and-pump
CPL South					
WW-T20-1001	Conestoga River	12.3	Fish consumption	Mercury	HDD
WW-T36-1007	Indian Run	14.6	Aquatic life	Nutrients, siltation	Dam-and-pump
WW-T20-1005	Unnamed Tributary to Indian Run	15.3	Aquatic life	Nutrients, siltation	Dam-and-pump
WW-T24-1001	Witmers Run	17.0	Aquatic life	Siltation	Dam-and-pump
WW-T11-2001	Stamans Run	18.1	Aquatic life	Nutrients, siltation	Dam-and-pump
WW-T11-2002	Unnamed Tributary to Stamans Run	18.9	Aquatic life	Nutrients, siltation	Dam-and-pump
WW-T24-2001	Strickler Run	M-0389 0.1	Aquatic life	Siltation, urban runoff	Dam-and-pump
WW-T10-2005	Unnamed Tributary to Strickler Run	20.8	Aquatic life	Siltation, urban runoff	Dam-and-pump
WW-T10-2004	Shawnee Run	22.4	Aquatic life	Siltation, metals, urban runoff, flow alterations	Flume
WW-T42-2003	Chiques Creek	23.9	Aquatic life	Nutrients	Dam-and-pump
WW-T64-5001	Gingrich Run	42.6	Recreational, aquatic life	Pathogens, suspended solids, organic enrichment/low dissolved oxygen	Flume
WW-T43-5003	Quittapahilla Creek	M-0183 1.3	Recreational, aquatic life	Pathogens, siltation, flow alterations	Dam-and-pump
WW-T43-5001	Unnamed Tributary to Quittapahilla Creek	M-0183 1.6	Recreational, aquatic life	Pathogens, siltation, flow alterations	Flume
WW-T14-5008	Unnamed Tributary to Swatara Creek	50.5	Aquatic life	Siltation, flow alterations	Dam-and-pump
WW-T14-5011	Unnamed Tributary to Reeds Creek	52.8	Aquatic life	Siltation, flow alterations	Dam-and-pump
WW-T14-5013	Reeds Creek	53.0	Aquatic life	Siltation, flow alterations	Dam-and-pump
WW-T32-6001	Forge Creek	56.3	Aquatic life	Siltation, flow alterations	Dam-and-pump
WW-T40-6001A	Unnamed Tributary to Forge Creek	56.9	Aquatic life	Siltation, flow alterations	Dam-and-pump
WW-T31-8001	Lorberry Creek	M-0181 0.2	Aquatic life	Metals, pH, suspended solids	Dam-and-pump
WW-T24-8002	Lower Rausch Creek	73.5	Aquatic life	Metals, siltation	Dam-and-pump
WW-T35-8001	Good Spring Creek	74.7	Aquatic life	Metals, siltation	Dam-and-pump
WW-T11-9001	Mahantango Creek	80.3	Aquatic life	Siltation	Dam-and-pump
WW-T09-9002	Unnamed Tributary to Little Mahantango Creek	81.2	Aquatic life	Siltation	Dam-and-pump
WW-T09-9001	Little Mahantango Creek	M-0194 0.2	Aquatic life	Siltation	Dam-and-pump
WW-T01-10001	Mahanoy Creek	83.4	Aquatic life	Metals	Flume
WW-T04-10001	Shamokin Creek	M-0240 0.2	Aquatic life	Metals	Dam-and-pump
WW-T18-10002	Quaker Run	86.6	Aquatic life	Metals	Flume

TABLE 4.3.2-6 (cont'd)

Impaired Waterbodies Crossed by the Pipeline Facilities for the Atlantic Sunrise Project

Facility [a]/Waterbody ID	Waterbody Name	Milepost	Impaired Designated Use(s) – 305(b) List	Pollutant(s) – 303(d) List	Proposed Crossing Method
WW-T58-11001	Coal Run	M-0235 1.2	Aquatic Life	Metals	Dam-and-pump
WW-T35-11001	Roaring Creek	95.9	Recreational	Pathogens	Dam-and-pump
WW-T04-12001	Susquehanna River	99.7	Fish consumption	Mercury, PCBs	HDD
WW-T04-12005A	Montour Run	101.7	Aquatic life	Siltation	Dam-and-pump
WW-T04-12006	Unnamed Tributary to Montour Run	102.0	Aquatic life	Siltation	Dam-and-pump
WW-T70-12003	Hemlock Creek	M-0423 1.5	Aquatic life	Siltation	Dam-and-pump
WW-T06-13002	Unnamed Tributary to Deerlick Run	110.2	Aquatic life	Siltation	Dam-and-pump
WW-T35-13002	Deerlick Run	111.2	Aquatic life	Siltation	Dam-and-pump
WW-T21-13001	Mud Run	113.4	Aquatic life	Siltation	Dam-and-pump

Source: PADEP, 2014h

[a] All impaired waterbodies crossed by the project facilities are in Pennsylvania.

Waterbodies that Support Fisheries of Special Concern

Through consultations with both federal and state agencies, Transco identified 221 waterbodies in Pennsylvania that support fisheries of special concern and 1 waterbody in Virginia (unnamed tributary to Broad Run) that is designated as a Stream Conservation Unit. Fisheries of special concern are described in greater detail in section 4.6.2.1.

Waterbodies Containing Threatened or Endangered Species or Critical Habitat

Transco consulted with various federal and state agencies to identify waterbodies that may contain federally or state-listed threatened or endangered or candidate species and their habitat. Additional information regarding special status species is provided in section 4.7.

National Rivers Inventory and State Rivers Inventory

No federal wild and scenic rivers would be crossed by the Project. The Pennsylvania Scenic Rivers Act has designated one waterbody, Tucquan Creek, as scenic. Transco proposes to cross Tucquan Creek using the dam-and-pump method. Information regarding the scenic qualities of Tucquan Creek is included in section 4.8.6.3.

Flood Hazard Zones

The Project would cross 80 waterbodies within FEMA-identified flood hazard zones. According to FEMA, Zone A and AE areas have a 1 percent annual chance of flood event. These areas are known as the base flood or 100-year-flood. For comparison, Zone X areas, also known as the 500-year flood, have a 0.2 percent annual chance of a flood event (FEMA, 2013). Waterbodies in FEMA Zones A and AE are identified in table K-3 in appendix K.

None of the new aboveground facilities would be within FEMA-identified flood hazard zones.

4.3.2.5 Waterbody Construction Procedures

As described above, the Project would involve 388 waterbody crossings,[9] consisting of 256 minor[10] crossings, 97 intermediate[11] crossings, and 5 major crossings. Transco would cross all waterbodies according to state-designated timing windows as described in section 4.6.2.1. A description of alternative pipeline routes evaluated to minimize impacts on waterbodies is provided in section 3.3.

Dry Crossing Method

Transco proposes to use a dry crossing method (i.e., dam-and-pump or flume) at 325 waterbodies. Dry crossing methods involve installation of a flume pipe(s) and/or dam-and-pump configuration prior to trenching to divert the stream flow over or around the construction area and to allow trenching of the stream crossing in drier conditions isolated from the stream flow. Spoil removal during trenching would be stored away from the water's edge and protected by sediment containment structures. Pipe strings would be fabricated on one bank and either pulled across the stream bottom to the opposite bank or carried into place and lowered into the trench. Where these methods are employed, ATWS areas would be required for assembly of the pipe strings and spoil storage areas. Dry crossing methods are described in more detail in section 2.3.2.2.

Trenchless Crossing Methods

Transco would use a trenchless crossing method (i.e., conventional bore or HDD) at 11 waterbodies. Transco has proposed four conventional bore crossings (each crossing one waterbody) and four HDD crossings (two of which would cross more than one waterbody). Trenchless crossing methods are described in more detail in section 2.3.2.2.

The remaining 52 waterbodies would not be crossed by the centerline but may be crossed by equipment.

Drilling and Blasting at Waterbodies

Some blasting may be required along the project route to allow excavation of the trench. Shallow bedrock areas with moderately difficult or difficult rippability are considered to be those that may require blasting. Based on a review of the USDA soils data and field surveys, 27 waterbodies may require blasting along CPL North, 27 waterbodies along CPL South, 3 waterbodies along Chapman Loop, and 9 waterbodies along Unity Loop. Table K-4 in appendix K lists waterbodies that may require blasting. Construction crews would determine if rock is present and if blasting would be required. If in-water blasting is required, Transco would develop a site-specific blasting plan for each crossing.

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9 Three hundred thirty-six of the waterbodies would be crossed by the centerline. The remaining 52 waterbodies would be within the workspace and may be crossed by equipment.

10 A "minor" waterbody is less than or equal to 10 feet wide at the water's edge at the time of crossing.

11 An "intermediate" waterbody is greater than 10 feet wide but less than or equal to 100 feet wide at the water's edge at the time of crossing.

Water for Horizontal Directional Drill Operations

Transco would use the HDD method at the CPL North and CPL South Susquehanna River crossings, the Conestoga River crossing, and the I-80/Little Fishing Creek crossing. Throughout the process of drilling and enlarging the hole, a slurry made of non-toxic/non-hazardous bentonite clay and water, referred to as drilling mud, would be circulated through the drilling tools to lubricate the drill bit, remove drill cuttings, and hold the hole open. Transco would use water from the waterbody being crossed to create the drilling mud; and estimates that 81,586 gallons would be required at the CPL North Susquehanna River crossing, 286,065 gallons at the CPL South Susquehanna River crossing, and 275,565 gallons at the Conestoga River crossing. We estimate that about 130,940 gallons of water would be required to create the drilling mud at the I-80/Little Fishing Creek HDD crossing.

During the HDD operations, the drilling mud returns would be circulated through mud pits to remove the drill cuttings, and the bentonite would be recycled for use as the drilling operation continues. After completion of the HDD, the recovered drilling mud would be recycled or disposed of at an approved upland location or disposal facility.

Hydrostatic Testing and Dust Control

Before placing the pipeline in service, Transco would verify the structural integrity of the pipeline and the aboveground facilities by conducting hydrostatic testing.[12] This testing would be conducted in accordance with DOT regulations to ensure the system is capable of withstanding the appropriate test pressure for 8 hours. This testing involves filling the pipeline with water, pressurizing it, and then checking for pressure losses due to pipeline leakage. Transco would withdraw over 72 million gallons of water from a combination of surface waterbodies and municipal sources (see table 4.3.2-7). Testing would take place at 16 test segments (see table 4.3.2-8). Following testing, hydrostatic test water would be discharged into well-vegetated upland locations or into receiving waters using energy dissipation devices.

Transco would ensure that base flows, fish habitat, and other aquatic wildlife or recreational uses are not substantially affected in the source streams during the water withdrawal process. Transco would also consult with local and state agencies to ensure that public water supplies would not be affected. Transco would require an additional 1,342,349 gallons of water for hydrostatic testing for new and existing facilities as follows:

- 286,957 gallons for new aboveground facilities;
- 880,379 gallons for existing aboveground facilities; and
- 175,013 gallons for new MLV sites.

Water for testing at these facilities would come from municipal sources.

Transco would also use various water sources for dust control activities as described in Transco's *Fugitive Dust Control Plan* (FDCP) (see attachment 1 of Transco's ECP). Transco would complete dust control activities in accordance with all appropriate state regulations (see section 4.11.1.3 for additional information about dust control measures). Given the length of the proposed pipeline and that weather conditions would play a large role, it is impossible to predict precisely how much water would be needed for dust suppression.

12 Transco would obtain the required National Pollutant Discharge Elimination System permits for hydrostatic test water discharge from the PADEP, MDE, Virginia Department of Environmental Quality, and South Carolina Department of Health and Environmental Control.

TABLE 4.3.2-7

Proposed Hydrostatic Test Water Sources and Discharge Locations for the Atlantic Sunrise Project

State/Facility/County	Water Source and Use Restrictions	Water Withdrawal Location (milepost)	Discharge Location (milepost)	Rate of Discharge (gpm)	Approximate Volume (gallons)
PENNSYLVANIA					
CPL North					
Columbia	Fishing Creek [a,b]	1.3	1.3 and 21.7	1,800	3,996,000
Wyoming	Susquehanna River [c]	34.9	34.9 and M-0080 0.0	1,800	5,224,057
	Susquehanna River [c] (HDD hydrotest)	34.9	34.9	1,800	151,410
	Tunkhannock Creek [c]	M-0080 0.0	M-0080 0.0	1,800	1,530,400
CPL South					
Lancaster	Pequea Creek	8.2	8.2 and 23.9	2,000	8,709,540
	Conestoga River (HDD hydrotest)	NA	12.1	2,000	513,076
	Chickies Creek	23.9	37.4	2,000	4,906,000
Lebanon	Swatara Creek	49.3	49.3 and 64.4	2,000	10,063,000
Schuylkill	Deep Creek	78.0	78.0 and 95.0	2,000	10,922,400
Columbia	Susquehanna River [c] (HDD hydrotest)	NA	99.3	2,000	530,832
	Roaring Creek	95.9	95.9, 107.0, and 125.2	2,000	10,921,509
	Little Fishing Creek	107.0	107.0 and 125.2	2,000	10,921,509
Chapman Loop					
Clinton	Municipal Water	L188.5	L188.5	2,000	669,000
Unity Loop					
Lycoming	Pond	L125.7	L125.7	2,000	3,109,300
VIRGINIA					
Mainline A and B Replacements					
Prince Williams	Dawkins Branch	1,578.6	1,578.6	2,000	420,898
	Municipal Water	1,579.6	1,579.6	2,000	71,367
PROJECT TOTAL					**72,660,298**

[a] Classified by the state as trout habitat and/or a high-quality coldwater fishes, and a migratory fishes; would require fish exclusion and other BMPs.

[b] Stream has seasonal in-water work restrictions (Pennsylvania Fish and Boat Commission-approved window is January 1 to September 30).

[c] Classified by the state as trout habitat and/or a warmwater/coolwater fishery and a migratory fishery; may require fish exclusion and other BMPs.

TABLE 4.3.2-8 **Proposed Hydrostatic Test Water Segments for the Atlantic Sunrise Project**				
State/Facility/ Test Segment	Test Segment Milepost Begin	Test Segment Milepost End	Test Segment Length	Water Source and Use Restrictions
PENNSYLVANIA				
CPL North				
1	0	21.7	114,312	Fishing Creek [a,b]
2	21.7	49.4	146,784	Susquehanna River [c]
3	34.9	35.3	2,223	Susquehanna River [c] (HDD hydrotest)
4	49.4	57.3	41,448	Tunkhannock Creek [c]
CPL South				
5	0.0	23.9	126,034	Pequea Creek
6	12.1	12.8	3,843	Conestoga River (HDD hydrotest)
7	23.9	37.4	71,438	Chickies Creek
8	37.4	64.4	142,718	Swatara Creek
9	64.4	71.0	34,848	Lorberry Creek
10	71.0	95.0	126,773	Deep Creek
11	99.3	100.0	3,976	Susquehanna River [c] (HDD hydrotest)
12	95.0	125.2	159,034	Little Fishing Creek
Chapman Loop				
13	L186.0	L188.9	15,312	Unnamed tributary to Paddy Run [a,b]
Unity Loop				
14	L120.3	L128.9	45,197	Greg's Run
VIRGINIA				
Mainline A and B Replacements				
15	1,578.7	1,579.8	5,808	Dawkins Branch
16	1,580.8	1,581.0	1,056	Municipal Water

[a] Classified by the state as trout habitat and/or a high-quality coldwater fishes, and a migratory fishes; will require fish exclusion and other BMPs.

[b] Stream has seasonal in-water work restrictions (Pennsylvania Fish and Boat Commission-approved window is January 1 to September 30).

[c] Classified by the state as trout habitat and/or a warmwater/coolwater fishery and a migratory fishery; may require fish exclusion and other BMPs.

4.3.2.6 Surface Water Impacts and Mitigation

Pipeline construction activities that could potentially affect surface waters include clearing and grading of streambanks, in-stream trenching, blasting, trench dewatering, inadvertent returns from HDD operations, and potential spills or leaks of hazardous materials. Potential effects on surface waters may include:

- modification of aquatic habitat;
- increased runoff and the rate of in-stream sediment loading;
- turbidity;
- decreased dissolved oxygen concentrations;
- releases of chemical and nutrient pollutants from sediments;
- thermal effects;

- modification of riparian areas; and
- introduction of chemical contaminants such as fuel and lubricants.

In-stream construction activities, especially trenching and backfilling of the trench, would temporarily increase the amount of sediments mobilized downstream. The extent of the impact would depend on sediment loads, stream velocity, turbidity, bank composition, and sediment particle size. These factors would determine the density and downstream extent of sediment migration. In-stream construction could also result in the alteration of stream contours. Changes in the stream bottom contours could alter stream dynamics and increase downstream erosion or deposition. Turbidity resulting from resuspension of sediments from in-stream construction and erosion of cleared right-of-way areas could reduce light penetration and photosynthetic oxygen production. In-stream disturbance could also introduce chemical and nutrient pollutants from sediments. Resuspension of deposited organic material and inorganic sediments could cause an increase in biological and chemical use of oxygen, potentially resulting in a decrease of dissolved oxygen concentrations in the affected area. Lower dissolved oxygen concentrations could cause temporary displacement of motile organisms, such as fish, and may kill non-motile organisms within the affected area.

The clearing and grading of streambanks would reduce riparian vegetation and expose soil to erosional forces. The use of heavy equipment for construction could cause compaction of near surface soils, an effect that could result in increased runoff into surface waters in the immediate vicinity of the construction right-of-way. Increased surface runoff could transport sediment from uplands into surface waters, resulting in increased turbidity levels and increased sedimentation rates in the receiving waterbody. Disturbances to stream channels and streambanks could also increase the likelihood of scour after construction.

Refueling of vehicles and storage of fuel, oil, or other hazardous materials near surface waters could create a potential for contamination. If a spill were to occur, immediate downstream users of the water could experience degradation in water quality. Acute and chronic toxic effects on aquatic organisms could also result from such a spill.

Blasting may be required along the pipeline route and within waterbodies. In-stream blasting has the potential to injure or kill aquatic organisms, displace organisms during the blast-hole drilling operations, and temporarily increase stream turbidity. Chemical by-products from the blasting materials could also be released and could potentially contaminate the water.

Floodplain Crossings

Executive Order 11988, Floodplain Management, requires each federal agency to ensure that the potential effects of any action it may take in a floodplain are evaluated. None of the proposed aboveground facilities are in FEMA-designated floodplains. Floodplains that would be crossed by the pipeline could be temporarily affected by trenching and spoil piles. Creation of the trench would temporarily increase the flood retention capacity, but this would be offset by an equal reduction of flood retention capacity associated with the spoil piles, thus the overall flood retention capacity would be unchanged. However, the presence of the spoil piles would temporarily alter surface drainage and could redirect flows within the floodplain area. Floodplains would not be affected by the operation of the pipeline, which would be buried. Seasonal and flash flooding hazards are a potential concern where the pipeline would cross or be near major waterbodies and small watersheds. Although flooding itself does not generally present a risk to pipeline facilities, bank erosion and/or scour could expose the pipeline or cause sections of pipe to become unsupported. All pipeline facilities are required to be designed and constructed in accordance with 49 CFR 192. These regulations include specifications for installing the pipeline at a sufficient depth to avoid possible scour at waterbody crossings. Typically, the trench would be sufficiently deep to provide for a minimum of 5 feet of cover over the pipeline at waterbodies.

In addition, Transco would implement several mitigation measures within floodplains to minimize potential effects from flood events. These measures include:

- installing and maintaining erosion and sediment control structures;
- restoring floodplain contours and waterbody banks to their preconstruction condition; and
- conducting post-construction monitoring to ensure successful revegetation.

Dry Crossings

Transco would cross the majority of waterbodies using an open-cut, dry crossing method involving either the flume or dam-and-pump technique. Section 2.3.2.2 provides a description of waterbody crossing methods. Construction-related effects associated with the dry crossing method would be limited to short periods of increased turbidity before installation of the pipeline during the assembly of the upstream and downstream dams, and following installation of the pipeline when the dams are pulled and flow across the restored work area is re-established. Transco would minimize effects on surface waters during construction by implementing the construction and mitigation measures contained in its Procedures, which include:

- minimizing streambed and bank disturbance;

- constructing the crossing as close to perpendicular to the waterbody as site conditions allow;

- maintaining adequate flow rates throughout construction to protect aquatic life and prevent the interruption of existing downstream uses;

- locating equipment refueling areas, concrete coating activities, and hazardous material storage to areas at least 100 feet from surface waters;

- constructing across waterbodies as quickly as possible;

- installing temporary erosion and sediment control measures across the entire width of the construction right-of-way after clearing and before ground disturbance;

- installing temporary erosion controls immediately after initial soil disturbance;

- maintaining temporary erosion and sediment control measures throughout construction until streambanks and adjacent upland areas are stabilized;

- requiring bank stabilization and reestablishing bed and bank contours and riparian vegetation after construction;

- limiting post-construction maintenance of vegetated buffer strips adjacent to waterbodies; and

- implementing Transco's Spill Plan if a spill or leak occurs during construction.

If water is present at the time of construction, Transco would cross waterbodies that include water intakes within 3 miles downstream of the Project using the flume method. In addition, Transco would implement BMPs to minimize and avoid effects on surface waters, including:

- limiting the clearing of vegetation to the amount necessary to construct the crossing;
- requiring non-essential construction equipment to cross waterbodies using an equipment bridge;
- parking equipment at least 100 feet from the edges of the waterbody;
- storing hazardous materials more than 100 feet from the edges of the waterbodies;
- discharging pumped trench water to an appropriately sized filter device located in a well-vegetated area at least 15 feet from the edge of the waterbody;
- placing excavated material from the trenchline at least 10 feet from the top of the waterbody bank;
- restoring the stream channel and banks to preconstruction contours; and
- permanently stabilizing stream banks immediately following installation of the pipeline.

No long-term effects associated with pipeline operation and maintenance are anticipated. Transco would stabilize streambanks within 24 hours of completing in-stream construction activities. Streambanks would be revegetated following installation of the pipeline, and post-construction vegetation maintenance would be limited to the permanent right-of-way pursuant to Transco's ECP.

Public Water Supply Watersheds and Source Water Protection Areas

As described in section 4.3.2.2., the Project would cross source water protection areas associated with the Susquehanna River and Swatara Creek and would cross four waterbodies with potable water intakes within 3.0 miles downstream of the crossing site. Refueling of vehicles and storage of fuel, oil, or other hazardous materials near surface waters creates a potential for surface water contamination if a spill were to occur. If a spill were to occur, downstream water supplies could be negatively affected.

The measures that Transco would implement to avoid or minimize the potential effects of construction on surface waters are contained in Transco's Procedures and its Spill Plan. Because Transco has not indicated that it has completed consultations with surface water intake operators within 3 miles downstream of waterbody crossings or those waterbody crossings located within Zone A source water protection areas, **we recommend that:**

- **<u>Prior to construction</u>, Transco should file with the Secretary, for review and written approval by the Director of OEP, a notification plan developed in consultation with surface water intake operators. The notification plan should identify the specific points of contact and procedures that Transco would implement in the event of an inadvertent release of hazardous materials within 3 miles upstream of a surface water intake or within Zone A source water protection areas.**

Blasting

If blasting in waterbodies is required, there is a potential for permanent alterations of stream channels. Transco proposes to develop site-specific blasting plans for each waterbody crossing where blasting is determined to be necessary. Transco would obtain blasting permits from appropriate agencies (see section 4.1.3 for additional information about blasting) and would conduct any required in-stream work during the appropriate timing window for warmwater and coldwater fisheries. To confirm compliance with fisheries timing windows, **we recommend that:**

- **<u>Prior to construction</u>, Transco should file with the Secretary, and provide to other applicable agencies, a schedule identifying when trenching or blasting would occur within each waterbody greater than 10 feet wide, or within any coldwater fishery. Transco should revise the schedule as necessary to provide <u>at least 14 days advance notice</u>. Changes within this last 14-day period must provide for <u>at least 48 hours advance notice</u>.**

Trenchless Crossings

Transco proposes to use a trenchless crossing technique (either conventional bore or the HDD method) to cross 11 waterbodies.[13] The potential effects on waterbodies associated with the use of these trenchless crossing methods would be minor because the pipeline would be installed below the bed and banks of the waterbody and would typically avoid the clearing of riparian vegetation and the trenching of the bed and banks.

The primary effect that could result from use of a trenchless crossing method would be an inadvertent release of drilling fluid directly or indirectly into the waterbody. During an HDD, drilling fluid may leak through previously unidentified fractures in the material underlying the river bed, in the area of the mud pits or tanks, or along the drill path due to unfavorable ground conditions. Although drilling fluid consists of non-toxic materials, in large quantities the release of drilling fluid into a waterbody could affect fisheries or other aquatic organisms by causing turbidity and/or temporarily coating the streambed with a layer of clay. The probability of an inadvertent release is greatest when the drill bit is working near the surface.

Transco completed geotechnical borings and feasibility studies to assess the viability of an HDD at the CPL North and CPL South Susquehanna River crossings, at the Conestoga River crossing, and at the I-80/Little Fishing Creek crossing. The feasibility studies conclude that the HDD crossing method is feasible at these locations based on the currently available data and that the risk of inadvertent drilling returns is low where the HDD profile is in good to excellent rock quality designation bedrock.[14] The feasibility studies recommend that additional borings be completed at each of the crossings and that mitigation measures be implemented at the two Susquehanna River crossings to address the potential for borehole collapse and/or HDD cutterhead steering issues due to the presence of gravel, cobbles, and boulders. In addition, due to the elevation difference between the entry and exit sides of the HDD at the two Susquehanna River crossings, there is a greater potential for large volumes of drilling fluid to be returned to the low side of the crossing, which would require additional equipment and/or storage pits to manage the drilling fluids.

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13 Transco has proposed four conventional bore crossings (each crossing one waterbody) and four HDD crossings (two of which would cross more than one waterbody). The Susquehanna River would be crossed twice via HDD.

14 Rock quality designation is an index of rock quality or problematic rock that is highly weathered, soft, fractured, sheared, and/or jointed counted against the rock mass. Rock quality designation ranges from very poor (0 to 25 percent) through excellent (90 to 100 percent). All pieces of sound core over 4 inches long are summed and divided by the length of the core run.

Transco developed an HDD Contingency Plan that describes how the HDD operations would be monitored to minimize the potential for inadvertent returns. The HDD Contingency Plan includes general procedures for the containment and cleanup of drilling mud should a release occur at one or more of the HDD sites. On August 18, 2016, Transco submitted a geotechnical study for the I-80/Little Fishing Creek HDD crossing, additional geotechnical studies for the CPL North and CPL South Susquehanna River HDD crossings, and a revised HDD Contingency Plan that includes specific mitigation measures Transco would implement in the event that an HDD fails and to minimize drilling risks.[15] In the event that an HDD were to fail at a particular location, Transco would abandon the drill hole, relocate the HDD operation to an adjacent area, and commence drilling a new hole. Transco filed contingency crossing plans for the CPL North and CPL South Susquehanna River crossings and indicates that, in the event that a second drilling attempt were to fail, Transco would cross the Susquehanna River using a cofferdam construction technique. In the event that a second drilling attempt were to fail at the Conestoga River HDD or the I-80/Little Fishing Creek HDD, Transco indicates it would complete the crossing using a direct pipe construction technique[16] and that it would coordinate with the USACE on the development of the plans.

Because the contingency crossing plans are preliminary and do not provide detailed information on the mitigation measures Transco would implement at the time of the crossing to minimize effects on water quality and recreational boating, **we recommend that:**

- **<u>In the event that the HDD of the CPL North Susquehanna River, CPL South Susquehanna River, Conestoga River, or I-80/Little Fishing Creek fails</u>, Transco should file with the Secretary, for review and written approval by the Director of OEP, final site-specific crossing plans concurrent with its application to the USACE for an alternative crossing method. These plans should include scaled drawings identifying all areas that would be disturbed by construction and a description of the mitigation measures Transco would implement to minimize effects on water quality and recreational boating. In addition, a scour analysis should be conducted for each crossing and filed concurrently with the site-specific crossing plan.**

The procedures for abandoning the failed HDD hole include extracting the cutting tools (i.e., reamer and cutting heads) from the hole, advancing the drill pipe into the hole to the required grout depth, and pumping a grout mixture consisting of cement or cement and bentonite clay into the borehole while the drill pipe is extracted from the hole. The rate at which the drill pipe would be extracted would be regulated to match the rate of grout placement. A site-specific grouting plan would be developed and submitted to the appropriate regulatory agency if abandonment of a drill hole were deemed necessary by Transco or the HDD contractor. The grout plan would include the grout mix design (e.g. strength, water/cement/bentonite ratios).

We have reviewed Transco's revised HDD Contingency Plan and find it acceptable. With these measures in place, we conclude that the HDD construction method would not significantly affect surface water resources.

Access Roads

The proposed temporary and permanent access roads for construction and operation of the pipeline may require improvements to existing roads. However, all of the access roads that would cross

[15] Transco's geotechnical study for the I-80/Little Fishing Creek HDD crossing, additional geotechnical studies for the CPL North and CPL South Susquehanna River HDD crossings, and revised HDD Contingency Plan are available on FERC's website at http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20160818-5320.

[16] The direct pipe construction technique is a one-step trenchless construction method in which a microtunnelling machine is used to bore a crossing and the prefabricated pipe is pushed into the bore hole at the same time as excavation takes place.

waterbodies are existing roads with existing culverts. Transco has not proposed to replace any of the existing culverts and does not anticipate the need for any culvert repairs during the use of these roads. As such, we do not expect any effects on surface waters associated with the proposed access roads.

Hydrostatic Testing and Dust Control

As described in section 4.3.2.5, Transco estimates that about 72 million gallons of water would be needed for hydrostatic testing of the proposed pipeline and aboveground facilities.

The withdrawal of large volumes of water from surface water sources could temporarily affect the recreational and biological uses of the resource if the diversions constitute a large percentage of the source's total flow or volume. Water withdrawals could also result in temporary loss of habitat, change in water temperature and dissolved oxygen levels, and entrainment or impingement of fish or other aquatic organisms. Water quality could also be affected if any chemicals are added to the water during the testing process. Transco would minimize the potential effects of water withdrawals from surface water by adhering to its Procedures (see appendix E). During water withdrawals, Transco would maintain base flows, screen intake hoses, and discharge test waters to well-vegetated, upland areas or to receiving waters using energy dissipation devices to minimize the potential for stream scour. Transco would also acquire and adhere to the requirements of the necessary water use and discharge permits and approvals from state and federal agencies. Transco does not plan to add any chemicals or biocides to the test water.

Based on the proposed mitigation, we conclude that effects on surface waters from withdrawal of hydrotest and dust control water would be minimized and not significant. Section 4.6 further describes the potential effects from water withdrawal on aquatic species.

Hazardous Material Spills

Accidental spills and leaks of hazardous materials associated with equipment trailers, the refueling or maintenance of vehicles, and the storage of fuel, oil, and other fluids can have immediate effects on aquatic resources and could contaminate waterbodies downstream of the release point. Transco would implement its Procedures and Spill Plan to avoid or minimize effects associated with spills or leaks of hazardous liquids. These plans include storing hazardous materials away from wetlands and waterbodies, restrictions on refueling within 100 feet of wetlands and waterbodies, and the use of secondary containment structures for petroleum products. Transco's Spill Plan also specifies routine inspections for storage tanks; soil spill response kits on every vehicle that transports fuel; and measures to contain, clean up, and properly dispose of spills. Transco's implementation of these plans and measures would adequately address the storage and transfer of hazardous materials and petroleum products, and the appropriate response in the event of a spill.

Extra Workspace Within 50 Feet of Waterbodies

As described in section 2.3, our Procedures stipulate that all ATWS should be at least 50 feet from waterbodies. However, Transco has identified certain areas where site-specific conditions do not allow for a 50-foot setback. The locations where these ATWSs are requested, Transco's explanation of the need for the ATWS, and our evaluation of each request is included in table K-5 in appendix K. Based on our review, we have determined that Transco has provided adequate justification for the majority of the requested ATWSs. However, additional explanation is necessary for us to complete our evaluation of Transco's request for certain ATWS within 50 feet of some waterbodies. Therefore, **we recommend that:**

- **<u>With its Implementation Plan</u>, Transco should file with the Secretary additional justification for the ATWS associated with the waterbodies identified in bold in table K-5 in appendix K of the EIS.**

4.3.2.7 Conclusion

No long-term effects on surface waters are anticipated as a result of construction and operation of the Project. No designated water uses would be permanently affected because the pipeline would be buried beneath the bed of the waterbodies, erosion controls would be implemented during construction, and streambanks and streambed contours would be restored as close as possible to preconstruction conditions.

Operation of the Project would not result in any surface waters effects, unless maintenance activities involving pipe excavation and repair in or near streams are required. If this should occur, Transco would employ protective measures similar to those proposed for construction of the Project. Consequently, we conclude that any maintenance-related effects would be short term and similar to those described above for the initial pipeline construction.

4.4 WETLANDS

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation adapted for life in saturated soil conditions (Environmental Laboratory, 1987). Examples of wetlands include swamps, marshes, and bogs. Wetlands serve important biological, physical, and chemical functions, including providing wildlife food, habitat, recreation opportunities, flood control, and water quality improvement.

In the project area, wetlands are regulated at both federal (USACE) and state (PADEP and Virginia Department of Environmental Quality [VADEQ]) levels. Under Section 404 of the CWA, the USACE is authorized to issue permits for activities that would result in the discharge of dredge or fill material into, or the dredging of, waters of the United States such as wetlands. Under Section 401 of the CWA, states are required to certify that proposed dredging or filling of waters of the United States meets state water quality standards.

4.4.1 Existing Wetland Resources

Transco identified and delineated wetlands along the proposed pipeline route during field surveys in 2014, 2015, and 2016. Wetland boundaries were delineated using the methods described in the 1987 *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) and the USACE regional supplements applicable to each project facility. The Northcentral and Northeast Regional Supplement was used for CPL North, and the Eastern Mountains and Piedmont Regional Supplement was used for all other project facilities (USACE, 2012a, 2012b). For areas where Transco was unable to complete surveys in the 2014, 2015, and 2016 field seasons, remote-sensing resources were used to approximate the locations and boundaries of wetlands within the project area.[17] Remote-sensing delineations were conducted using a combination of:

- high-resolution aerial photographic imagery;
- LiDAR data;
- NWI data;
- NHD data;
- hydric soil data maintained by the NRCS;
- floodplain and flood elevations maintained by FEMA; and
- field survey results on adjacent land parcels.

[17] As of June 24, 2016, Transco has completed surface water surveys for about 95.4 percent of the Project. Remote sensing was used to identify surface waters for the remaining 4.6 percent of the Project; however, Transco plans to complete the remaining surveys when survey access is granted.

Transco tested this methodology for accuracy on field-delineated land areas. The results of the assessment indicate that remote sensing may have slightly underestimated the likely amount of palustrine forested wetland area when compared to actual field delineations. However, less than 5 percent of the wetland acreage was derived from remote sensing, and those areas would be surveyed prior to construction.

Transco classified wetlands based on Cowardin type, which is a widely used system that categorizes wetlands based on systems (e.g., palustrine) and classes (e.g., emergent, scrub-shrub, and forested). Transco also classified wetlands meeting exceptional value criteria (Pennsylvania Code, 2015).

Transco completed wetland surveys within a 300-foot-wide corridor during the 2014, 2015, and 2016 field seasons. A total of 46.3 acres of wetlands would be either crossed by the Project, affected by temporary extra workspace, or located within the construction right-of-way. Table L-1 in appendix L identifies the location, project facility, Cowardin classification, crossing length, and acreage of each wetland that would be affected by the Project. Table L-1 also differentiates between surveyed wetlands and wetlands estimated based on remote sensing (identified with "RS").

4.4.1.1 Pipeline Facilities

The pipeline and extra workspaces would affect a total of 46.3 acres of wetlands, including 44.1 acres in Pennsylvania and 2.2 acres in Virginia. Of those impacts, 38.0 acres (35.8 acres in Pennsylvania and 2.2 acres in Virginia) would be temporary and associated with construction of the Project. Transco did not have access to survey all parcels; therefore, the total acreages were determined through a combination of field survey data and remote sensing.

Project construction activities in Maryland, North Carolina, and South Carolina would be at existing facilities only and no wetlands would be affected. Therefore, wetlands in those three states are not addressed further in this section.

4.4.1.2 Aboveground Facilities, Contractor Yards, and Access Roads

No wetlands would be affected by any of the aboveground facilities or contractor yards associated with the Project. The proposed temporary access roads would cross six wetlands; however, Transco would use free-span bridges at temporary access road crossings to minimize wetland impacts.

4.4.2 Wetland Classifications

Wetland classifications were assigned based on the Cowardin system described by Cowardin et al. (1979). Wetlands crossed by the Project are classified as palustrine (freshwater wetland) and are defined by their dominant vegetation layer (emergent, scrub-shrub, or forested), as described below.

Palustrine Forested Wetlands

Palustrine forested wetlands in the project area are dominated by trees and shrubs at least 20 feet tall with a tolerance to a seasonally high water table (Cowardin et al., 1979). Forested wetlands typically have a mature tree canopy with a diverse range of understory and herbaceous community structure and species. Common wetland tree species along the proposed pipeline include black willow and green ash.

Palustrine Scrub-Shrub Wetlands

Palustrine scrub-shrub wetlands in the project area are dominated by shrubs and saplings less than 20 feet tall. Plant species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions (Cowardin et al., 1979). Common shrub species along the proposed pipeline include willows, dogwoods, and speckled alder.

Palustrine Emergent Wetlands

Palustrine emergent wetlands in the project area are dominated by rooted herbaceous and grass-like plants that stand erect above the water or ground surface. Vegetation is present for most of the growing season in most years (Cowardin et al., 1979). Common emergent species along the proposed pipeline include common rush, smartweeds, goldenrods, sedges, cattails, and reed canary grass (an invasive species).

4.4.2.1 State Wetland Classifications

Pennsylvania

The Pennsylvania pipeline facilities (CPL North, CPL South, Chapman Loop, and Unity Loop) would cross 267 wetlands. Of these, 169 are classified as palustrine emergent, 12 are classified as palustrine scrub-shrub, and 30 are classified as palustrine forested. The remaining 56 wetlands contain areas with more than one wetland classification (e.g., palustrine emergent/palustrine forested).

Exceptional value wetlands are given special protection[18] in the state of Pennsylvania by the PADEP under Pennsylvania Code Title 25 and include those wetlands that:

- serve as habitat for threatened and endangered species (or are hydrologically connected to or within 0.5 mile of such wetlands);
- are adjacent to a wild trout stream or exceptional value water;
- are along a designated drinking water supply; and
- are within natural or wild areas (e.g., federal and state lands).

Virginia

The Virginia pipeline facilities (Mainline A and B Replacements) would cross nine wetlands, which are all palustrine emergent. One of the wetlands would be temporarily affected by an access road.

4.4.2.2 Exceptional Value and Other Notable Wetland Communities

One hundred five of the wetlands crossed by the proposed pipelines in Pennsylvania are classified as exceptional value, with 32 of these containing a forest component.

The Project would cross 17 forested wetlands (16 on the CPL North route and 1 on the CPL South route) that are characteristic of the Hemlock/Mixed Hardwood Palustrine Forest Community type, which the PADCNR identified as a natural or special concern community type due to a restricted range, relatively few populations, recent and widespread declines, or other factors making them at risk of extirpation in Pennsylvania (Bowen, 2014; PNHP, n.d.). The locations of these wetlands and the Project's potential effects on these areas are provided in section 4.5.2. No exceptional/designated wetland communities were identified along the Virginia facilities.

4.4.3 Wetland Construction Procedures

Construction would be conducted in accordance with Transco's ECP. In wetlands, the construction right-of-way would be generally limited to a width of 75 feet, except in areas where Transco requested additional right-of-way width (see section 2.3).

[18] The antidegradation regulations mandate that the water quality of exceptional value waters be maintained and protected; therefore, the PADEP must ensure that the water quality of exceptional value waters will not be degraded prior to issuing any permit or approval.

Transco would determine the method of pipeline construction it would use within each wetland by soil stability and saturation at the time of construction. Where soils are stable and are not saturated at the time of crossing, the pipeline would be installed using methods similar to those used in uplands with additional wetland-specific protections. The additional wetland protection methods include:

- stripping topsoil from the trench area;
- limiting the use of equipment operating in wetlands;
- limiting the time that the trench would remain open;
- installing trench breakers on the upland boundary of each wetland; and
- using equipment mats in wetlands where rutting could occur.

Where wetland soils are saturated or are not stable enough to support construction equipment at the time of crossing, conventional wetland crossing methods would be used. Using the conventional wetland crossing method, Transco would string and weld the pipe in an upland staging area. Topsoil would not be segregated if soils are saturated or inundated.

Where wetland soils are inundated, the pipeline may be installed using the push-pull technique. This technique involves stringing and welding the pipeline outside of the wetland and excavating the trench through the wetland using a backhoe supported by equipment mats. The water that seeps into the trench would be used to "float" the pipeline into place together with a winch and flotation devices that would be attached to the pipe. After the pipeline is floated into place, Transco would remove the floats, and the pipeline would sink into place.

Pipe installed in saturated wetlands is typically coated with concrete or equipped with set-on weights to provide negative buoyancy. After the pipeline sinks to the bottom of the trench, a trackhoe working on equipment mats backfills the trench and completes any additional required cleanup.

Transco incorporated several route modifications during project design to avoid or minimize impacts on wetlands. A description of alternative pipeline routes evaluated to minimize impacts on wetlands is provided in section 3.3. In addition, Transco would minimize wetland impacts by using trenchless construction methods (either the HDD or conventional bore) to cross six wetlands in Pennsylvania (four wetlands along CPL North and two wetlands along CPL South). Trenchless construction methods would eliminate the need for trenching across the wetlands.

4.4.4 General Impacts and Mitigation

Table 4.4.4-1 summarizes the impacts of the proposed pipeline on wetlands. Construction would affect a total of 46.3 acres of wetland, including 11.3 acres of forested wetlands, 4.3 acres of scrub-shrub wetlands, and 30.8 acres of emergent wetlands. The primary impact of pipeline construction and right-of-way maintenance activities on wetlands would be the temporary alteration of wetland vegetation and permanent conversion of forested wetland to scrub shrub or emergent wetlands.

In emergent wetlands, the impact of construction would be relatively brief because the emergent vegetation would be returned to grade and reseeded following construction and would regenerate quickly, typically within 1 to 3 years. In scrub-shrub wetlands, Transco would seed with a native seed mix. Transco would maintain a 10-foot-wide corridor centered over the pipeline in an herbaceous state and would selectively cut trees within 15 feet of the pipeline centerline. The operational right-of-way would be maintained in scrub-shrub wetlands no more frequently than on an annual basis and the native shrub layer would be allowed to re-sprout between maintenance events. The remainder of forested and scrub-shrub vegetation would be allowed to return to preconstruction conditions and would not be further affected during operation.

TABLE 4.4.4-1								
Wetland Acreages Affected by the Construction and Operation of the Atlantic Sunrise Project								
	Wetland Impacts [a,b] (acres)							
	PEM		PSS		PFO		Total [c]	
State/Facility	Cons.	Oper.	Cons.	Oper.	Cons.	Oper.	Cons.	Oper.
PENNSYLVANIA								
CPL North	18.0	0.0.	3.4	1.6	7.9	4.2	29.3	5.8
CPL South	8.5	0.0	0.9	0.4	3.2	2.0	12.6	2.4
Chapman Loop	<0.1	0.0	0.0	0.0	0.0	0.0	<0.1	0.0
Unity Loop	2.0	0.0	<0.1	0.0	0.3	0.1	2.3	0.1
VIRGINIA								
Mainline A and B Replacements	2.2	0.0	0.0	0.0	0.0	0.0	2.2	0.0
PROJECT TOTAL[c]	**30.8**	**0.0**	**4.3**	**2.0**	**11.3**	**6.3**	**46.3**	**8.3**

[a] Construction impacts include the construction right-of-way, additional temporary workspace, and access roads.

[b] Operational impacts reflect a 30-foot-wide corridor centered over the pipeline in forested wetlands and a 10-foot-wide corridor centered over the pipeline in scrub-shrub wetlands. The remaining areas within the permanent easement would be allowed to revegetate to preconstruction condition. Emergent wetlands would not be affected during operation as they would be allowed to revegetate to preconstruction condition.

[c] Total may not match sum of addends due to rounding.

Other effects on wetlands could include temporary changes in hydrology and water quality during construction. Temporary removal of wetland vegetation during construction could alter the capacity of wetlands to function as habitat and flood and erosion control buffers. Mixing topsoil with subsoil could alter nutrient availability and soil chemistry, thereby inhibiting recruitment of native wetland vegetation. Heavy equipment operating during construction could result in soil compaction or rutting that would alter natural hydrologic and soil conditions, potentially inhibiting germination of native seeds and the ability of plants to establish healthy root systems. Additionally, discharges from stormwater, dewatering structures, or hydrostatic testing could transport sediments and pollutants into wetlands, affecting water quality.

The majority of the effects on wetlands from construction of the pipelines would be temporary and short term because Transco would restore all wetlands to preconstruction contours and hydrology. Transco would mitigate for unavoidable wetland impacts by implementing the procedures specified in its ECP and by complying with the conditions of its pending section 404 and 401 permits. Specific measures Transco would implement in addition to limiting vegetation maintenance practices in wetlands include:

- limiting the construction right-of-way width to 75 feet, except in areas where site-specific conditions require additional space (FERC approval required);
- locating extra workspaces at least 50 feet from wetland boundaries, except where site-specific conditions warrant otherwise (FERC approval required);
- cutting vegetation just above ground level, leaving existing root systems in place, and limiting the pulling of stumps and grading activities to directly over the trenchline except where the Chief Inspector and EI determine that these activities are required for safety reasons;
- using low ground weight equipment or operating equipment on timber mats in saturated soils to prevent rutting;

- installing sediment barriers immediately after initial ground disturbance at the edge of the boundary between wetlands and uplands, immediately upslope of the wetland boundary, and along the edge of the right-of-way as necessary to contain spoil and to protect adjacent wetland areas;

- segregating the top 12 inches of topsoil from the trenchline, except in areas where standing water is present or soils are saturated or frozen;

- prohibiting the use of rock, soil imported from outside the wetland, tree stumps, or brush riprap to stabilize the right-of-way;

- installing trench plugs as necessary to maintain the original wetland hydrology;

- restoring preconstruction contours to maintain the original wetland hydrology;

- prohibiting the use of lime or fertilizer within wetlands;

- seeding restored wetlands with annual ryegrass and/or an agency approved wetland seed mix, unless standing water is present; and

- prohibiting the use of herbicides or pesticides within 100 feet of wetlands or waterbodies except as specified by the appropriate land management or state agency.

Following construction, Transco would ensure that all disturbed wetland areas are successfully revegetated. Revegetation would not be considered successful until:

- the affected wetland satisfies the current federal definition for a wetland;

- vegetation is at least 80 percent of either the cover documented for the wetland prior to construction, or at least 80 percent of the cover in adjacent wetland areas that were not disturbed by construction;

- the plant species composition is consistent with early successional wetland plant communities in the affected ecoregion; and

- invasive species and noxious weeds are absent, unless they are abundant in adjacent areas that were not disturbed by construction.

Transco's mitigation measures to control invasive species during construction are described in section 4.5.4 and in its ECP.

In accordance with its ECP and the Procedures, Transco would conduct routine wetland monitoring for a minimum of 3 years to assess the success of wetland revegetation. Three years after construction (or sooner if revegetation is determined successful prior to that time), Transco would file a report with the Secretary identifying the status of wetland revegetation efforts and documenting success, as defined above. Where revegetation is not successful at the end of 3 years, Transco would develop and implement remedial revegetation plans, in consultation with a professional wetland ecologist, to actively revegetate any wetland and continue revegetation efforts and file annual reports until wetland revegetation is successful.

4.4.5 Alternative Measures

The FERC Procedures and Transco's ECP specify that the construction right-of-way in wetlands would be limited to 75 feet wide and that ATWSs would be set back at least 50 feet from wetlands. However, in certain circumstances, Transco has requested ATWS either adjacent to the 75-foot-wide construction right-of-way in wetlands or within 50 feet of wetlands. The locations where these ATWSs are requested, Transco's explanation of the need for the ATWS, and our evaluation of each request is included in table L-2 in appendix L. Based on our review, we have determined that Transco has provided adequate justification for the majority of the requested ATWSs. However, additional explanation is necessary for us to complete our evaluation of Transco's request for additional ATWS in some wetland areas. Therefore, **we recommend that:**

- **<u>With its Implementation Plan</u>, Transco should file with the Secretary additional justification for the ATWS associated with the wetlands identified in bold in table L-2 in appendix L of the EIS.**

4.4.6 Compensatory Mitigation

Transco has submitted a Permittee-Responsible Mitigation (PRM) Plan as part of its application for a CWA Section 404 permit, CWA Section 401 Certification, and Pennsylvania (Chapter 105) Water Obstruction and Encroachment permit.[19] Transco is proposing off-site mitigation for palustrine forested wetlands disturbed by construction and operation of the Project. No wetlands would be permanently lost as a result of construction; however, maintenance of the permanent right-of-way would convert forested vegetation within the maintained right-of-way to palustrine emergent and palustrine scrub-shrub vegetation types. Although Transco's initial mitigation strategy was to purchase mitigation bank credits or participate in an in-lieu fee program, the USACE had indicated that these options are not available at this time.

Transco's PRM Plan would use a watershed approach to establish four separate mitigation sites in Lycoming, Bradford, Lancaster, and Columbia Counties. An impact ratio of 2:1 is proposed for palustrine forested conversions; however, exceptional value palustrine forested wetlands would be mitigated at a ratio of 2.5:1. Transco's PRM Plan was submitted as part of the federal and state wetland applications to the USACE and PADEP and is currently under review by those agencies**. Therefore, we recommend that**:

- **<u>Prior to construction</u>, Transco should file with the Secretary a final copy of the PRM Plan, including any comments and required approvals from the USACE and PADEP. The plan should designate wetland seed mixes to be used and which agency recommended them.**

4.4.7 Conclusion

While minor adverse and long-term effects on wetlands would occur, with adherence to Transco's ECP and Procedures, we conclude that construction and operation of the Project would result in minor effects on wetlands that would be appropriately mitigated and reduced to less than significant levels. In addition, impacts on wetlands, including exceptional value wetlands, would be further mitigated through Transco's implementation of an agency-approved PRM Plan.

[19] Transco filed a copy of its PRM Plan with FERC on June 8, 2015 (FERC accession number 20150608-5221).

4.5 VEGETATION

4.5.1 Existing Vegetation Conditions

The northern portion of CPL North (from MPs 18.0 to 57.3), Chapman Loop, and Compressor Station 605 lie within the Northeastern Mixed Forest Province, which is characterized by moderate relief and forest vegetation that includes maple-beech-birch, oak-hickory, and aspen-birch communities (USDA, 2005).

The northern portion of CPL South (from approximately MP 40.0 to the tie-in with CPL North), the southern portion of CPL North (from the tie-in with CPL South to approximately MP 18.0), Unity Loop, and Compressor Station 610 lie within the Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province, which is characterized by broad shallow valleys that are typically covered by tall drought-tolerant oak-hickory forests that transition to coniferous forest or shrub land at higher elevations (USDA, 2005; Cleland et al., 2007).

The southern portion of CPL South (between MP 0.0 and about MP 40.0) and the Mainline A and B Replacements extend into the Northern Appalachian Piedmont Section of the Eastern Broadleaf Forest Province, which is characterized by oak-hickory and loblolly-shortleaf pine communities (USDA, 2005; Cleland et al., 2007).

Modifications to existing compressor stations and meter/regulator facilities in Maryland, North Carolina, and South Carolina take place within or immediately adjacent to existing facilities and, as a result of the previous disturbance, would have limited effects on vegetation communities.

There are four major land cover types (i.e., vegetation communities) along the pipeline route within the provinces described above. Characterized by dominant vegetation and habitat communities, these land covers are listed in table 4.5.1-1.

Developed land, which is not included in this section, consists of residential, commercial, and industrial lands; roadways; and mining operations, all of which are generally devoid of native vegetation and provide little habitat value (see section 4.8). Agricultural land includes areas used for livestock grazing and crop production that provide minor to moderate habitat value. Open land consists of non-forested vegetated areas not encompassed by developed or agricultural lands and includes grass and shrub lands, successional fields, and maintained rights-of-way. In Pennsylvania, upland forest communities are generally deciduous hardwood forests with smaller amounts of mixed conifer-deciduous hardwood and conifer forests (PADCNR, 2010b). In Virginia, upland forest communities are generally mixed conifer-deciduous forests dominated by oaks, loblolly pine, and red maple (Virginia Department of Forestry, 2010). See section 4.4 for information about wetlands.

Pipeline Facilities and Workspaces

The majority of vegetation that the pipeline and associated workspaces[20] would affect during construction is agricultural land (1,401.5 acres). Additional vegetation types affected during construction would include 952.0 acres of upland forest, 292.6 acres of open lands, and 45.4 acres of wetlands.

[20] Includes cathodic protection and MLV sites.

TABLE 4.5.1-1

Land Cover Types and Vegetation Communities Potentially Crossed by the Atlantic Sunrise Project Pipeline Facilities in Pennsylvania

Land Cover	Vegetation Communities	Common Species
Agricultural	Cropland and pastureland	Corn, tobacco, clover, soybeans, and Kentucky blue grass
	Orchards and nurseries	Apples, pears, and tree farms
	Hayfields	Alfalfa, clover, timothy and orchard grass
Open Land	Herbaceous openings	Multiflora rose, creeping buttercup, and golden rod
	Grassland/shrubland	Timothy, smooth brome, and juniper
Upland Forest	Deciduous	Oaks, hickories, tuliptree, and maples
	Coniferous/evergreen	Hemlock, white pine, and pitch pine
	Mixed deciduous/coniferous	Hemlock, white pine, oak, and birch
Wetlands	Palustrine emergent	Reed canary grass, cattails, and bulrush
	Palustrine scrub-shrub	River birch, black willow, and blueberry
	Palustrine forested	Hemlock, black gum, sycamore, and maples

Source: Fike, 1999

Aboveground Facilities

Section 2.1.2 describes the new and modified aboveground facilities for the Project. Construction would affect 86.9 acres of agricultural land, 55.4acres of open land, and 24.1 acres of upland forest. No wetlands would be affected by the aboveground facilities.

Contractor/Pipe Yards and Staging Areas

Transco proposes to use 14 contractor/pipe yards (13 in Pennsylvania and 1 in Virginia) and 48 staging areas (all in Pennsylvania) during construction. These areas would affect vegetation in 263.2 acres of agricultural land, 31.7 acres of open land, and 2.9 acres of upland forest. Less than 1.0 acre of wetlands would be affected by the contractor yards.

Access Roads

In addition to public roads, Transco proposes to use 157 access roads (154 in Pennsylvania and 3 in Virginia) to construct the Project. Of these 157 roads, 42 roads would be permanently maintained for operations, and the remaining 115would be restored to preconstruction conditions following completion of the Project. In order to support construction equipment, Transco would make some improvements to these roads, including tree, brush, or structure removal; widening; grading; installation or replacement of culverts; and the addition of gravel. During construction, 64.2 acres of upland forest, 51.8 acres of open land, 38.1 acres of agricultural land, and less than 0.1 acre of wetlands would be affected.

4.5.2 Vegetation Communities of Special Concern or Value

Transco consulted with federal and state resource agencies to identify sensitive or protected vegetation types, natural areas, and unique plant communities in the project area. The results of these consultations are summarized below.

Federal

No federally owned or protected natural communities such as designated wilderness areas, wildlife preserves, or national wildlife refuges would be crossed by or located in the vicinity of the Project.

Pennsylvania

The Project would not cross any Pennsylvania state forest- or park-designated "Natural Areas" intended to protect special plant communities (PADCNR, 2003, 2014a). However, the PADCNR identified eight natural or special concern community types in the vicinity of CPL North and CPL South that are considered vulnerable or imperiled in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making them at risk of extirpation in Pennsylvania (Bowen, 2014; PNHP, n.d.). These community types include the:

- Calcareous Opening/Cliff Community;
- Herbaceous Vernal Pond Community;
- Red Spruce/Mixed Hardwood Palustrine Forest Community;
- Black Spruce/Tamarack Palustrine Woodland Community;
- Hemlock/Mixed Hardwood Palustrine Forest Community;
- Big Bluestem – Indiangrass River Grassland Community;
- Leatherleaf/Sedge Wetland Community; and
- Riverside Ice-Scour Community.

These natural communities are not regulated under the Pennsylvania Code, and the PADCNR did not request that Transco conduct field surveys for these areas. However, the PADCNR recommended that Transco avoid these areas if possible, and employ minimization measures if any of these communities are crossed (Bowen, 2014; Sechler, 2015).

Transco conducted surveys for vegetation communities of concern in 2014, 2015, and 2016. Transco determined that there are 16 forested wetlands along the CPL North route and 1 forested wetland community along the CPL South route that potentially qualify as Hemlock/Mixed Hardwood Palustrine Forest Communities; however, final determination of whether these communities meet the definition of a community of concern would be made by the PADCNR. Table 4.5.2-1 lists the location and potential effect on these wetland areas. These areas are also shown on the project alignment sheets. In total, construction would affect about 3.6 acres and operation would permanently affect 1.8 acres of this community type. To reduce impacts on these communities, Transco proposes to reduce the right-of-way width to 75 feet where practicable. Transco would minimize and compensate for effects on these wetlands in the same manner as for other forested wetlands (see sections 4.4.4 and 4.4.6).

A potential Herbaceous Vernal Pond Community that contained the endangered northeastern bulrush (*Scirpus ancistrochaetus*) was avoided by a route alternative and would not be affected by the Project.

<u>Pennsylvania State-Threatened Plant Species</u>

Several jeweled shooting-stars, a Pennsylvania state-threatened plant species, that may be indicative of a potential Calcareous Opening/Cliff Community were identified along the CPL South route near MP 99.5. See section 4.7.3.4 for additional information.

TABLE 4.5.2-1

Vegetation Communities of Concern Potentially Crossed by the Atlantic Sunrise Project Pipeline Facilities in Pennsylvania

Facility/County	Special Community	Milepost(s)	Area Affected During Construction (acres)	Area Affected During Operation (acres)
CPL North				
Columbia	Hemlock/Mixed Hardwood Palustrine Forest Community	0.9	0.3	0.2
Columbia	Hemlock/Mixed Hardwood Palustrine Forest Community	2.3	<0.1	<0.1
Columbia	Hemlock/Mixed Hardwood Palustrine Forest Community	2.9	0.1	<0.1
Columbia	Hemlock/Mixed Hardwood Palustrine Forest Community	3.8	<0.1	<0.1
Luzerne	Hemlock/Mixed Hardwood Palustrine Forest Community	5.9	0.2	0.1
Luzerne	Hemlock/Mixed Hardwood Palustrine Forest Community	6.4	0.7	0.5
Luzerne	Hemlock/Mixed Hardwood Palustrine Forest Community	7.0	0.1	<0.1
Luzerne	Hemlock/Mixed Hardwood Palustrine Forest Community	7.2	0.2	0.1
Luzerne	Hemlock/Mixed Hardwood Palustrine Forest Community	11.0	0.1	<0.1
Luzerne	Hemlock/Mixed Hardwood Palustrine Forest Community	11.5	0.2	0.1
Luzerne	Hemlock/Mixed Hardwood Palustrine Forest Community	18.1	0.5	0.2
Wyoming	Hemlock/Mixed Hardwood Palustrine Forest Community	M-0088 3.19	0.8	0.4
Susquehanna	Hemlock/Mixed Hardwood Palustrine Forest Community	54.1	<0.1	<0.1
Susquehanna	Hemlock/Mixed Hardwood Palustrine Forest Community	54.1	<0.1	<0.1
Susquehanna	Hemlock/Mixed Hardwood Palustrine Forest Community	54.4	<0.1	0.0
Susquehanna	Hemlock/Mixed Hardwood Palustrine Forest Community	M-0061 0.06	0.3	0.2
CPL South				
Lancaster	Safe Harbor East Woods County Natural Heritage Inventory	10.4 to 12.3	18.2	9.1
Schuylkill	Hemlock/Mixed Hardwood Palustrine Forest Community	78.0	0.1	<0.1
Columbia	Potential Calcareous Opening/Cliff Community	99.5	unknown	unknown

None of the other five PADCNR-identified vegetation community types were documented within the project workspaces during field surveys.

In addition to the vegetation communities described above, the PADCNR identified the Safe Harbor East Woods – County Natural Heritage Inventory (SHEW-CHNI) as being in the area of the proposed route. The SHEW-CHNI site is dominated by a tuliptree-beech-maple hardwood forest (PNHP, 2008) and contains two large interior forest patches. It also includes core habitat for a population of puttyroot (*Aplectrum hyemale*), a Pennsylvania rare plant species, and adjacent blocks of forestland. The PADCNR recommended avoiding this area but, if avoidance is not possible, the PADCNR recommended botanical surveys, as well as mitigation and monitoring for rare and threatened plants (Bowen, 2014).

The CPL South route would cross the northern edge of the SHEW-CHNI in two locations between MPs 10.4 and 12.3 for a total of 1.5 miles. About 0.1 mile of the 1.5 miles within the SHEW-CHNI is designated as Supporting Natural Landscape within the Natural Heritage Area. The remaining 1.4 miles is in areas designated as Supporting Natural Landscape outside the Natural Heritage Area. The CPL South route would not cross any areas within the SHEW-CHNI that are designated as Species of Concern Core Habitat. Most of the proposed route within the SHEW-CHNI would cross agricultural land. Transco selected this route as the result of an alternative analysis that showed it would reduce upland forest effects within the Natural Heritage Area by about an acre compared to the originally proposed route.

Virginia, Maryland, North Carolina, and South Carolina

Based on agency correspondence to date (Baird, 2014; Byrne, 2014; Cason, 2014; Weakley, 2014), the Project would not cross any natural area preserves nor any vegetation communities of concern in Virginia, Maryland, North Carolina, or South Carolina.

4.5.3 Interior Forest Habitat

Interior forest habitat is not managed as a federally or state-regulated sensitive area, but does provide habitat for a variety of wildlife species including providing food resources, brooding habitat, and protection from disturbance and predation. Clearing or fragmentation of interior forests creates more edge habitat and smaller contiguous forested tracts, which can affect availability and quality of feeding and nesting habitat for certain species as well as isolate species populations (Rosenberg et al., 1999). Interior forest has a higher habitat value for some wildlife species, may take decades to establish, and is generally considered more rare in the environment compared to edge forest, which has a lower habitat value for many species and can be created immediately with disturbance (Landowner Resource Center, 2000; Sprague et al., 2006).

In response to concerns raised by the PGC, Transco identified interior forests that provide habitat that is not substantially influenced by edge conditions, such as light penetration, wind, humidity, and exposure to predators (Slonecker et al., 2012). Transco delineated interior forests using aerial photography. Forest patches were delineated by their non-forested edges and had to be at least 225 acres in size. Edges were defined as the "interface between forested and non-forested ecosystems or between two forests of contrasting composition or structure." Sixty-six forest patches were delineated and included mid-successional or mature forests, but excluded Christmas tree farms, early successional/shrub vegetation, tree "wind rows," and trees in residential yards or landscaping. After these forest patches were identified, the amount of interior forests was determined based on the portion of the forest patch located more than 300 feet from the non-forested edges. The method Transco used to identify interior forest patches is described in its *Migratory Bird Plan* (see appendix M). Based on these criteria, Transco determined it would cross 44 interior forests along CPL North and South and 1 interior forest (crossed by an existing access road) associated with Chapman Loop, and would affect 262.6 acres of interior forest habitat during construction. About 118.5 acres of the affected interior forest would be permanently eliminated and converted to forest edge habitat due to Transco's maintenance of the right-of-way during operation of the pipeline facilities. Interior forest patches that would be affected by construction are shown on figure B-2 in the *Migratory Bird Plan*.

The potential effects on these interior forest areas are summarized in table 4.5.3-1. Most of these areas (27 in total) are along the CPL South route. All but one of the remaining areas are along the CPL North route. The other patch of interior forest would be crossed by an access road associated with Chapman Loop. The other pipeline facilities would be within or adjacent to existing Transco rights-of-way and would not cross any interior forest. The proposed new or existing aboveground facilities also are not located within interior forests.

TABLE 4.5.3-1

Interior Forest Habitats Affected by the Atlantic Sunrise Project

Facility/PA County	No. of Interior Forest Patches Crossed[a]	Crossing Distance (Miles)	Total Length of Pipeline in Miles (Percent Crossing Interior Forest)	Habitat Affected During Construction (acres)[b]	Habitat Affected During Operation (acres)[c]
CPL North					
Columbia	0	0	5.0 (0.0)	0.0	0.0
Luzerne	5	2.0	23.2 (8.6)	23.7	11.9
Wyoming	11	5.0	23.7 (21.1)	58.8	30.0
Susquehanna	1	0.2	6.7 (3.0)	2.2	1.3
Subtotal	**17**	**7.2**	**58.6 (12.3)**	**84.7**	**43.2**
CPL South					
Lancaster	1	<0.1	37.1 (<0.1)	0.3	0.1
Lebanon	5	3.1	28.4 (10.9)	44.6	19.8
Schuylkill	7	3.2	18.5 (17.3)	49.7	19.2
Northumberland	7	4.1	9.0 (45.6)	60.0	25.5
Columbia	7	1.7	34.1 (5.0)	21.3	10.1
Subtotal	**27**	**12.0**	**127.3 (9.4)**	**175.8**	**74.7**
Chapman Loop					
Clinton	1	0.0[d]	2.5 (0.0)	2.1	0.6
Project Total	**41**[e]	**19.2**	**199.4 (9.6)**	**262.6**	**118.5**

a Multiple crossings of a single continuous interior forest patch are counted once, but interior forests that would be crossed in two counties are counted twice (i.e., once in each county).
b Construction impacts include temporary construction workspaces, access roads, and area within permanent rights-of-way.
c Operational impacts associated with maintenance of permanent rights-of-way.
d No interior forest patches would be crossed by the pipeline in Clinton County. Impact acreage reflects interior forest that would be crossed by an access road.
e Sum for counties does not equal project total. Project total reflects number of unique interior forests that would be crossed by the Project when double-counting those that are crossed in two separate counties.

During siting and development of the pipeline routes, Transco implemented routing strategies to avoid and minimize effects on forest habitat and interior forests including, but not limited to, the following:

- selecting a route through non-forested areas wherever possible;
- collocating the pipeline routes with existing utility and transportation infrastructure to the extent practicable;
- utilizing already disturbed, cleared, discontinuous, or fragmented portions of forest; and
- adjusting the route to maximize the preservation of the largest interior forest stands (i.e., shortest crossing length).

When routing through forests (including interior forests) was unavoidable, Transco conducted routing surveys within a 600-foot-wide study corridor to facilitate further refinement of the proposed centerline within that corridor and minimize effects on interior forest. Forest stands were given a weight or value based on the size of the stand, with the larger contiguous forest stands (i.e., those with more interior forest) given a greater value than the smaller fragmented stands. This process facilitated a preference for routing through smaller noncontiguous forest stands over larger contiguous forest stands and helped to minimize forest fragmentation, maintain forest and habitat contiguity, protect wildlife movement and dispersal corridors, and maintain higher ratios of interior forest to forest edge.

The continuity of the tree canopy and the shape of the forest patch were taken into consideration to avoid forest stands with a continuous tree canopy and to minimize the amount of tree clearing that would be required to construct, operate, and maintain the Project. Transco located the right-of-way as far from the interior portion of the forest stand as feasible and preferentially selected more linear forest patches with shorter crossing distances to minimize how the effects were spread across a forest stand and to reduce the proportion of the forest stand that would be affected by tree clearing. In addition, Transco minimized the routing distance through a forest patch by locating the pipeline between previously disturbed, cleared, or fragmented portions of a forest to minimize tree clearing within the stand. Lastly, the pipeline was routed to exit the forest stand as soon as feasible to minimize the length traversed within a particular stand.

In addition to direct effects on interior forest tracts by the proposed clearing during construction and maintenance operations, indirect effects also would occur on interior forest tracts. Newly created edge habitats would be established by maintenance of the permanent right-of-way, and the indirect impacts could extend for 300 feet on each side (600 feet total) of the new corridor into the remaining interior forest blocks. Transco calculated indirect impacts as a measurement of the acreage 300 feet laterally from the edges of the construction workspaces into interior forests. We estimate that the Project would indirectly affect about 1,307.7 acres of interior forest in this manner. In 2014, Pennsylvania's forestland totaled about 16.9 million acres or 58 percent of Pennsylvania's total land area (U.S. Forest Service, 2015). In 2002, about 42 percent of Pennsylvania's total forestland was considered core forest habitat and 58 percent was considered edge habitat. Of the core forest habitat, about 70 percent was found in patches of 5,000 acres or less (Goodrich et al., 2002). According to the U.S. Forest Service, "Pennsylvania's forestland area has been very stable since 1965, with small change over the last 49 years well within the range of sampling error" (U.S. Forest Service, 2015). Land-use patterns suggest that the amount of forested acreage has remained stable because losses caused by development in the Southern Tier have been offset by gains resulting from agriculture declines in the Northern Tier counties (U.S. Forest Service, 2013).

Clearing of interior forest would increase habitat fragmentation (i.e. create edge habitat) in the affected areas, which may benefit or have no effect on some species, but would be detrimental to others (Masters et al., 2002). Species that require more than one habitat type or successional stage often benefit from the proximity of two habitat types at edges, particularly birds that utilize scrub-shrub and/or successional forest habitats. However, species that require habitat interiors or larger, contiguous tracts of habitat typically would be negatively affected. Edges create barriers to travel for some wildlife and migratory birds, which may affect movement and, potentially, gene flow (Putz et al., 2011).

As mentioned above, wildlife is more exposed to common predators that frequent the edges. Common predators, including American crows, blue jays (*Cyanocitta cristata*), and raccoons, are considered edge species and use edges to facilitate movement and improve hunting efficiency. Brood parasites, such as brown-headed cowbirds (*Molothrus ater*), are also generally considered an edge species and prefer woodland and field transitional habitats, having a large negative effect often out-competing migratory bird host species. Other species that may be affected by fragmentation of interior forests are discussed in sections 4.6.1.2 through 4.6.1.5 and Transco's *Migratory Bird Plan* (see appendix M).

As previously mentioned, Transco attempted to avoid and minimize effects on interior forest habitat by routing the proposed pipelines adjacent to existing right-of-way corridors when possible. About 43 percent of CPL North would be collocated with existing pipeline and electric transmission line rights-of-way. About 12 percent of CPL South would be collocated with pipeline and electric transmission line rights-of-way, and 100 percent of Chapman and Unity Loops would be collocated with the existing Transco Leidy Line system. Transco is also proposing to reduce the width of the construction right-of-way in some forested wetlands to minimize effects.

Several commentors expressed concerns about the amount of interior forest crossed by the Project, possible avoidance strategies, and minimization measures to mitigate impacts. In addition to Transco's routing and collocation efforts described above, section 3.3 of the EIS examines numerous major route alternatives, minor route alternatives, and route deviations where the amount of forestland or interior forest crossed was one of the major criteria considered in the evaluation of route alternatives, including a quantitative comparison of forestland crossed by the various route alternatives/deviations. After issuance of the draft EIS, Transco incorporated several minor reroutes that further reduced the amount of interior forest crossed by 11.9 acres. To minimize impacts on forested areas (including interior forests) during and after construction of the Project, Transco would implement the measures in its ECP, Plan and Procedures (see appendix E), PRM Plan, and *Noxious and Invasive Plant Management Plan* (Management Plan).[21]

Transco is working with the FWS to develop a memorandum of understanding that would specify the voluntary conservation measures that would be provided to offset the removal of upland forest and indirect impacts on interior forest. Section 4.6.1.3 of this EIS discusses upland forest and interior forest habitat loss and requires that Transco file the memorandum of understanding with the FWS prior to construction of the project.

During operation, the right-of-way would be maintained to allow continued access for routine aerial and pedestrian pipeline patrols and other maintenance activities. In upland areas, maintenance of the right-of-way would involve clearing the entire permanent right-of-way of woody vegetation. As such, the maintained permanent rights-of-way would be subjected to mowing every 3 years. To facilitate periodic corrosion surveys, a 10-foot-wide strip centered on the pipeline would be mowed annually to maintain herbaceous growth.

4.5.4 Noxious Weeds, Invasive Plant Species, and Plant Disease Prevention

Invasive species are those that display rapid growth and spread, becoming established over large areas (USDA, 2013a). Most commonly they are exotic species that have been introduced from another part of the United States, another region, or another continent, although some native species that exhibit rapid growth and spread are also considered invasive. Invasive plant species can change or degrade natural vegetation communities, which can reduce the quality of habitat for wildlife and native plant species. Similar to invasive species, noxious weeds are frequently introduced but are occasionally native. Noxious weeds are defined as those that are injurious to commercial crops, livestock, or natural habitats and typically grow aggressively in the absence of natural controls (USDA, 2013b). The USDA maintains a List of Federal Noxious Weeds (USDA, 2013b) and most states, including Pennsylvania, Virginia, Maryland, North Carolina, and South Carolina, have noxious weed control laws and maintain lists of noxious and invasive species.

Transco documented noxious weeds on accessible tracts during its 2014 field surveys. In Pennsylvania, Transco identified:

- 22 noxious species populations along CPL North;
- 51 noxious species populations along CPL South;
- 5 noxious species populations along Unity Loop; and
- 1 noxious species at the Compressor Station 610 site.

No noxious species populations were observed along Chapman Loop or at any of the other Pennsylvania aboveground facility sites. The predominant noxious species identified along CPL North and Unity Loop, and the only noxious weed species identified at the Compressor Station 610 site, was

[21] Transco's Management Plan is included as attachment 11 of its ECP (FERC Accession No. 20150331-5153).

multiflora rose. A few occurrences of Canada thistle, bull thistle, and musk thistle also were present along CPL North and Unity Loop. Along CPL South, equal occurrences of multiflora rose and Canada thistle were recorded, but there was also a smaller number of mile-a-minute and bull thistle infestations.

Transco identified plants of the genus *Rubus* and *Digitaria* at its aboveground facilities in North Carolina. Certain species within these two genera are listed as noxious weeds in North Carolina Administrative Code Chapter 48A. Transco also identified Johnson grass at aboveground facilities in South Carolina. Johnson grass is listed as noxious under section 5-462 of the South Carolina Code of Regulations. Transco will file the results of surveys of vegetated workspaces around the perimeter of the MLVs in North and South Carolina.

Removing existing vegetation and disturbing soils during construction could create conditions conducive to the establishment or spread of noxious weeds, particularly where new corridors are established in previously forested areas. To minimize the spread of invasive species, Transco developed a Management Plan in consultation with the applicable state regulatory agencies. The Management Plan contains measures designed to control invasive plant species during project construction and operation. During construction, vehicles, equipment, and materials (including equipment mats) would be inspected and cleaned of soils, vegetation, and debris before they are brought to the project area or moved to another work area within the construction right-of-way. Cleaning methods may include pressure washing, brushing, or using compressed air or an elevated wash rack. Rapid restoration and reseeding of disturbed soils following installation of the pipeline would promote the establishment of desirable plant species and deter the spread of unwanted plant species. Following construction, Transco would monitor the right-of-way for invasive species. If populations of noxious or invasive plant species are identified during the post-construction monitoring, Transco would conduct remedial actions such as the application of herbicides in upland areas and the manual removal of non-native vegetation, and would consult with qualified biologists as necessary to identify more effective revegetation strategies. Any herbicides that are used would be applied in accordance with agency regulations and manufacturer's recommendations, and no herbicides would be applied within 100 feet of a wetland or waterbody except as allowed by the appropriate state or federal agency.

We received comments on the draft EIS regarding potential impacts of disease spread to forest industries, specifically tree farms, from the construction corridor. As described above, Transco's Management Plan includes provisions for the inspection and cleaning equipment and materials (including equipment mats) during construction. Although the mitigation measures in Transco's Management Plan were developed to prevent the spread of noxious and invasive species, we believe they would help prevent the spread of tree diseases as well.

To further minimize forest disease spread and because noxious weed surveys and appropriate control methods are not final, **we recommend that:**

- **Prior to construction, Transco should file with the Secretary for review and written approval by the Director of OEP, complete results of noxious weed surveys and a final Management Plan. The final Management Plan should be revised to include mitigation measures to prevent forest disease spread from the construction corridor.**

Based on Transco's draft Management Plan and our recommendation to finalize surveys and the Management Plan before construction, we conclude that the potential spread of noxious or invasive weeds would be effectively minimized or mitigated.

4.5.5 General Impacts and Mitigation

Construction of the Project, including the construction right-of-way, extra workspace, aboveground facilities, contractor yards, and access roads would affect 3,309.3 acres of vegetated lands. This total includes 2,219.8 acres of open and agricultural lands, 1,043.2 acres of upland forest, and 46.3 acres of wetland habitat (of which 11.3 acres would be forested wetland). Operation of the Project (routine mowing in the maintained right-of-way) would affect 1,171.9 acres of vegetated lands. This total includes 725.2 acres of agricultural and open lands, 425.8 acres of upland forest, and 20.9 acres of wetland (including 6.3 acres of forested wetlands). Appendix N summarizes the approximate acreage that would be affected during construction and operation of the Project.

Construction impacts on vegetation resources are classified based on the duration and significance of impacts. Temporary impacts generally occur during construction with vegetation returning to preconstruction conditions almost immediately after construction, whereas short-term impacts are those that require up to 3 years to return to preconstruction conditions. Long-term impacts require more than 3 years to revegetate, but conditions would return to their preconstruction state during the life of the Project. Permanent impacts are those that modify vegetation resources to the extent that they would not return to preconstruction conditions during the life of the Project. Additional information on land use impacts is presented in section 4.8. See section 4.4 for additional information about impacts on wetland vegetation.

Pipeline Facilities

The degree of impact on vegetation would depend on the type of vegetation affected, the rate at which the vegetation would regenerate after construction, and the area and frequency of vegetation maintenance conducted during operation. The primary effect of pipeline construction would be cutting, clearing, and/or removing 2,691.5 acres of existing vegetation, of which 952.0 acres would be upland forest. The remaining vegetation would include 1,401.5 acres of agricultural land, 292.6 acres of open land, and 45.4 acres of wetlands (including 11.3 acres of forested wetlands). See section 4.4 for additional information about mitigation for impacts on wetlands.

Impacts associated with disturbances to vegetation could include increased soil compaction and erosion, increased potential for the introduction and establishment of non-native and invasive species, and a reduction in interior forests. Transco would implement erosion control measures as described in its ECP and mitigate the introduction of non-native and invasive species by adhering to its Management Plan.

During clearing activities, Transco would mow non-woody vegetation to ground level and cut and remove woody vegetation and stumps, as necessary. Transco would fell trees and other woody material into the right-of-way, then chip and remove the debris. At the request of individual landowners, Transco would stack the tree length cut timber on the landowner property for landowner use. Following construction, Transco would seed all of the previously vegetated workspaces disturbed by construction in accordance with its ECP, Plan, and Procedures. Transco is developing project seed mixes using NRCS guidance, which would be filed with Transco's Implementation Plan prior to construction.

Most impacts on agricultural lands would be temporary to short-term because these areas are disturbed annually to produce crops and would typically return to their previous condition shortly following construction, cleanup, and restoration. Transco would implement topsoil segregation throughout all construction workspaces in agricultural lands in order to mitigate impacts on subsequent crop production and maintain a minimum cover depth of 48 inches. This is important for agricultural activities by maintaining the soil's tilth for crop production and facilitating farm practices by placing the pipeline below the plow layer. Lands currently dominated by herbaceous growth would revegetate quickly, often within one growing season after seeding and otherwise typically within 3 years, depending on a number of factors. Cleared scrub-shrub vegetation communities would likely require 3 to 5 years to regain their woody composition.

The greatest impact would be in forested areas. Construction in forested lands would remove the tree canopy over the entire width of the construction right-of-way, which would change the structure and environment of the underlying and adjacent areas. Forested lands within the maintained right-of-way would be permanently converted to an herbaceous cover type. The indirectly affected lands adjacent to the right-of-way would remain forested; however, they would have reduced habitat value compared to preconstruction conditions. The creation of edge habitat could increase the risk of invasive species and other impacts on wildlife species. The regrowth of shrubs and trees within the temporary workspaces would reduce the edge effect and provide connectivity between adjacent forested tracts to some extent (Tewksbury et al., 2002), but it may take decades before these areas resemble the forest vegetation that was present before construction, resulting in long-term impacts.

Soils that were previously shaded by the tree canopy would receive increased amounts of light, which could lead to drier soils and higher soil temperatures. Trees on the edge of the right-of-way might be subject to mechanical damage to trunks and branches and root impacts from soil disturbance and compaction, all of which could result in the decreased health and viability of some trees and root systems. Some edge trees that were previously within dense forested stands may also lack stability following removal of adjacent supporting trees, which could result in increased susceptibility to wind damage.

Following construction, if Transco's operational site monitoring identifies unsuccessful revegetation or potential invasive species colonization, it would conduct additional vegetation management, such as herbicide application, manual removal of non-native vegetation, and consultation with qualified botanists. If deemed necessary, Transco would use foliar herbicides along the right-of-way in accordance with agency regulations and manufacturer's recommendations to control potential invasive vegetation. Transco would not apply herbicides, fertilizer, or lime within 100 feet of a wetland.

During operation, Transco would mow up to a 50-foot-wide permanent right-of-way no more than once every 3 years; however, a 10-foot-wide swath may be mowed more frequently to facilitate routine patrols and emergency access. Within wetlands, Transco would permanently maintain only a 10-foot-wide swath and selectively remove trees within 15 feet of the pipeline. These maintenance activities would result in permanent vegetation impacts by converting 405.3 acres of upland forest and 6.3 acres of forested wetlands to non-forested cover types.

Aboveground Facilities

Temporary impacts on vegetation within the construction work area would be similar to those described for the pipeline facilities. Transco would stabilize, seed, and allow the temporary workspace areas used during construction to revegetate. Permanent vegetation impacts (operation of the pipeline) would include converting 72.9 acres of agricultural land, 22.0 acres of open land, and 14.4 acres of upland forest to developed land.

Pipe Storage and Contractor Yards

Transco identified 14 contractor/pipe yards and 48 staging areas to temporarily use during construction. Following construction, Transco would re-seed the open land and upland forests, allowing it to revegetate. No seeding would occur in actively cultivated cropland without landowner approval. Because these areas are only used during construction, no operational impacts are anticipated.

Access Roads

New and improved access roads for the pipeline would affect vegetation. Construction impacts on vegetation would be comparable to those described for the proposed pipeline, including the potential for soil compaction and erosion, establishment of invasive species, and fragmentation of interior forested tracts. Following construction, Transco would restore and seed any previously vegetated areas affected by construction of the 115 temporary access roads according to its ECP and Plan. During operation, the 42 permanent access roads would permanently convert about 14.2 acres of vegetation to developed lands.

4.5.6 Conclusion

Based on our review of the potential impacts on vegetation as described above, we conclude that the primary impact from construction and operation of the Project would be on forested lands. However, due to the prevalence of forested habitats within the project area, the eventual regrowth of prior forested areas outside of the permanent right-of-way, and Transco's avoidance measures during pipeline routing and alternatives consideration, we conclude that impacts on vegetation, including forested areas, would be adequately reduced to less than significant levels. In addition, impacts on forested and non-forested vegetation types, as well as the introduction or spread of noxious weeds or invasive plant species, would be further mitigated through Transco's adherence to the measures outlined in its ECP, Plan and Procedures, PRM Plan, Management Plan, migratory bird provisions, our recommendation, and other mitigation measures described above.

4.6 WILDLIFE AND AQUATIC RESOURCES

4.6.1 Wildlife

This section identifies and describes the various wildlife species associated with the vegetation land cover and community types traversed by the Project (see section 4.5.1). It also identifies sensitive wildlife habitats, such as those managed by federal and state agencies.

4.6.1.1 Existing Wildlife Resources

The Project would traverse habitats that support a variety of wildlife species. Vegetation cover type and density are important environmental factors influencing wildlife habitat and species distribution. Variations in vegetation community types (e.g., deciduous hardwood and conifer are community types within the forested upland vegetation cover type) and other conditions, such as topography and existing land use, influence the quality and availability of wildlife habitat within the project area.

The pipeline route would traverse the following major cover types:

- agricultural land;
- upland forest;
- open land;
- developed land; and
- wetlands.

The greatest wildlife diversity and density is in natural habitats such as extensive, contiguous forest tracts, successional habitats (scrub-shrub), and grasslands. Habitats in agricultural lands such as pastures, croplands, and hayfields harbor generalist wildlife species, consisting primarily of small mammals and white-tailed deer (Hibbitts et al., 2013). Representative wildlife species that could be found in these habitats within the project area are described in table 4.6.1-1.

TABLE 4.6.1-1 **Representative Species Within Vegetation Communities for the Atlantic Sunrise Project**		
Land Cover	Vegetation Community/ Habitat Description	Representative Species
Upland forest	All non-wetland forested and woodland communities including: deciduous, coniferous/evergreen, and mixed deciduous/coniferous forest.	Black bear (*Ursus americanus*), white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), gray squirrel (*Sciurus carolinensis*), eastern chipmunk (*Tamias striatus*), ruffed grouse (*Bonasa umbellus*), wild turkey (*Meleagris gallopavo*), northern ringneck snake (*Diadophis punctatus edwardsii*), American toad (*Anaxyrus americanus*), eastern newt (*Notophthalmus viridescens*), red-headed woodpecker (*Melanerpes erythrocephalus*), tufted titmouse (*Baeolophus bicolor*), house finch (*Haemorhous mexicanus*)
Open land	Non-wetland herbaceous openings; not-wetland grassland and shrubland.	White-tailed deer, coyote (*Canis latrans*), red fox (*Vulpes vulpes*), raccoon, eastern cottontail (*Sylvilagus floridanus*), gray squirrel, wild turkey, Virginia opossum (*Didelphis virginiana*), eastern garter snake (*Thamnophis sirtalis*), American goldfinch (*Spinus tristis*), Northern cardinal (*Cardinalis cardinalis*)
Wetland	Palustrine emergent, scrub-shrub, and forested.	Beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), mink (*Mustela vison*), northern water snake (*Nerodia sipedon*), painted turtle (*Chrysemys picta*), snapping turtle (*Chelydra serpentine*) wood frog (*Rana sylvatica*), green frog (*Rana clamitans*), bullfrog (*Rana catesbeiana*), red-backed salamander (*Plethodon cinereus*), northern dusky salamander (*Desmognathus fuscus fuscus)*, swamp sparrow (*Melospiza georgiana*), red-winged blackbird (*Agelaius phoeniceus*)
Agricultural Land	Cropland and pastureland; orchards, groves, vineyards, and nurseries; and hayfields.	Coyote, white-tailed deer, meadow vole (*Microtus pennsylvanicus*), wild turkey, ring-necked pheasant (*Phasianus colchicus*), American crow (*Corvus brachyrhynchos*), killdeer (*Charadrius vociferus*)
Developed land	Commercial, industrial, residential and transportation lands supporting: turf grasses, ornamental plants, and landscaped trees and shrubs.	Coyote, raccoon, striped skunk (*Mephitis mephitis),* crow, robin (*Turdus migratorius*), Norway rat (*Rattus norvegicus*), house mouse (*Mus musculus*)
Source: Fike, 1999; Cowardin et al., 1979; NatureServe, 2014.		

Some of the habitats that would be crossed by the Project support populations of big game and/or small game. Big game species include black bear, white-tailed deer, and wild turkey (D'Angelo and Kosack, 2014; PADCNR, n.d.[b]). Small game species include furbearers such as gray squirrel and cottontail rabbit (*Sylvilagus floridanus*). Migratory waterfowl such as mallard (*Anas platyrhynchos*), wood duck (*Aix sponsa*), and American coot (*Fulica americana*) are also found in the project area. Game species are hunted and also provide recreational value for wildlife observers throughout the year. The most popular game for hunters in Pennsylvania include deer, bear, wild turkey, rabbit, grouse, and squirrel (DOI et al., 2011). Waterfowl is also hunted in Pennsylvania, although the PGC managers have indicated that waterfowl hunting does not occur on the SGL properties that would be crossed by the Project. SGLs are described further in section 4.6.1.2.

Existing vegetation conditions and acres affected by construction and operation of the Project are described in section 4.5.1. The Project would affect a total of 3,741.0 acres of land including:

- 1,789.2 acres of agricultural land;
- 1,043.2 acres of upland forest;
- 430.6 acres of open land;
- 414.4 acres of developed land;
- 46.3 acres of wetlands (of which 11.3 acres would be forested wetlands); and
- 20.4 acres of open water.

4.6.1.2 Significant or Sensitive Wildlife Habitats

Sensitive wildlife habitat includes state or federal lands managed to support populations of wildlife, areas designated by conservation organizations as providing critical habitat for wildlife species, and other areas identified through consultation with state and federal resource agencies. The Project would not cross any Pennsylvania state forests that have been designated as "Wild Areas" to protect special animal communities (PADCNR, 2003). It also would not cross any Special Regulation Areas described in the Pennsylvania 2014-15 Hunting & Trapping Digest (D'Angelo and Kosack, 2014); any Natural Area Preserves in Virginia that are managed for the benefit of rare plants, animals, and natural communities (Virginia Department of Conservation and Recreation [VADCR], 2014); or any other significant or sensitive wildlife habitats outside of Pennsylvania.

The 2.9-mile Chapman Loop lies within an Elk Management Area but would not cross any approved Elk Hunt Zones within the management area (PGC, 2015). Construction of Chapman Loop may temporarily disturb elk due to human activity and noise, but the expansion of herbaceous areas associated with the right-of-way would provide additional foraging grounds for elk, consistent with the goals of the 2006 Management Plan for Elk in Pennsylvania (DeBerti, 2006).

Pennsylvania State Game Lands and State Forest

Sensitive habitats that would be crossed by the Pennsylvania pipeline facilities are listed in Transco's *Migratory Bird Plan* (see appendix M).

Portions of four SGLs and one state forest would be crossed by the Project: SGL 206, SGL 211, SGL 132, SGL 084, and Sproul State Forest. The PGC administers 305 individual SGLs comprising over 1.4 million acres in Pennsylvania, of which about 1.2 million acres are classified as forest. The SGLs are primarily managed for the protection, propagation, and preservation of game and wildlife (Jacobson et al., 2010). SGLs are part of wildlife management units that PGC comprehensively manages for all game except elk, which has an individual management plan, and migratory game birds (including waterfowl), which are subject to an FWS framework for hunting (D'Angelo and Kosack, 2014). The forested areas support populations of large game, such as black bear, white-tailed deer, and beaver, along with numerous other common wildlife species included in table 4.6.1-1. In some instances, these forests provide a contiguous wildlife corridor between other managed lands.

There are over 2.1 million acres of land in the Pennsylvania state forest system, which are managed by the PADCNR Bureau of Forestry. The goals of the state forest system are to retain the wild character and biological diversity of these forests by providing habitats for plants and animals; provide pure water sources; and emphasize opportunities for dispersed recreation, sustained yields of quality timber, and environmentally sound use of mineral resources (PADNCR, 2003). State forests host small and large game, including black bear, whitetail deer, wild turkey, and ruffed grouse (PADCNR, n.d.[b]).

The Project would cross a total of 4.0 miles of SGL and state forest, and would temporarily affect 48.8 acres of state game land and forestland. In four of the five areas, the pipeline route would follow three existing pipeline and one existing electric transmission line rights-of-way, and the new permanent right-of-way would abut the existing rights-of-way in these areas. The effects of the Project on the SGLs and state forest are summarized in table 4.6.1-2. To minimize effects on hunting, the PGC has requested that Transco avoid working within SGLs from October 1 to December 30, and during a 3-week period within the spring turkey hunting season. Following completion of construction, temporary workspaces within the SGLs and Sproul State Forest would be restored, allowing the regrowth of successional forest stages. In SGLs 084, 132, and 206 and Sproul State Forest, the expanded rights-of-way would be maintained as grassland or shrubland similar to the existing rights-of-way. In SGL 211, Transco would cross the Appalachian Trail using the conventional bore method and would maintain a 100-foot forested buffer on either side of the Appalachian Trail. Additional details regarding the crossing of these state lands are provided in section 4.8.6.1. Although conventional bore is the proposed construction method for crossing the Appalachian Trail, technical limitations of a conventional bore could not cross the entire 400-foot-wide Appalachian Trail management area. Consultations between Transco and the PGC and the PADCNR are ongoing concerning the impacts on and restoration of wildlife habitat in the affected SGLs and Sproul State Forest. Therefore, we recommend that:

- **Prior to construction of project facilities in Pennsylvania, Transco should file with the Secretary all documentation of its correspondence with the PGC and the PADCNR and any avoidance or mitigation measures developed with these agencies regarding the SGL and Sproul State Forest crossings.**

TABLE 4.6.1-2

Pennsylvania State Game Lands and State Forests Crossed by the Atlantic Sunrise Project

Facility/County	PA Lands Crossed	Crossing Distance in Miles/Milepost Range(s)	Affected Habitat	Habitat Affected During Construction (acres)[a]	Habitat Affected During Operation (acres)[b]
CPL North					
Luzerne	SGL 206	1.0/ (MPs 11.0 to 11.3, 11.7 to 12.4)	Mixed forest/ grassland-shrubland (right-of-way)	11.1	3.1
CPL South					
Lebanon	SGL 211	0.5/ (MPs 59.8 to M-200 0.3)	Mixed forest	2.9	1.5
Schuylkill	SGL 132	0.8/ (MPs 78.9 to 79.7)	Deciduous forest/ grassland-shrubland (right-of-way)	14.3	4.5
Northumberland	SGL 084	0.8/ (MPs M-0194, 1.0 to 83.4)	Deciduous forest/ grassland-shrubland (right-of-way)	11.8	5.1
Chapman Loop					
Clinton	Sproul State Forest	0.9/ (Three segments, MPs 186.1, 187.2, 187.6 to 187.8, 188.3 to 188.6)	Mixed forest/ grassland-shrubland (right-of-way)/ herbaceous opening	8.7	2.6
Project Total				**48.8**	**16.8**

[a] Construction impacts include temporary construction workspaces, access roads, and area within permanent rights-of-way.
[b] Operation impacts associated with maintenance of permanent rights-of-way.

Interior Forest Habitat

The PGC identified unfragmented, or interior forests, as sensitive habitats, particularly for various area-sensitive forest bird species (Taucher, 2014a). Several commenters also expressed concern about the potential effect of the Project on biodiversity and natural resources in contiguous woodlands and forests, particularly in Lancaster County. Interior forest habitat is typically of higher quality and diversity, meeting the habitat needs of many plant and animal species including large mammals, many wildflowers, wood frogs, thrushes, warblers, and wild turkey (Jones et al., 2000). Large contiguous forests also support nesting habitat for many migratory birds of conservation concern. Direct and indirect effects on interior forest associated with the construction and operation of the Project are described in section 4.5.3.

Important Mammal Areas

The Pennsylvania Important Mammal Areas Project (IMAP) was initiated in 2001. While selection as an Important Mammal Area (IMA) does not provide legal protection, the focus is to promote the conservation of mammals by identifying sites or regions that include habitats critical to their survival, and to educate the public about mammals and their needs. The IMAP is a joint partnership of the PGC, National Wildlife Federation, Pennsylvania Wildlife Federation, Pennsylvania Federation of Sportsmen's Clubs, Mammal Technical Committee/Pennsylvania Biological Survey, and the Carnegie Museum of Natural History. There are currently 45 IMAs that were chosen on the basis of meeting one or more of the following attributes:

- supports diverse or unique mammal communities;
- contains habitats that support high density mammal populations;
- supports species or subspecies listed as endangered or threatened by the Pennsylvania Biological Survey (PBS);
- supports species or subspecies that are declining or vulnerable nationally or listed as candidate species by the PBS; and
- important for wildlife viewing and public education (PGC, n.d.).

One IMA would be crossed by the Project. This is the Stony Mt. Woodrat Complex (IMA No. 26), which would be crossed by CPL South between MPs 60.9 and 78.9, for a total of about 9.9 miles in Lebanon and Schuylkill Counties. The site encompasses about 84,480 acres of public and private lands and includes rugged, mountainous terrain, covered by deciduous and mixed forest, with extensive rocky areas favored by Allegheny woodrats (a state-listed threatened species).

Construction of CPL South would affect about 219.1 acres within IMA No. 26. About 57.1 acres of this is within the St. Anthony's Wilderness – SGL 211 IBA. During operation, permanent rights-of-way and access roads would affect about 60.5 acres within IMA No. 26, of which 22.3 acres is within the St. Anthony's Wilderness – SGL 211 IBA.

The PGC requested surveys of three sites along the proposed pipeline route within IMA No. 26. Two of these survey areas were found to have suitable habitat for the Allegheny woodrat, and evidence of recent woodrat occupation was found within one of these two areas. Transco will continue to coordinate with the PGC in developing acceptable avoidance, minimization, and mitigation measures to avoid adverse impacts on the Allegheny woodrat. The potential effects on the Allegheny woodrat are described in further detail in section 4.7.3.4.

Important Bird Areas

In the United States, the National Audubon Society administers the Important Bird Area (IBA) program to identify and conserve a network of sites that provide critical habitat for birds. IBAs are selected according to standardized criteria (i.e., sites for species at risk, sites for responsibility assemblages, and sites for congregations of birds) through a collaborative effort with non-governmental conservation organizations, government agencies, local conservation groups, academics, birders, and others (Burger and Liner, 2005). In Pennsylvania, IBAs are designated by the Pennsylvania Ornithological Technical Committee and are recognized as the most critical regions in the state for conserving bird diversity and abundance (National Audubon Society, n.d.).

Portions of four IBAs would be crossed by the pipelines in Pennsylvania. The CPL North route crosses the Ricketts Glen – Crevelling Lake Area IBA for about 0.5 mile. The CPL South route would cross Lower Susquehanna River Gorge – Conowingo/Muddy Run IBA for about 0.2 mile, St. Anthony's Wilderness – SGL 211 IBA for about 3.7 miles, and Kittatinny Ridge IBA for about 4.3 miles. No IBAs would be crossed by Chapman Loop, Unity Loop, or the Mainline A and B Replacements. Table 4.6.1-3 lists the habitats that would be affected in each IBA and provides a breakdown of the area that would be affected during construction and operation of the Project.

TABLE 4.6.1-3

Important Bird Areas Affected by the Atlantic Sunrise Project

Facility/PA County	IBA	Crossing Distance in Miles/Milepost Range(s)	Affected Habitat	Habitat Affected During Construction (acres)[a]	Habitat Affected During Operation (acres)[b]
CPL North					
Luzerne	Ricketts Glen – Crevelling Lake	0.5/ (MPs 7.4 to 7.9)	Evergreen forest, mixed forest, herbaceous opening	4.9	2.3
CPL South					
Lancaster	Lower Susquehanna River Gorge – Conowingo/Muddy Run	0.2/ (MPs 1.9 to 2.1)	Deciduous forest, cropland/ pastureland, developed land	3.2	1.3
Lebanon	Kittatinny Ridge	3.7/ (Two Segments, MPs 56.9 to 59.8 and 60.0 to 60.8)	Deciduous forest, mixed forest, cropland/ pastureland, herbaceous opening	56.8	21.1
Schuylkill and Lebanon	St. Anthony's Wilderness – SGL 211	4.3/ (Four Segments, MPs 59.8 to 60.4, 62.4 to 63.4, 67.9 to 68.5, 68.8 to 70.9)	Deciduous forest, mixed forest, cropland/ pastureland, shrubland	66.4	26.3
Project Total				**132.3**	**51.0**

[a] Construction impacts include temporary construction workspaces, access roads, and area within permanent rights-of-way.
[b] Operation impacts associated with maintenance of permanent rights-of-way.

CPL North and CPL South would affect about 132.3 acres within the IBAs during construction. About 51.0 acres of this would be on Transco's proposed permanent right-of-way. Effects on these lands could potentially have an effect on migratory bird species. Potential project effects on migratory birds and conservation measures related to migratory bird habitat are described in section 4.6.1.3.

4.6.1.3 Migratory Birds

Migratory birds are federally protected by the MBTA. The MBTA (16 USC 760c-760g), as amended, implements protection of many native migratory game and non-game birds, with exceptions for the control of species that cause damage to agricultural or other interests. The MBTA prohibits the take of any migratory bird or their parts, nests, and eggs, where "take" means to "pursue, hunt, shoot, wound, kill, trap, capture, or collect."

Executive Order 13186 requires that all federal agencies undertaking activities that may negatively affect migratory birds take a prescribed set of actions to further implement the MBTA, and directs federal agencies to develop a memorandum of understanding with the FWS that promotes the conservation of migratory birds through enhanced collaboration between the two agencies. FERC entered into a memorandum of understanding with the FWS in March 2011.

Though all migratory birds are afforded protection under the MBTA, both Executive Order 13186 and the memorandum of understanding require that Birds of Conservation Concern (BCC) be given priority when considering effects on migratory birds. BCCs are a subset of MBTA-protected species identified by the FWS as those in the greatest need of additional conservation action to avoid future listing under the ESA. Executive Order 13186 states that emphasis should be placed on species of concern, priority habitats, key risk factors, and that particular focus should be given to addressing population-level impacts.

Of Transco's proposed facilities, the pipelines in Pennsylvania have the greatest potential to affect migratory birds. Construction of the project facilities in Maryland, Virginia, North Carolina, and South Carolina, as well as aboveground facilities in Pennsylvania, are anticipated to have a negligible effect on migratory birds because these facilities would be constructed and operated primarily within existing rights-of-way, or other developed areas, and/or areas with limited to widely scattered patches of upland forest and open land habitat.

The FWS Pennsylvania Ecological Services Field Office (ESFO) has indicated that migratory birds are expected to occur in the habitats and counties crossed by the CPL North and CPL South routes (Zimmerman, 2014). Moreover, the migratory bird occurrence data are ample in these counties to develop a comprehensive list of the species that regularly occur or breed in the area, without the need for field surveys. Available occurrence data from eBird (2014), the USGS Breeding Bird Survey (Sauer et al., 2014), and the Pennsylvania Breeding Bird Atlas (Wilson et al., 2012) were reviewed to develop a comprehensive list of the species that regularly occur in the area. This review revealed that 157 migratory bird species are regular breeders in project counties. These species are included in table A-1 of the *Migratory Bird Plan* included in appendix M.

The project area is in the northern portion of Bird Conservation Regions (BCR) 28 (Appalachian Mountains) and 29 (Piedmont) (FWS, 2008). By cross-referencing the list of migratory bird species with the BCC lists for BCR 28 and 29, 18 BCCs regularly occur in these BCRs within the project area, including four non-breeding species. Table 4.6.1-4 lists BCCs for which the preferred habitat is known or expected to be within the project area or for which breeding has been documented in the counties where the Project would be constructed and operated.

Transco developed a *Migratory Bird Plan* for the Project, in coordination with the FWS Pennsylvania ESFO and the PGC, outlining the potential effects on migratory birds that could result from construction and operation of the Project. Initial comments from the FWS have been incorporated into the plan, which describes avoidance and minimization measures that Transco has implemented during the planning phase or would implement during the construction phase of the Project to reduce direct and indirect effects on migratory birds and their habitats.

Construction and maintenance activities that would take place during migratory bird breeding seasons may have direct effects on migratory birds including mortality/injury, sensory disturbance, or increased predation. Adult migratory birds are generally highly mobile and would be able to avoid project vehicles and equipment during clearing, grading, excavation, and maintenance activities. Eggs and young birds would be more susceptible to crushing, mortality, or injury, and adult birds may potentially suffer mortality or injury while defending their nests or young. Transco would avoid mortalities or injuries of breeding birds and their eggs or young by clearing vegetation outside of the breeding season to the extent practicable, particularly in key habitat areas. Transco would also conduct vegetation maintenance activities during the operations phase of the Project outside of the breeding season.

TABLE 4.6.1-4

Birds of Conservation Concern with Potentially Suitable Habitat Within the Atlantic Sunrise Project Area

Species	Seasonal Occurrence	Habitat in Project Area	Breeding Dates[a]	Pipeline Segment in Pennsylvania
Bald eagle (*Haliaeetus leucocephalus*)	Year-round	Forested areas adjacent to large bodies of water	May 1 to July 15	All
Upland sandpiper (*Bartramia longicauda*)	Fall migrant	Migration	Not applicable	CPL South
Short-eared owl (*Asio flammeus*)	Winter resident and fall migrant	Open habitats, including agricultural fields, wetlands, reclaimed strip mines, fields/grasslands.	Not applicable	All
Eastern whip-poor-will (*Antrostomus vociferous*)	Breeder and migrant	Dry deciduous and mixed forests with minimal underbrush	June 1 to July 31	All
Red-headed woodpecker (*Melanerpes erythrocephalus*)	Year-round	Deciduous woodlands, riparian woodlands, orchards, parks, open agricultural land, grasslands with scattered trees, forest edges, roadsides, groves of dead/dying trees	May 25 to July 31	All
Peregrine falcon (*Falco peregrinus*)	Year-round	Broad range of habitats with cliffs, and urban environments with tall structures (e.g., towers, bridges).	May 15 to July 31	CPL North, CPL South
Olive-sided flycatcher (*Contopus cooperi*)	Migrant	Migration	Not applicable	All
Wood thrush (*Hylocichla mustelina*)	Breeder and migrant	Deciduous and mixed forests	June 1 to July 31	All
Worm-eating warbler (*Helmitheros vermivorum*)	Breeder and migrant	Large, contiguous tracts of deciduous and mixed forests	May 25 to July 15	All
Louisiana waterthrush (*Parkesia motacilla*)	Breeder and migrant	Breeds along streams in deciduous or mixed forests	April 15 to July 15	All
Blue-winged warbler (*Vermivora cyanoptera*)	Breeder and migrant	Early to mid-successional habitats	May 25 to July 15	CPL North, CPL South, Unity Loop
Golden-winged warbler (*Vermivora chrysoptera*)	Breeder and migrant	Broad range of habitats with dense herbs and shrubs with some taller trees	May 25 to July 15	CPL North, CPL South, Chapman Loop
Kentucky warbler (*Geothlypis formosa*)	Breeder and migrant	Woodlands near streams with dense understory	May 25 to July 31	All
Cerulean warbler (*Setophaga cerulea*)	Breeder and migrant	Large, mature deciduous forests	June 1 to July 31	All
Prairie warbler (*Setophaga discolor*)	Breeder and migrant	Broad range of shrubby habitats	May 25 to July 31	All
Canada warbler (*Cardellina canadensis*)	Breeder and migrant	Broad range of deciduous and coniferous forest habitats	June 1 to July 31	All
Henslow's sparrow (*Ammodramus henslowii*)	Breeder and migrant	Large fields with tall, dense grass	May 25 to August 15	CPL North; CPL South
Rusty blackbird (*Euphagus carolinus*)	Winter resident and migrant	Swamps, forested wetlands, pond edges	Not applicable	All

[a] Breeding dates are based on Wilson et al., 2012's "Safe Dates." Safe dates were established to exclude observations of migrant and other non-breeding birds from being recorded as breeding birds.

The increased presence of humans, noise, and vibrations associated with project activities would likely cause sensory disturbances of migratory birds. The resulting negative effects are expected to be intermittent and short term, occurring during work hours and ceasing after construction activities have moved from a given area. Displacement and avoidance of the area are direct responses to sensory disturbances. Birds may be injured or suffer mortality as an indirect effect of fleeing an area of disturbance. In most cases, project activities would be short term and episodic. As such, sensory disturbance effects associated with these activities may affect individuals but would not likely have notable effects on any local populations of migratory birds. Permanent aboveground structures such as compressor stations would create potential localized disturbances for the operational life of the Project, and thus would have more permanent effects. The compressor stations, however, have been sited in areas that have been subject to anthropogenic disturbances and would be away from key habitat areas, which would minimize any permanent effects associated with these facilities.

Artificial lights associated with the night-lighting of project activities occurring between sunset and sunrise may disorient migratory birds. Some birds use natural light sources and patterns for navigation, interspecific interactions, and other critical biological behaviors. Effects associated with light pollution are expected to be minimal given the Project's commitment to limiting night-lighting activities. Specifically, night construction operations would not allow lighting to project upward during migratory periods (approximately August through November and March through May) and any security lighting would be down-shielded.

Project construction or maintenance activities would not likely result in increased predation of migratory birds. Trash from project personnel has the potential to attract predators like gulls, crows, and raccoons, sometimes in large numbers. However, Transco would dispose of construction debris according to federal, state, and local regulations, and construction crews would practice good housekeeping to prevent garbage from attracting predators. Transco would also train personnel accordingly to completely avoid and minimize the potential for these effects.

Habitat removal and/or modification of existing habitats during construction and the long-term or permanent conversion of habitats associated with tree clearing and the maintenance of rights-of-way would have indirect effects on migratory birds. The impact of grading, clearing, and excavation of open lands, non-forested wetlands, open water, agricultural lands, and developed lands would be short in duration because these land use types would likely return to their preconstruction condition within 1 to 5 years. The effect of clearing, grading, and right-of-way maintenance in upland and wetland forested lands would be more prominent and long term because these areas may not be restored to their preconstruction condition potentially for decades, if at all. The removal of interior forests would also have an indirect effect extending off the right-of-way because the uncleared forested areas near the right-of-way would be subject to edge effects and thus would no longer function as interior forest habitat.

Transco has also developed a *Migratory Bird Plan*, in coordination with the FWS, which includes specific measures to avoid and minimize effects on migratory birds. For example, Transco has committed to not clearing vegetation in migratory bird key habitat areas between April 1 and July 31 to avoid effects on breeding migratory birds. Transco would also implement reasonable measures, such as mobilizing additional clearing contractors, in non-key habitat areas to further minimize impacts. The FWS has determined that these general and specific avoidance and minimization measures would protect migratory birds. However, it should be noted that the FWS is also in the process of determining a methodology for standardizing the mitigation ratios for effects on interior forest habitat. Transco is continuing to work with the FWS to develop a project-specific memorandum of understanding that would specify the voluntary conservation measures that would be provided to offset the removal of upland forest and indirect impacts on interior forests.

Because the project-specific memorandum of understanding has not yet been filed with FERC, **we recommend that:**

- **<u>With its Implementation Plan</u>, Transco should file with the Secretary, for review and written approval by the Director of OEP, its memorandum of understanding with the FWS regarding the voluntary conservation measures that Transco would**

provide to offset the removal of upland forest and indirect impacts on interior forests.

4.6.1.4 General Impacts and Mitigation for Wildlife

Transco has attempted to avoid and minimize effects on sensitive wildlife habitat by collocating the workspace with other existing rights-of-way where practicable. Transco would further minimize project effects on wildlife communities through implementation of BMPs during construction as described in its ECP, including: restoring all temporary workspaces according to the Plan and the Procedures (attachments 17 and 18 of Transco's ECP) and reseeding open land and upland forests to facilitate revegetation.

Pipeline Facilities

Construction of the pipeline facilities, including MLVs, tie-ins, and cathodic protection, would affect 2,813.7 acres of land, of which 111.4 acres is developed land.[22] Following construction, Transco would reseed the disturbed workspaces to stabilize the soils and speed revegetation. During operations, 1,049.4 acres of vegetated habitat within the permanent right-of-way would be maintained in an herbaceous or early successional stage by Transco's periodic mowing of the right-of-way. This maintenance would result in the permanent conversion of about 405.0 acres of upland forest and 6.3 acres of forested wetlands to herbaceous and scrub-shrub habitat.

Construction of the pipeline facilities could negatively affect common wildlife species and general wildlife habitat within the immediate vicinity of the pipeline route. Noise and ground disturbance generated by pipeline construction activities may temporarily affect wildlife behavior in their immediate vicinity. Noise would potentially cause wildlife to disperse to other neighboring habitats; however, the stresses associated with wildlife dispersal are not anticipated to result in any measureable effects on any species at the individual or population level.

Other disturbance effects, including direct mortality, could occur due to clearing, grading, trench excavation, and the movement of equipment on the right-of-way and access roads. This would affect less mobile species, including those that hide within burrows along the route, to a greater degree than those that could quickly flee the project area. Most of the equipment would operate at slow speeds, and Transco would require construction vehicles to adhere to low speed limits along all access roads to avoid wildlife mortality. Therefore, we do not expect that significant direct mortality of wildlife would occur as a result of construction activities.

Removal of vegetation within forested land could cause long-term displacement of some local wildlife populations. Although forested areas would be restored similar to other areas, forested habitat would be converted to successional stages of open herbaceous and scrub-shrub habitat either permanently (as on the permanent right-of-way) or for several years to decades until a mature forest community redevelops on the temporary workspaces. Some wildlife species that rely on forested habitat for foraging, breeding, and nesting could be negatively affected by the long-term loss of forest cover. Other species that prefer open land and scrub-shrub habitat would benefit from the permanent or temporary habitat conversion. Forest fragmentation would increase in certain locations due to project construction, reducing the amount of habitat available for interior forest species (i.e. movement and dispersal corridors). With habitat conversion and forest fragmentation, there is also a risk of intrusion by invasive or noxious species. Transco would manage invasive and noxious plant species as described in section 4.5.4.

[22] Developed land includes industrial/commercial, transportation, and residential land.

Increased predation could also occur during construction and operation of the pipeline due to the removal of vegetation and loss of cover, which could increase the visibility of prey species. While individual mortality rates could increase, the Project would not likely have any population-level impacts on any particular species.

The duration of effects on wildlife using other habitats such as agricultural lands and other open lands (including existing rights-of-way) would be shorter than in forested areas. Following construction, vegetation, similar to that existing before construction, would typically become reestablished within months to a few years. We expect wildlife to quickly return to the vicinity of the rights-of-way, using them as corridors for travel, refuge, foraging, and nesting.

Aboveground Facilities

Construction of the new aboveground facilities (Compressor Stations 605 and 610, and five new M&R stations) would affect a total of about 107.0 acres. Following construction, Transco would stabilize, seed, and allow temporary workspace to revegetate, which would restore their use to most wildlife; however, 88.5 acres would be permanently converted. Construction of the compressor stations would permanently convert 72.9 acres of agricultural land, 13.6 acres of upland forest, and 2.0 acres of open space to developed land.

Wildlife would likely be permanently displaced from these areas by habitat conversion to non-vegetated and/or impervious cover (i.e., slab and gravel at the meter stations) or maintained vegetation (i.e., ornamentals and maintained lawn) and the erection of security fences at the new aboveground facility sites. Increases in ambient noise and ambient lighting may result in a decrease in wildlife use of adjacent habitat. Due to the existing industrial nature of the sites, and the amount suitable habitat outside of the project area, these effects are expected to be negligible.

Modifications to existing facilities (MLVs, M&R stations, compressor stations) would result in additional impacts of 199.1 acres of land, although 135.4 acres would be within existing fenced facilities, so no significant additional effects on wildlife habitat would occur. However, in some locations, expansion of the existing fenced area would be required. Permanent effects due to the modification of aboveground facilities include 0.8 acre of upland forest and 20.0 acres of open land. Wildlife in these areas, if present, are likely already acclimated to the permanent noise and lighting environment associated with an existing natural gas compressor station.

Contractor Yards and Staging Areas

Transco proposes to use 14 contractor yards and 48 staging areas on a temporary basis to support construction activities. These contractor yards and staging areas would affect 2.9 acres of upland forest, 263.2 acres of agricultural land, 31.7 acres of open lands; 0.3 acre of wetlands, and 104.8 acres of developed lands.

Access Roads

The access roads for the pipeline would temporarily affect 64.2 acres of upland forest, 51.5 acres of open land, 38.1 acres of agricultural land, 54.5 acres of developed land, and less than 0.1 acre of wetlands and open water. Following construction, Transco would stabilize, seed, and allow temporary access roads to revegetate. Permanent access roads would permanently affect 6.2 acres of upland forest, 4.8 acres of open land, 3.2 acres of agricultural land, and 10.8 acres of developed land.

4.6.1.5 Conclusion

Overall, wildlife resources are not expected to be significantly affected due to construction and operation of the Project based on the presence of suitable adjacent habitat available for use, the proposed clearing window for avoidance of the migratory bird nesting season, and our recommendations, which would further minimize effects on wildlife due to forest clearing. In addition, Transco would minimize effects to the extent possible through adhering to its ECP, Plan, and Procedures; routing of the pipeline to minimize effects on sensitive areas; and reducing the construction right-of-way through wetlands and interior forests.

4.6.2 Existing Aquatic Resources

The pipeline would involve 388 waterbody crossings, 384 in Pennsylvania and 4 in Virginia. Waterbody crossings in Pennsylvania would include 254 minor, 95 intermediate, and 5 major crossings. Waterbody crossings in Virginia would include two minor and two intermediate crossings. Waterbodies could also be affected by the construction or improvements of access roads in Pennsylvania. A more detailed characterization of the waterbodies that Transco would cross is provided in section 4.3.2. None of the aboveground facilities, contractor yards, or access roads would affect any fishery resources. Therefore, these facilities are not described further in this section.

Pennsylvania

As described in section 4.3.2.3, the PADEP classifies waterbodies according to water quality and aquatic communities. Under Pennsylvania Code Title 25, Chapter 93 waterbodies in the state are classified as: coldwater fishes, warmwater fishes, migratory fishes, and trout stocked. Selected waterbodies are further classified as high quality or exceptional value and given special protection. Waterbodies that are classified as high quality exceed levels necessary to support fish, shellfish, wildlife, and recreation whereas waterbodies classified as exceptional value are in significant natural areas, provide exceptional ecological significance, or are designated as a "wilderness trout stream." The pipeline would cross 73 waterbodies classified as high quality or exceptional value. The Pennsylvania Fish and Boat Commission (PFBC) further classify waterbodies supporting trout populations or providing habitat as: Approved Trout Water, Class A Trout Waters, Special Regulation Areas, Stream Sections that Support Natural Reproduction of Trout, and Wilderness Trout Streams. Trout streams and their applicable tributaries are the only streams with a PFBC-recommended crossing window. All of the high quality waterbodies also support trout fisheries.

Virginia

As described in section 4.3.2.3, the VADEQ classifies waterbodies according to water quality. Under 9 VAC 25-260-30, waterbodies in the state are classified into three tiers: Tier I, II, and III Exceptional Waters. The pipeline would cross four waterbodies, all of which are Tier II.

4.6.2.1 Fisheries of Special Concern

There is no federally designated essential fish habitat in the project area.

The FWS, PFBC, VADCR, and VDGIF were consulted to identify waterbodies that may contain federally or state-listed threatened, endangered, or candidate species and their habitats and other fisheries resources that could be considered fisheries of special concern. Based on these consultations, we have determined that none of the waterbodies that would be affected by the Project contain federally or state-listed fish species, but some of these waterbodies may contain federally or state-listed mussels. See section 4.7 for additional information about mussel species.

Pennsylvania

Based on consultation with the PFBC, 221 waterbody crossings that may contain sensitive fisheries were identified in Pennsylvania. Table K-1 in appendix K includes the unique identification number, waterbody name, milepost, crossing width, fishery type, FERC classification, state water classification, and proposed crossing method for each waterbody. These waterbodies are classified as Wild Trout Stream, Class A Wild Trout Streams, or Trout Stocked Streams, or are tributaries to waterbodies with these designations. Effects on these waterbodies and their fisheries would be similar to those on other waterbodies as described in section 4.3.2.6. Transco would cross all of these special concern waterbodies using a dry crossing method (i.e., dam-and-pump, flume, conventional bore, or HDD), which would allow construction under mostly dry conditions, minimizing the potential for downstream sedimentation and turbidity. Transco would further minimize effects on fisheries resources within these waterbodies by adhering to the measures in its ECP and the PFBC's recommended construction windows to avoid effects on fish spawning and recreational angling. Table 4.6.2-1 summarizes the standard PFBC construction timing restrictions for these fisheries, including locations within 0.5 mile upstream of Trout Stocked Waters where fish-stocking is planned.

TABLE 4.6.2-1

Construction Timing Restrictions for Fishery Resources of Special Concern Crossed by the Atlantic Sunrise Project Facilities in Pennsylvania

Fishery Classification	Construction Restriction Window	In-Stream Work Window
Trout Stocked Waters	March 1 through June 15	June 16 through February 28
Wild Trout Waters	October 1 through December 31	January 1 through September 30
Class A Wild Trout Streams	October 1 through April 1	April 2 through September 30

Virginia

According to the VADCR and VDGIF, only one waterbody (unnamed tributary to Broad Run) crossed by the Project in Virginia is designated as a Stream Conservation Unit. Transco would use the dam-and-pump dry crossing method for all waterbody crossings in Virginia. Transco would further minimize effects on fisheries resources in Virginia by adhering to its ECP and the VDGIF-recommended construction windows to avoid effects on recreational angling spawning. Transco anticipates that the VDGIF will recommend the timing windows listed in table 4.6.2-2.

TABLE 4.6.2-2

Potential Construction Timing Restrictions for Fishery Resources Crossed by the Atlantic Sunrise Project Facilities in Virginia

Fishery Category	Construction Restriction Window	In-Stream Work Window
General warmwater species spawning	April 15 through July 15	July 16 through April 14
General long-term brooders (mollusks)	April 15 through June 15; August 15 through September 30	June 16 through August 14; October 1 through April 14
General short-term brooders (mollusks)	May 15 through July 31	August 1 through May 14

4.6.2.2 General Impacts and Mitigation

This section describes general impacts on fisheries and aquatic resources and the measures Transco would implement to minimize these impacts. Table K-1 in appendix K includes the unique identification number, waterbody name, milepost, crossing width, fishery type, FERC classification, state water classification, and proposed crossing method for each waterbody. Transco proposes to construct across all waterbodies using dry crossing methods, which maintain the flow of the waterbody during the crossing. The four dry crossing methods that could be used are the dam-and-pump, flume, HDD, and conventional bore. The last two of these are trenchless methods where the pipeline is installed beneath the waterbody without impacting the stream bed or banks. The other two involve isolating the flow of the waterbody from the construction area and trenching through the stream bed and banks under drier conditions.

Transco proposes to use a trenchless crossing method (i.e., conventional bore or HDD) at 11 waterbody crossing locations (4 conventional bore crossings of a single waterbody each and 4 HDD crossings, 2 of which would cross multiple waterbodies).[23] For those waterbodies not crossed via trenchless crossing methods, Transco would use one of the other two dry crossing methods based on in-stream flow and conditions at the crossing location. Additional details concerning these construction methods are included in section 2.3.2.2.

Impacts on fisheries and aquatic resources, such as macroinvertebrates, associated with open-cut crossings would include temporary stream bank disturbance, a short-term increase in sedimentation and water turbidity, a temporary reduction in shading and cover, and temporary modification of flow. These temporary effects could cause physical damage to the gills of fish, disrupt food sources and predator/prey interactions, affect fish passage, increase ambient water temperature, degrade spawning and nursery habitat, smother demersal eggs, and temporarily reduce reproduction potential. Aquatic invertebrates and macroinvertebrates such as caddisflies, dragonflies, and damselflies, which are preyed upon by fishes, could be affected by direct mortality from construction, increased sedimentation filling interstitial spaces of bottom substrates, and reduced reproduction potential. However, these effects would be temporary because these macroinvertebrates rapidly recolonize affected areas (Matthaei et al., 1996; McCabe and Gotelli, 2000).

Transco's use of the traditional open-cut method would be limited primarily to waterbodies that are either dry or that have no discernable flow at the time of crossing. This method would only be used where there is discernable flow if permitted by regulatory agencies. Transco's restricted use of the open-cut wet trench method under these conditions would reduce the potential for many of the effects described above. Transco would also implement the measures described in its ECP to minimize effects on fisheries and other aquatic resources. These measures include:

- completing waterbody crossings during appropriate in-stream construction windows and completing open-cut crossings within 24 hours and 48 hours for minor and intermediate crossings, respectively;
- installing temporary erosion controls and maintaining flow rates;
- dispersing any downstream discharges to minimize scour and downstream siltation;
- crossing waterbodies perpendicular to the channel or as close as practicable; and
- promptly restoring stream channels to their original contours and flow rates and stabilizing banks.

Following construction, Transco would allow a 25-foot-wide riparian strip along each waterbody bank to revegetate with native flora in order to stabilize banks, reduce erosion impacts, and provide shading and cover for fisheries resources; however, a 10-foot-wide corridor may be permanently maintained in an herbaceous state directly above the pipeline, except in areas crossed by trenchless

[23] The Susquehanna River would be crossed twice via the HDD crossing method.

methods. While stream temperature changes are possible following riparian vegetation clearing, the reduction in shading across the maintained corridor would not likely influence a temperature change in the waterbody (Beschta and Taylor, 1988).

Dry Crossing Method

The use of dry crossing methods would have some of the same effects as an open-cut wet trench crossing (e.g., the clearing of vegetation and the disturbance of the stream bed and banks) but the potential for sedimentation and associated turbidity impacts is typically lower because the grading, trenching, and backfilling activities are isolated from the stream flow. The potential for sedimentation and turbidity would be limited to short periods of time during and shortly following the installation and removal of the dams and any flumes. If the dam-and-pump method is used, fish and other biota could also be impinged or entrained during pump use; however, Transco would screen the intakes of its pumps to minimize the potential for this impact. Transco would mitigate the other potential effects of the dry crossing methods by adhering to the applicable BMPs listed above and in its ECP.

Trenchless Crossings

Transco is evaluating two methods of trenchless construction: conventional horizontal bore and HDD. The proposed conventional horizontal bore locations include:

- unnamed tributary to Huntington Creek at MP 13.9 (CPL North);
- Pikes Creek at MP 16.6 (CPL North);
- unnamed tributary to Qureg Run at MP 55.5 (CPL South); and
- unnamed slough at MP 95.8 (CPL South).

The proposed HDD locations include:

- Susquehanna River and two unnamed tributaries near MPs 35.0 to 35.1 (CPL North);
- Conestoga River and one unnamed tributary near MPs 12.3 to 12.4 (CPL South);
- Susquehanna River at MP 99.7 (CPL South); and
- Little Fishing Creek at MP M-0423 3.3 (CPL South).

Additional details regarding trenchless crossing methods can be found in sections 2.3.2.2 and 4.3.2.5. Trenchless crossing methods would avoid or minimize effects on fishery resources within the waterbodies, including freshwater mussel populations. The greatest potential for effects on aquatic resources associated with an HDD crossing would be if there was an inadvertent release of drilling fluid into the waterbody either as a result of a direct discharge, or an indirect discharge resulting from the runoff of drilling fluid from an onshore inadvertent release. Any HDD drilling fluid that reaches a waterbody could increase the turbidity of the waterbody due to the high clay content of the water-based drilling fluid. Because the clay would remain in suspension for an extended period, the turbidity plume could persist for several minutes or hours and, depending on the flow of the waterbody, this turbidity plume could extend downstream for a considerable distance. The effect of the turbidity would be similar to the sedimentation effects described above. To prevent and control inadvertent releases of drilling fluids, Transco would implement an HDD Contingency Plan. This plan would include measures to monitor the drilling operation and drill path to identify and minimize the potential for inadvertent returns, minimize the duration of any releases that occur, and contain and clean up any spills.

Blasting

Transco is evaluating 65 waterbodies in Pennsylvania where shallow depth to bedrock along the pipeline project route may require blasting (see section 4.3.2.5 and table K-4 in appendix K). In-stream blasting has the potential to injure or kill aquatic organisms, displace organisms during blast-hole drilling activities, and temporarily increase stream turbidity. Chemical by-products from the blasting materials could also be released and could potentially contaminate the water. Details of how blasting would be conducted and measures to avoid and minimize effects related to blasting are included in Transco's Blasting Plan, which is included in Transco's ECP. If blasting is required in or near a stream, Transco would develop a detailed, site-specific blasting plan for that location. Each site-specific blasting plan would include protocols for the protection of fisheries and other aquatic resources.

Hydrostatic Test Water

To comply with DOT regulations, Transco would conduct hydrostatic testing of the pipeline prior to placing it into service. As described further in see section 4.3, Transco proposes to use 11 waterbodies in Pennsylvania and 2 waterbodies in Virginia as sources of hydrostatic test water. Three of the waterbodies in Pennsylvania that would be used for hydrostatic test water contain sensitive fisheries.

Transco would mitigate impacts of hydrostatic water withdrawals and discharges on aquatic resources by adhering to its ECP and would conduct activities in accordance with applicable regulatory requirements, including monitoring receiving waters before and after discharge for contaminants. Intake hoses would be screened to minimize entrainment or impingement of aquatic species, and withdrawal rates would be regulated to maintain downstream flows. No chemicals or additives would be added to the water except where necessary to eradicate non-native aquatic species and the rate of discharges of hydrostatic test water would be regulated to minimize erosion. Diffusers or other dissipation devices would be used to reduce the energy of the discharge and prevent scouring of streambeds. Transco would direct upland discharges into a filter bag or other erosion-control barrier to trap sediments.

Spill Prevention, Control, and Countermeasures

Accidental spills of construction-related fluids (e.g., oil, gasoline, or hydraulic fluids) into waterbodies could result in water quality effects that affect fish and other aquatic organisms. The potential impact would depend on the type and quantity of the spill, and the dispersal and attenuation characteristics of the waterbody. Minimization and mitigation procedures related to water quality are described in section 4.3.2.6. To reduce the potential for surface water contamination and resulting effects on aquatic life, Transco would implement the measures in its ECP and Spill Plan, which include conducting routine inspections of construction equipment, tanks, and storage areas to help reduce the potential for spills or leaks; restricting refueling and the handling of hazardous materials to greater than 100 feet from wetland and waterbody resources; and the use of secondary containment around all containers and tanks. With adherence to these measures, effects on aquatic resources from potential spills would be adequately minimized.

4.6.2.3 Conclusion

Based on our review of potential project effects on aquatic resources as described above, we conclude that the Project would result in some temporary effects on aquatic resources, but that these effects would be adequately mitigated through adherence to the measures described in Transco's ECP and other project-specific plans and the requirements of its waterbody crossing permits, including state-recommended crossing windows.

4.7 THREATENED, ENDANGERED, AND OTHER SPECIAL STATUS SPECIES

Special status species are those species for which state or federal agencies afford an additional level of protection by law, regulation, or policy. For the purposes of this environmental analysis, special status species of plants and animals include species officially listed by the States/Commonwealths of Pennsylvania, Virginia, Maryland, North Carolina, or South Carolina or the federal government as endangered or threatened (as per the ESA), or species of special concern.

4.7.1 Regulatory Requirements and Species Identification

4.7.1.1 Federal

Section 7 of the ESA requires federal agencies to ensure that any actions authorized, funded, or carried out by the agencies do not jeopardize the continued existence of a federally listed threatened or endangered species, or result in the destruction or adverse modification of designated critical habitat for a federally listed species. As the lead federal agency, FERC is required to consult with the FWS and/or NOAA Fisheries to determine whether federally listed endangered or threatened species or designated critical habitat occur in the vicinity of a proposed project, and to determine the potential effects of a project on these species or their critical habitats. The FWS, which is responsible for terrestrial and freshwater species, and NOAA Fisheries, which is responsible for marine and anadromous species, jointly administer the law.

For actions involving major construction activities with the potential to affect listed species or designated critical habitat, FERC must report its findings to the FWS in a Biological Assessment (BA) for those species that may be affected. If it is determined the action is likely to adversely affect listed species or designated critical habitat, FERC is required to initiate formal consultation with the appropriate agency. In response, the FWS would issue a Biological Opinion (BO) as to whether or not the action would likely jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. The BA and BO processes are often used to confer on proposed and candidate species, as well as proposed critical habitat, due to the potential for these species to be listed in the future. No candidate species or species proposed for federal listing, or designated critical habitats or critical habitats proposed for federal listing occur in the project area.

Transco, acting as FERC's non-federal representative for the purpose of complying with section 7(a)(2) of the ESA, initiated informal consultation with the FWS ESFOs in Maryland, North Carolina, Pennsylvania, South Carolina, and Virginia beginning in February 2014. Because there are no marine or anadromous habitats within the project area, consultation with NOAA Fisheries is not required.

We reviewed the information submitted by Transco, performed our own independent analyses, and participated in meetings with the FWS. We have determined that four federally listed species potentially occur within the project area and have the potential to be affected by the Project. We requested that the FWS consider the EIS, along with various survey reports prepared by Transco, as the BA for the Project in accordance with section 7 of the ESA. Federally listed species are further discussed in section 4.7.2.

4.7.1.2 State

In addition to federal law, Maryland, North Carolina, Pennsylvania, South Carolina, and Virginia have passed laws to protect state-listed threatened and endangered species. The state-specific regulations include the following:

- Maryland – Maryland statutes comprise the Nongame and Endangered Species Conservation Act (Annotated Code of Maryland 10-2A-01). Under the Act, any species designated under the federal ESA is deemed an endangered species as are other species designated by the state secretary based on habitat and population factors. This Act is supported by regulations (Code of Maryland Regulations 08.03.08) that contain the official State Threatened and Endangered Species List and is managed by the Maryland Department of Natural Resources (MDNR). The MDNR also maintains an official list of game and commercial fish species that are designated as threatened or endangered in Maryland (Code of Maryland Regulations 08.02.12). The MDNR determined that there is no record of state-listed rare, threatened, or endangered species within the boundaries of the project area (i.e., existing Compressor Station 190) (Byrne, 2014).

- North Carolina – North Carolina's Endangered Species Act provisions are contained in the statute that authorizes the North Carolina Wildlife Resources Commission (NCWRC) to publish an endangered species list, a threatened species list, and a list of species of special concern (Annotated General Statute of North Carolina, 25-113-IV). Pursuant to this Act, all native or resident wild animals that are on the federal lists of endangered or threatened species have the same status on the North Carolina protected animals lists. Additional species the NCWRC deems in need of conservation are also included on the list. Transco received natural heritage data for rare plants, animals, and communities from the NCDENR. Additionally, the NCWRC identified state-listed species with the potential to be affected by the Project. State-listed species that could be affected are described in section 4.7.3.3.

- Pennsylvania – State-listed species are protected in Pennsylvania under Title 58, Part II of the Pennsylvania Code (58 Pa. Code sections 75.1-75.4) (Pennsylvania Code, 2014). Three agencies are responsible for administering this law. The PGC has jurisdiction over state-listed birds and mammals; the PFBC has jurisdiction over state-listed fish, reptiles, amphibians, and aquatic organisms; and the PADCNR has jurisdiction over state-listed plants and terrestrial invertebrates. The PFBC determined that no state-listed threatened or endangered fish species are known to occur in the project area in Pennsylvania (Smiles, 2014). State-listed species that could be affected are described in section 4.7.3.4.

- South Carolina – South Carolina state regulations list non-game wildlife on the state's List of Endangered Wildlife Species, as well as the animals that are considered threatened and in need of management. If an animal is listed as threatened or endangered, a permit must be obtained in certain situations to avoid penalty for the taking of a listed species (Annotated South Carolina Code, Chapter 123, Article 5). The South Carolina Department of Natural Resources (SCDNR) did not identify any species listed as threatened or endangered by the state within 1 mile of the proposed project facilities (Holling, 2014).

- Virginia – Virginia has two separate acts that cover endangered plant and animal species. Under the Virginia Endangered Species Act (Code of Virginia 29.1-563-570), the Commonwealth of Virginia is authorized to adopt the federal list and to make modifications and amendments to that list. The Virginia Endangered Species Act prohibits the taking, transportation, processing, sale, or offer for sale within the commonwealth of any threatened or endangered species of fish or wildlife. Under the Endangered Plant and Insect Species Act (Virginia Regulations 325-01 et seq.), the taking or possession of endangered or threatened species is prohibited. The VADCR determined that the Project would not affect any documented state-listed plants or insects (Baird, 2014). State-listed species that could be affected are described in section 4.7.3.6.

4.7.2 Federally Listed Species

Based on consultations with the FWS, Transco initially identified eight ESA-listed species as potentially occurring in the project area. However, based on field surveys conducted in 2014 and 2015, Transco and the FWS subsequently determined that four of the species would not be affected by the Project:

- the gray bat;
- the dwarf wedgemussel;
- the dwarf-flowered heartleaf; and
- the harperella.

The remaining four species, the northern long-eared bat, Indiana bat, bog turtle, and northeastern bulrush, may be affected by the Project. The status and determination of effect for each species is summarized in table 4.7.2-1 and described in detail below.

4.7.2.1 Indiana Bat

The Indiana bat is a federally listed endangered species and is a state-listed endangered species in Pennsylvania, Maryland, and North Carolina. The Indiana bat may occur in the project area in Pennsylvania within Clinton, Columbia, Lancaster, Lebanon, Luzerne, Lycoming, Northumberland, and Schuylkill Counties (FWS, 2014a, 2015a).

Threats to the Indiana bat vary during its annual cycle. At the hibernation sites (hibernacula), threats include modifications to caves, mines, and surrounding areas that change airflow and alter microclimate in the hibernacula. Human disturbance and vandalism pose significant threats during hibernation through direct mortality and by inducing arousal and consequent depletion of fat reserves. White-nose syndrome, a fungal disease, has recently been added as a threat due to the death of millions of hibernating insect-eating bats in 25 states and 5 Canadian provinces since the winter of 2007–2008. Natural catastrophes can also have a significant effect during winter because of the concentration of individuals in relatively few sites. During summer months, possible threats relate to the loss and degradation of forested habitat. Migration pathways and swarming sites may also be affected by habitat loss and degradation.

TABLE 4.7.2-1

Federally Listed Species Potentially Occurring in the Atlantic Sunrise Project Area

Species Name	Federal Status [a]	State Status [a]	County/State of Potential Occurrence Within Project Area [b]	Determination of Effect
Mammals				
Indiana bat (*Myotis sodalis*)	E	PA-E; MD-E; NC-E	Clinton, Columbia, Lancaster, Lebanon, Luzerne, Lycoming, Northumberland, and Schuylkill Counties, PA	May affect, not likely to adversely affect
Northern long-eared bat (*Myotis septentrionalis*)	T	PA-SC	Clinton, Columbia, Lancaster, Lebanon, Luzerne, Lycoming, Northumberland, Schuylkill, Susquehanna, and Wyoming Counties, PA; Appomattox County, VA [c]	May affect, not likely to adversely affect
Gray bat (*Myotis griescens*)	E	VA-E; NC-E	Appomattox County, VA [c]	No effect
Mussels				
Dwarf wedgemussel (*Alasmidonta heterodon*)	E	VA-E; MD-E; NC-E	Prince William County, VA [c]	No effect
Reptiles				
Bog turtle (*Clemmys muhlenbergii*)	T	PA-E; MD-T; NC-T	Lancaster and Lebanon Counties, PA	May affect, not likely to adversely affect
Plants				
Northeastern bulrush (*Scirpus ancistrochaetus*)	E	PA-E; MD-E	Clinton, Columbia, and Luzerne Counties, PA	May affect, not likely to adversely affect
Harperella (*Ptilimnium nodosum*)	E	MD-E; NC-E	Prince William County, VA [c]	No effect
Dwarf-flowered heart (*Hexastylis nanifloral)*	T	Not Applicable	Cherokee County, SC [d]	No effect

Sources: DOI, 2014; Hammond, 2015; Zimmerman, 2014; McCoy, 2015; Smith, 2014

[a] E = endangered; T = threatened; SC = Special Concern; PA = Pennsylvania; NC = North Carolina; VA = Virginia; MD = Maryland

[b] Only county locations of possible occurrence based on federal and state resource agency feedback are listed. State status is listed for all states although occurrence has not been identified within the project area in some states.

[c] Although these species have been identified in these counties in Virginia, the FWS Virginia ESFO determined that the Project would have no effect on these species in Virginia.

[d] Although these species have been identified in this county in South Carolina, the FWS South Carolina ESFO determined that the Project would have no effect on this species.

The Indiana bat is relatively small, weighing only 0.25 ounce, and has a wingspan of 9 to 11 inches. The fur is dark-brown to grayish. Indiana bats hibernate during winter in caves or, occasionally, in abandoned mines from approximately November through March. For hibernation, the bats require cool, humid caves with stable temperatures under 50 °F but above freezing. Very few caves within the range of the species have these conditions. The hibernacula typically have large volumes of Indiana bats and often have large rooms and vertical or extensive passages (FWS, 2006a).

In April and May, Indiana bats begin migrating to their summer roosting sites. When active, Indiana bats roost in dead or dying trees, or live trees with exfoliating bark. A bat roost is a location where bats sleep during non-active periods, including daylight hours, or rest for brief periods during the night. During the summer months, most reproductive females occupy roost sites that receive direct sunlight for more than half the day. Roost trees generally are found within canopy gaps in a forest, along fence lines, or along a wooded edge. Maternity roosts are found in riparian zones, bottomland, floodplain habitats, wooded wetlands, and upland communities. Indiana bats forage in semi-open to closed forested habitats, forest edges, and riparian areas (FWS, 2007a).

As mentioned above, the Indiana bat may occur in the counties that would be affected by the Project in Pennsylvania; however, there are no known Indiana bat maternity colonies or male capture sites in any of these counties (FWS, 2014a). As of 2014, known Indiana bat hibernacula occur in only one of the counties that would be crossed by the Project in Pennsylvania (Luzerne County) (Butchkoski, 2010a; FWS, 2014a). However, the FWS did not identify any hibernacula within 2.5 miles of project workspaces in Luzerne County (Zimmerman, 2014).

While there are no summer records in counties crossed by the Project, and only Luzerne County has known hibernacula, the FWS requested that Transco conduct mist-netting surveys within the project area to confirm presence/absence of the species and cave/abandoned mine surveys to identify potential hibernacula (Zimmerman, 2014).

Transco conducted presence/absence surveys within suitable summer habitat along the project route in accordance with:

- the 2014 *Range-Wide Indiana Bat Summer Survey Guidelines* (FWS, 2014b);
- PGC's standard netting survey protocol as provided in *Standard and Minimum Effort Requirements for Qualified Bat Surveyor Netting within the Commonwealth of Pennsylvania for Environmental Review Projects* (PGC and FWS, n.d.); and
- direction provided by the FWS Pennsylvania ESFO (Shellenberger, 2014a).

Transco's survey plan was approved and surveys were initiated on May 21, 2014, and continued through August 14, 2014. Surveys were completed on all of the accessible parcels, which included 82 percent of the sites targeted for survey. No Indiana bats were captured or identified during presence/absence surveys in 2014.

Transco conducted additional summer presence/absence surveys in 2015 to cover several route modifications and properties where access had been granted following the initial surveys. The 2015 surveys were conducted in accordance with the *2015 Range-wide Indiana Bat Summer Survey Guidelines* (FWS, 2015b). Transco submitted an updated work plan in 2015 to include 78 sites along the pipeline route and 42 net-nights at Compressor Station 517. Transco initiated surveys on May 15, 2015. Transco did not capture any Indiana bats during the 2015 surveys. According to the FWS, the lack of captures indicates that the species is "likely absent" (FWS, 2015b).

In addition to surveying the forested summer habitat of the Indiana bat, Transco conducted a desktop analysis of the PADEP Abandoned Mine Land Inventory (AMLI), known bat caves, and karst feature database to identify potential portals that may be used as entryways to potential hibernacula within 1,000 feet of the Project (Bat Conservation and Management, Inc., 2014; PADEP, 2014b; PADCNR, 2007a). No known bat caves were identified, but 24 potential portals were identified from the AMLI database, 5 in Schuylkill County and 19 in Northumberland County. A single cave was identified in Lancaster County from the karst feature database. One additional potential hibernaculum was discovered in Schuylkill County during eastern small-footed bat surveys in January 2015.

Transco conducted field inspections of the potential portal features from September 17 through 22, 2014, and during the winter and summer of 2015, in accordance with the *Protocol for Assessing Bat Use of Potential Hibernacula* (PGC and FWS, 2012). The purpose of this field work was to verify the locations of sites identified during the desktop review, identify other potential portals that may not have been evident during the desktop exercise, and determine if fall trapping surveys would be needed at any of these sites. This effort resulted in the field verification of 14 potentially suitable hibernacula (4 in Schuylkill County and 10 in Northumberland County). Transco performed fall trapping surveys at 13 of the 14 sites from September 22 through October 8, 2014. No Indiana bats were captured at any of the 2014–2015 trapping sites (Sanders, 2015) or any of the Phase 2 presence/absence surveys. A combined 2014–2015 Bat Survey Report was submitted to the FWS following completion of the surveys and included the fall 2015 trapping results.

Because no Indiana bats or fall hibernacula were identified during surveys, Indiana bats are likely absent from the project area. As described for the northern long-eared bat, Transco committed to seasonal restrictions on vegetation clearing that would minimize potential impacts on any bats that may use the project area. The primary impact of the Project would be the clearing of about 682 acres of potentially suitable habitat (i.e., forested areas) within the Indiana bat's recognized range. This would reduce the area available for potential Indiana bat use but, because it is only a small amount of the total potentially suitable summer habitat in the project area, it would not limit any Indiana bats that may be present from finding other suitable summer habitat. Therefore, we have determined that the Project *may affect, but is not likely to adversely affect* the Indiana bat.

4.7.2.2 Northern Long-eared Bat

The northern long-eared bat was federally listed as threatened on May 4, 2015, and is a special concern species in Pennsylvania. The northern long-eared bat is known to or believed to occur in all project counties in Pennsylvania, Maryland, Virginia, and South Carolina (FWS, 2014a, 2015c). Northern long-eared bats are also known to or believed to occur in every project county in North Carolina except Guilford County. The proposed project workspaces in Maryland, Virginia, North Carolina, and South Carolina do not contain forest habitat suitable for northern long-eared bats. There is some suitable forest habitat for northern long-eared bats along the Mainline A and B Replacements in Prince William County, Virginia; however, the FWS Virginia ESFO indicated that no impacts on federally listed species would occur in Virginia (Smith, 2014). Therefore, the Project's potential for affecting northern long-eared bats is limited to workspaces in Pennsylvania.

The northern long-eared bat is about 3 to 3.7 inches long with a wingspan of 9 to 10 inches, and typically weighs between 0.2 and 0.3 ounce. It is distinguished from other myotis species by its long ears. It eats insects and emerges at dusk to fly primarily through the understory of forest areas, feeding on moths, flies, leafhoppers, caddisflies, and beetles. Northern long-eared bats catch these insects while in flight using echolocation or by using gleaning behavior, catching motionless insects from vegetation and water (Harvey et al., 2011). Northern long-eared bats spend the winter hibernating in caves and abandoned mines. During summer, they roost alone or in small colonies, typically in groups containing less than 100 individuals, with maternity colonies averaging 20 to 30 individuals, underneath bark or in cavities or crevices of both live and dead trees (snags) (FWS, 2013).

The species was federally listed primarily due to the threat of white-nose syndrome, which is causing bats to disappear completely from many hibernation sites. Other threats to the northern long-eared bat include wind energy development, habitat destruction or disturbance (e.g., vandalism to hibernacula, roost tree removal), and contaminants.

As mentioned above, the northern long-eared bat may occur within all of the counties crossed by the Project in Pennsylvania; however, information regarding known northern long-eared bat hibernacula and summer roosting habitat is limited. In Pennsylvania, known northern long-eared bat hibernacula have been documented in Clinton, Columbia, Lancaster, Luzerne, Lycoming, Northumberland, and Schuylkill Counties (FWS, 2014a). The FWS Pennsylvania Field Office has noted that the Project is within 5 miles of five known hibernacula in Schuylkill, Northumberland, and either Lancaster or York Counties (Shellenberger, 2015a). Two of the hibernacula are within 0.25 mile of the Project in Northumberland County between CPL South MPs 84.9 and 85.5.

Transco completed presence/absence and hibernacula surveys for the northern long-eared bat concurrently with the Indiana bat surveys described in section 4.7.2.1. Northern long-eared bat surveys were completed according to the survey requirements specified in the *Northern Long-eared Bat Interim Conference and Planning Guidance* (FWS, 2014c).

Transco completed mist netting surveys for bats at 312 sites. Of the 312 sites surveyed, 277 sites were targeted and required for survey for the current project alignment. All 277 target sites, which represents 100 percent of the current alignment, were surveyed. Transco captured 70 northern long-eared bats during the mist-netting surveys. Fifty-two of these captured northern long-eared bats were radio-tagged. All but one of the northern long-eared bats were captured along the pipeline route; one was captured along an access toad. No northern long-eared bats were captured at any aboveground facility sites.

Transco tracked radio tagged bats to roost locations on properties where it had access (Sanders, 2015). Where access could not be obtained, roost locations were approximated based on biangulation or triangulation from accessible areas (i.e., public roads or other accessible parcels). When actual roost locations were identified, Transco conducted exit counts in accordance with the work plan. Radio-tagged bats located on inaccessible properties were monitored for the life of the transmitter to determine and document any changes in roost location. Table 4.7.2-2 summarizes, by county, the location and number of northern long-eared bat captures and the total number of radio-tagged northern long-eared bats, confirmed roosts identified on accessible properties, and approximate roost locations on inaccessible properties. Hibernacula/portal search and sampling results for Indiana and northern long-eared bats are described in section 4.7.2.1. No northern long-eared bats were captured during any portal site trapping surveys to date, including the most recent fall 2015 hibernacula surveys.

The *Northern Long-eared Bat Interim Conference and Planning Guidance* describes how to delineate “known habitat” based on survey results as follows (FWS, 2014c):

- Hibernacula – all suitable habitat located within a 5-mile radius of a hibernaculum;
- Mist-net Capture(s) – all suitable habitat located within a 3-mile radius of a mist-net capture without any roost location data; and
- Mist-net Capture with Roost Data – all suitable habitat located within a 1.5-mile radius, or the distance from the capture location to the roost, whichever is greater, of a single roost. All suitable habitat located within a 1.5-mile buffer, or the distance from the capture location to the roost, whichever is greater, of a line connecting multiple roosts.

Based on the above guidance and the survey results to date, Transco delineated the potential impacts the Project would have on northern long-eared bat habitats (see table 4.7.2-3).

Transco would implement the following avoidance and minimization measures to reduce impacts on the northern long-eared bat and its suitable habitat. Measures include, but are not limited to:

- routing the pipeline through nonforested areas where possible;
- collocating the Project with existing rights-of-way to avoid greenfield habitat to the extent practical; and
- when routing through forested areas:
    - selecting the route to minimize the length of forestland crossed within each forest stand;
    - locating the right-of-way as far from the interior portion of the forest as practicable; and
    - giving preference to routing of the pipeline through fragmented and discontinuous forest stands versus forest stands with continuous canopy cover.

TABLE 4.7.2-2

Northern Long-Eared Bat Captures and Radio Telemetry Results by County for the Atlantic Sunrise Project

Facility/County	Sites Surveyed for Current Alignment (Total Sites Surveyed)	Sites with a Capture (no. (percent))	Total Bats Captured	Total Radio-tagged bats	Total Confirmed Roosts [a]	Total Approximate Roosts [b]
CPL North						
Columbia	9	1 (13%)	1	1	3	2
Luzerne	35 (39)	8 (21%)	12	8	3	4
Susquehanna	11	3 (27%)	7	7	1	7
Wyoming	32	16 (50%)	21	18	15	16
Subtotal	**87 (91)**	**28 (31%)**	**41**	**34**	**22**	**29**
CPL South						
Columbia	40 (54)	12 (23%)	13	9	5	9
Lancaster	33 (38)	1 (3%)	2	1	1	0
Lebanon	31 (40)	2 (5%)	2	1	0	2
Northumberland	15	0 (0%)	0	0	0	0
Schuylkill	23 (28)	0 (0%)	0	0	0	0
Subtotal	**142 (175)**	**15 (9%)**	**17**	**11**	**6**	**11**
Unity Loop						
Lycoming	**14**	**2 (14%)**	**2**	**2**	**4**	**2**
Chapman Loop						
Clinton	**5**	**4 (80%)**	**9**	**4**	**5**	**5**
Compressor Station 517						
Columbia	**1**	**0 (0%)**	**0**	**0**	**0**	**0**
CPL North Access Roads						
Luzerne	**2**	**1 (50%)**	**1**	**1**	**0**	**1**
CPL South Access Roads						
Columbia	2	0 (0%)	0	0	0	0
Lancaster	2	0 (0%)	0	0	0	0
Lebanon	6	0 (0%)	0	0	0	0
Northumberland	8	0 (0%)	0	0	0	0
Schuylkill	8	0 (0%)	0	0	0	0
Subtotal	**26**	**0 (0%)**	**0**	**0**	**0**	**0**
Project Total	**277 (312)**	**50 (16%)**	**70**	**52**	**37**	**48**

a A confirmed roost was located on accessible property and was physically identified.

b An approximate roost is where a radio-tagged bat roosted on inaccessible property and Transco estimated the location using biangulation or triangulation from accessible areas (i.e., public roads or other accessible properties).

TABLE 4.7.2-3

Impacts on Northern Long-Eared Bat Habitat by County for the Atlantic Sunrise Project

County	Potentially Suitable Habitat (acres) [a]	Known Maternity Habitat (acres) [b]	Known Non-maternity Habitat (acres) [c]	Spring Staging and Fall Swarming Habitat (acres) [d]	Total
Clinton	0.5	16.2	0	0	16.7
Columbia	35.3	97.7	22.8	8.4	164.2
Lancaster	20.8	18.0	0	34.4	73.2
Lebanon	60.5	58.4	0	0	118.9
Luzerne	78.8	97.6	24.5	0	200.9
Lycoming	33.1	13.5	0	0	46.6
Northumberland	0	0	0	106.3	106.3
Schuylkill	65.4	8.3	0	58.0	131.7
Susquehanna	0	31.9	4.0	0	35.9
Wyoming	0	159.6	0	0	159.6
Project Total	**294.3**	**501.2**	**51.3**	**207.1**	**1,053.9**

[a] Potentially suitable habitat refers to those forested areas where mist-netting and radio-tracking surveys yielded negative results.

[b] Known maternity habitat refers to those forested areas within 1.5 miles of a documented maternity roost.

[c] Known non-maternity habitat refers to those areas with documented roosts that were not associated with maternity colonies.

[d] Fall swarming and spring staging habitat refers to those areas within 5 miles of known hibernacula.

The Project would include tree clearing within 150 feet of four known northern long-eared bat maternity roosts and construction/tree clearing along about 2,007 feet of right-of-way within known hibernacula. Transco has developed specific avoidance and minimization measures for these areas to eliminate or reduce the potential for adverse impacts. Transco formulated the proposed clearing windows by sorting affected forested areas into categories (or tiers) based the results of its bat surveys, guidance contained in the *Northern Long-eared Bat Interim Conference and Planning Guidance* document and the interim 4(d) rule, and consideration of other resources including migratory birds (FWS, 2014c, 2015d).

Transco proposes to restrict vegetation clearing in select areas as described below:

- avoid tree clearing between June 1 and July 31 in areas that are within known northern long-eared bat summer habitat and are less than 150 feet from a documented occupied maternity roost;
- avoid tree clearing between April 1 and November 15 in areas that are within 0.25 mile from a known hibernaculum;
- complete tree clearing with non-mechanized equipment between November 16 through March 31 within 0.25 mile of the hibernaculum in advance of mainline construction;
- avoid blasting within 0.25 mile of a known hibernaculum to avoid potential structural impacts;
- avoid pipeline construction activities during the hibernation period within 0.25 mile of a known hibernaculum to avoid disturbing hibernating bats;

- avoid tree clearing within 700 feet of a hibernaculum entrance to prevent surficial micro-climate changes; and

- monitor hibernaculum entrances to verify that Project construction has not harmed the hibernaculum.

By implementing these measures, Transco would avoid impacts on the northern long-eared bat to the extent practicable; however, unavoidable impacts would occur. Transco would clear 1,053.9 acres of suitable northern long-eared bat habitat, of which 700.5 acres would no longer be available following construction. The northern long-eared bat is not habitat-limited; therefore, impacts associated with tree removal are expected to be insignificant. Nonetheless, Transco would provide mitigation for the permanent removal of known suitable forest habitat. Transco is currently developing this mitigation plan with the FWS, which would be filed with FERC prior to construction. In developing the mitigation plan with the FWS, we expect Transco's mitigation efforts to adequately address concerns related to habitat loss. With implementation of Transco's proposed avoidance and minimization measures and its mitigation for habitat loss, we have determined that the Project *may affect, but is not likely to adversely affect* the northern long-eared bat.

4.7.2.3 Bog Turtle

The bog turtle is a federally listed threatened species, a state-listed endangered species in Pennsylvania, and a state-listed threatened species in Maryland and North Carolina. In Pennsylvania, bog turtles can occur in Lancaster, Lebanon, and Schuylkill Counties. The FWS identified a known bog turtle population near Muddy Run in Lancaster County, but indicated that the project facilities in Schuylkill County would be in an area with no known occurrences of bog turtles (Easler, 2014; Zimmerman, 2014).

One of the smallest turtles in the world, the adult bog turtle carapace is approximately 3.1 to 4.5 inches long. Bog turtles can be easily identified by their mahogany-colored shell and bright yellow-orange blotches on both sides of the head. Bog turtles live in a mosaic of open, sunny, springfed wetlands and scattered dry areas that provide habitat and shelter for basking, foraging, nesting, and hibernation. Bog turtles are active, feeding, and nesting from April through October, with eggs hatching from late August through September. The species is dormant in the winter, burrowing in logs, mud, or tree roots (FWS, 2010).

The greatest threats to the bog turtle are the loss and fragmentation of its habitat. Fragmenting connected wetlands limits the bog turtle's ability to find mates and new habitat, and increases the amount of edge around the wetlands. Increased edge provides habitat for predators and increases the likelihood of invasion by non-native and non-wetland plants. The bog turtle is also illegally collected for market by disreputable pet traders (FWS, 2010).

Potential bog turtle habitat is identified by the following three criteria:

- Suitable hydrology is groundwater driven and includes some or all of the following: springs, shallow surface water, persistently saturated soils, subsurface flow, and rivulets.

- Suitable soils, which are the critical criterion, include a bottom substrate of soft muck. The term "muck" does not refer to a technical soil type; it can be soft deep peat or mineral mud.

- Suitable vegetation includes dominant vegetation consisting of low grasses and sedges, possibly a scrub-shrub wetland component, and a relatively open canopy (FWS, 2011).

The FWS Pennsylvania ESFO requested that Transco complete Phase 1 bog turtle habitat surveys of all wetlands within 300 feet of the project workspaces in Lancaster and Lebanon Counties. Transco conducted Phase 1 surveys in 2014 and 2015 in accordance with *Guidelines for Bog Turtle Surveys* (FWS, 2006b). Transco was able to access about 92 percent of the parcels in Lancaster and Lebanon Counties.

Transco completed a remote sensing analysis to determine the presence/absence of potential bog turtle habitat on no-access parcels. Results indicate that 37 percent of the no-access parcels potentially contain suitable habitat for bog turtles. Wetlands that provide suitable habitat based on remote sensing would require Phase 1 surveys once they become accessible, and Phase 2 surveys would then be completed on any parcels on which suitable bog turtle habitat is confirmed.

The Phase 1 surveys identified suitable bog turtle habitat in 20 delineated wetlands, 10 in Lebanon County and 10 in Lancaster County. Phase 2 presence/absence surveys and/or Phase 3 trapping surveys were completed between April 16 and May 28, 2015. Phase 2 surveys have been completed at 16 of these wetlands in accordance with the *Guidelines for Bog Turtle Surveys* (FWS, 2006b). Phase 2 surveys have not yet been completed in two wetlands (W-T30-4003 and W-T61-6001) and were determined unnecessary in wetlands W-T14-5009 and W-T42-1001. Phase 3 bog turtle trapping surveys were conducted concurrently with Phase 2 surveys at 7 of the 16 suitable wetlands where the amount of suitable habitat was greater than 2 acres and/or the suitable habitat was so densely vegetated that it limited the effectiveness of the Phase 2 surveys (WHM Consulting, Inc., 2015).

The Phase 2/Phase 3 survey effort identified a single bog turtle population within one wetland complex in Lancaster County. This population occurs in the same watershed as the known bog turtle population indicated in correspondence from the FWS (Zimmerman, 2014). The survey documented 11 individuals, including 5 adult females, 5 adult males, and 1 hatchling. Seven individuals were and remain fitted with transmitters. No other bog turtle populations were identified.

The wetland complex contains five patches of suitable habitat ranging from 0.2 to 0.9 acre. Two of the core habitat patches are close to the right-of-way but are outside of the construction workspace. Based on the most recent Phase 2/3 survey results, bog turtles in the wetland complex are confined to the northern end of the wetland (about 570 feet from the proposed pipeline crossing) and are not using the portion of the wetland within or adjacent to the proposed project workspace. Survey efforts documented 13 individuals, including 6 adult females, 6 adult males, and 1 hatchling. Radio transmitters were attached to 11 of the 13 bog turtles, and tracked movements ranged from 100 to 380 feet. The nearest turtle was located about 570 feet from the construction workspaces. Transmitters were left on four of the bog turtles through April 2016, providing a full year of tracking data.

In addition to project-wide BMPs that would minimize impacts on bog turtles, Transco would implement the following species-specific conservation measures:

- locating temporary workspaces outside of wetlands occupied by bog turtles;
- requiring mandatory training for all construction inspection and contractor staff by a FWS Recognized Bog Turtle Surveyor that would include instructions for identifying bog turtles as well as signs of turtle activity;
- placing signs along the construction corridor within the limits of workspace indicating that work is occurring in proximity to designated rare species habitat including photos and procedures to be implemented if a turtle is identified;

- installing double silt fencing (by non-mechanical means) within wetlands where bog turtles were identified that extends 300 feet along the edge of the right-of-way prior to the start of construction. Silt fence installation would be preceded by inspection of potential habitat by a FWS-recognized surveyor to ensure no bog turtles are inadvertently disturbed by installing the fencing. Prior to construction, the area within the bog turtle exclusion fence would be surveyed by a FWS-recognized surveyor to verify the absence of turtles. The surveyor would remain on site throughout the construction process and during active periods for bog turtles, and would conduct searches for turtles within the workspace. The results of these searches would be provided to the FWS and Pennsylvania Fish and Boat Commission on a weekly basis;

- daily inspections of all open trenches and silt fences prior to starting construction that day. Silt fences would be checked immediately following any major storm event; and

- completing construction through the wetland complex within 30 days to minimize the duration of potential impacts on bog turtles inhabiting the wetland.

During operation and maintenance activities, Transco has identified the following mitigation measures for wetlands occupied by bog turtles:

- conducting long-term vegetation maintenance by hand clearing woody vegetation. Mowing, herbicides, and mechanized equipment would not be used for right-of-way maintenance;

- avoiding vehicle use within the occupied wetland complex. Patrols for maintenance would be conducted on foot and care would be taken to avoid stepping on tussocks of hummocks; and

- conducting hand clearing between October 1 and April 15 to avoid/minimize impacts on bog turtle nests, eggs, or young.

Transco would avoid impacts on bog turtle populations on parcels currently not accessible for field surveys by ensuring that all necessary Phase 1 and Phase 2 bog turtle surveys are completed on the portions of these parcels within the project limits of disturbance before construction. Survey results would be provided to the FWS. Should any currently unknown bog turtle populations be identified during these preconstruction surveys, Transco would coordinate with the FWS to develop and implement site-specific avoidance and minimization measures and, at a minimum, implement measures similar to those proposed above.

Based on the survey results and Transco's commitment to implementing conservation measures in coordination with the FWS, and our recommendation that would ensure section 7 consultation is completed prior to the initiation of any construction, we conclude that the Project *may affect, but would not likely adversely affect* the bog turtle.

4.7.2.4 Northeastern Bulrush

The northeastern bulrush is a federally listed endangered species and a state-listed endangered species in Pennsylvania and Maryland. In Pennsylvania, northeastern bulrush could occur in Clinton, Columbia, and Luzerne Counties, and its range overlaps with the proposed pipeline route in Columbia and Luzerne Counties (Bowen, 2014; Shellenberger, 2014b; Zimmerman, 2014).

The northeastern bulrush is a tall, leafy bulrush in the sedge family of plants, with narrow leaves and a drooping flower head with chocolate-brown florets. Little is known about its life history, but like other sedges, northeastern bulrush grows in wet areas including small wetlands, sinkhole ponds, or wet depressions with seasonally fluctuating water levels. It may be found at the water's edge, in deep water or in just a few inches of water; however, during dry spells there may be no water visible where the plant is growing (FWS, 2006c). Because northeastern bulrush requires fluctuating water levels, threats to its existence include habitat alterations that make a site consistently drier or wetter. Activities such as filling or ditching in a wetland can destroy or degrade its habitat. The species is also vulnerable to invasions from non-native wetland plants because it does not compete well with dense vegetation.

The FWS requested Transco conduct presence/absence surveys of all wetlands crossed by the Project within Columbia County and a portion of Luzerne County.

Transco conducted surveys for northeastern bulrush from July 8 to September 2, 2014, and from July 30 to August 20, 2015. In total, 110 delineated wetlands were surveyed in 2014, and 19 delineated wetlands were surveyed in 2015 within the requested survey portion of the project area in Columbia and Luzerne Counties. Transco submitted the 2014 northeastern bulrush survey report to the FWS Pennsylvania ESFO and the PADCNR on January 26, 2015. The 2015 survey report was submitted to the FWS on December 2, 2015. Survey access is available and wetland delineations have been completed on about 97 percent of parcels within the northeastern bulrush survey area in Columbia and Luzerne counties. Transco completed a remote sensing analysis to determine the presence/absence of potential habitat on parcels without survey permission. None of these parcels were identified as having habitat suitable to support northeastern bulrush. Transco will conduct wetland delineations on all parcels without survey access with potential northeastern bulrush habitat once they become accessible.

Transco's surveys identified northeastern bulrush in one wetland in Luzerne County and a second wetland in northern Columbia County. Transco revised its route to avoid impacts on northeastern bulrush in Luzerne County. The new route provides a buffer of 250 feet between the workspace and the northeastern bulrush population, but does not avoid the wetland entirely. Transco also re-routed its proposed alignment in Columbia County to avoid impacts on the wetland and the northeastern bulrush population. At its closest point, the proposed construction workspace is set back about 110 feet from the northeastern bulrush population and about 50 feet from the wetland.

In addition to avoiding direct impacts on the identified northeastern bulrush population, potential impacts on wetlands containing bulrush would be minimized by Transco's implementation of the BMPs included in its ECP, which would include maintaining workspace setbacks; installing erosion control mats and using other erosion controls to contain sediments and limit the movement of disturbed soils; and reducing the width of the construction right-of-way.

With the implementation of these measures, the Project would have no direct or indirect effects on northeastern bulrush, occupied habitat, or associated wetland hydrology, nor would it result in wetland contamination. In addition to the measures identified above, Transco is working with the FWS to develop a right-of-way maintenance plan to ensure that the two documented northeastern bulrush populations are not adversely affected by operation and maintenance of the right-of-way. Transco would also implement its Management Plan for Project construction activities to minimize the spread of noxious weeds in these areas, and seed mixes for revegetation would include plant species native to the region (see section 4.5.4).

For these reasons, we have determined that the Project *may affect, but is not likely to adversely affect* the northeastern bulrush.

4.7.2.5 Conclusion

Based on the analyses above, Transco's survey results and proposed mitigation/conservation measures, and the implementation of Transco's Plan and Procedures and the other project-specific plans and BMPs, we conclude that the Project *may affect, but is not likely to adversely affect* the Indiana bat, northern long-eared bat, bog turtle, and northeastern bulrush. However, because consultations with the FWS are ongoing for federally listed species, **we recommend that:**

- **Transco should not begin construction activities until:**

  a. the FERC staff receives written comments from the FWS regarding the proposed action;

  b. the FERC staff completes formal consultation with the FWS, if required; and

  c. Transco has received written notification from the Director of OEP that construction or use of mitigation may begin.

4.7.3 State-Listed Species

Transco consulted with state agencies to determine whether any state-listed species are known to occur in the vicinity of the Project. In addition to the seven federally listed species in table 4.7.2-1 that are also state-listed species, five additional state-listed animals and five state-listed plant species may be present in the project area. The status and determination of effect for each species is summarized in table 4.7.3-1 and described below.

4.7.3.1 Bald Eagle

The bald eagle was formerly a federally listed species but was delisted in 2007 due to recovery of the population. Despite the delisting, the species retains federal protection under the Bald and Golden Eagle Protection Act and the MBTA, which prohibit the taking of eagles, their eggs, or their nests. The bald eagle was removed from Maryland's and Virginia's lists of threatened and endangered species in 2010 and 2013, respectively, and its Pennsylvania status was changed from threatened to protected in January 2014. Bald eagles are state-listed as threatened in the Carolinas. The FWS Pennsylvania ESFO indicated that the bald eagle is known to nest near the project area. No other agency identified bald eagles in the project area.

As requested by the FWS, Transco reviewed the bald eagle mapping tool and agency correspondence to identify bald eagle nests in the vicinity of the project area in Pennsylvania. These efforts identified one confirmed and one potential bald eagle nest near the Project. One mapped nest was identified in a wooded area along Deep Creek near MP 77.7, about 0.5 mile west of the CPL South route. The second potential bald eagle nest was identified near MP 24.5, about 0.5 mile southeast of the intersection of Iron Bridge Road and Bridge Valley Road. At its closest point, this potential nest is over 2,000 feet from the CPL South route. The *National Bald Eagle Management Guidelines* recommend the following protection buffers around active bald eagle nests to avoid adverse impacts on the species from construction activities:

- 330 feet if the activity would not be visible from the nest;
- 660 feet if the activity would be visible from the nest; and
- 0.5 mile from blasting activities (FWS, 2007b).

TABLE 4.7.3-1

State-Listed Species Potentially Occurring in the Atlantic Sunrise Project Area

Species Name	Current State Status [a]	Pennsylvania Proposed Plant State Status [b]	County/State of Potential Occurrence Within Project Area [c]	Determination of Effect
Mammals				
Allegheny woodrat (*Neotoma magister*)	PA-T; MD-E; NC-SC	Not applicable	Wyoming, Columbia, Northumberland, and Schuylkill Counties, PA	Minor adverse impact due to loss of suitable habitat.
Eastern small-footed bat (*Myotis leibii*)	PA-T; SC-T; MD-E; NC-SC	Not applicable	Wyoming, Northumberland, and Schuylkill Counties, PA; Davidson County, NC	Minor adverse impact due to loss of suitable habitat.
Mussels				
Brook floater (*Alasmidonta varicosa*)	VA-E; MD-E; NC-E	Not applicable	Prince William, VA	Potential occurrence downstream of Project activities. No adverse impacts expected due to construction methods and BMPs.
Birds				
Bald eagle [d] (*Haliaeetus leucocephalus*)	NC-T; SC-T	Not applicable	All counties in the project area in Pennsylvania and Virginia	No documented nest sites within protected buffer areas. No adverse impacts expected due to avoidance and mitigation measures.
Reptiles				
Timber rattlesnake (*Crotalus horridus*)	PA-C; NC-SC	Not applicable	Schuylkill, Northumberland, and Clinton County, PA	Detected during surveys. No adverse impacts expected.
Pygmy rattlesnake (*Sistrurus miliarius*)	NC-SC	Not applicable	Cleveland County, NC	Historical detections outside of the project area. No adverse impacts expected.
Plants[e]				
Scarlet ammannia (*Ammannia coccinea*)	PA-E	PA-T	Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
Bog-rosemary (*Andromeda polifolia*)	PA-R		Wyoming and Susquehanna Counties, PA	Not detected during surveys. No adverse impacts expected.
Puttyroot (*Aplectrum hyemale*)	PA-R		Lancaster and Lebanon Counties, PA	Detected during surveys within the project workspace. Individuals would be transplanted. No adverse impacts expected.
Bradley's spleenwort (*Asplenium bradleyi*)	PA-T	PA-E	Lancaster, PA	Not detected during surveys. No adverse impacts expected.
Lobed spleenwort (*Asplenium pinnatifidum*)	PA-N	PA-R	Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
Screw-stem (*Bartonia paniculata*)	PA-N	PA-R	Lebanon, Schuylkill, and Clinton Counties, PA	Not detected during surveys. No adverse impacts expected.
Soft-leaved sedge (*Carex disperma*)	PA-R		Luzerne, Susquehanna, Columbia [f], and Wyoming Counties, PA	Not detected during surveys. No adverse impacts expected.
Slender sedge (*Carex lasiocarpa*)	PA-R		Susquehanna and Wyoming Counties, PA	Not detected during surveys. No adverse impacts expected.
Mud sedge (*Carex limosa*)	PA-TU	PA-T	Susquehanna County, PA	Not detected during surveys. No adverse impacts expected.
Cattail sedge (*Carex typhina*)	PA-E	PA-T	Lebanon and Schuylkill Counties, PA	Not detected during surveys. No adverse impacts expected.
Wild oat (*Chasmanthium latifolium*)	PA-TU	PA-E	Lancaster County, PA	Not detected during surveys. No adverse impacts expected.

TABLE 4.7.3-1 (cont'd)

State-Listed Species Potentially Occurring in the Atlantic Sunrise Project Area

Species Name	Current State Status [a]	Pennsylvania Proposed Plant State Status [b]	County/State of Potential Occurrence Within Project Area [c]	Determination of Effect
Fringe-tree (*Chionanthus virginicus*)	PA-N	PA-T	Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
Many-flowered umbrella sedge (*Cyperus lancastriensis*)	PA-N	PA-T	Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
Jeweled shooting-star (*Dodecatheon radicatum*)	PA-T		Lancaster and Columbia Counties, PA	Detected during surveys outside of Project workspace. No adverse impacts expected.
Clinton's wood fern (*Dryopteris clintoniana*)	PA-N	PA-T	Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
Ellisia (*Ellisia nyctelea*)	PA-T		Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
Harbinger-of-spring (*Eriginia bulbosa*)	PA-T	PA-R	Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
Godfrey's thoroughwort (*Eupatorium godfreyanum*)	PA-N	PA-T	Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
Glade spurge (*Euphorbia purpurea*)	PA-E		Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
Striped gentian (*Gentiana villosa*)	PA-TU	PA-E	Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
St. Andrew's-cross (*Hypericum stragulum*)	PA-N	PA-T	Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
American holly (*Ilex opaca*)	PA-T		Lancaster County, PA	Detected during surveys. All non-native occurrences. No adverse impacts expected.
Dwarf juniper (*Juniperus communis var. depressa*)	PA-N	PA-E	Lebanon and Lycoming, PA	Not detected during surveys. No adverse impacts expected.
Upright primrose-willow (*Ludwigia decurrens*)	PA-E		Lancaster, PA	Not detected during surveys. No adverse impacts expected.
Lupine (*Lupinus perennis*)	PA-R		Clinton, PA	Not detected during surveys. No adverse impacts expected.
Southern bog clubmoss (*Lycopodiella appressa*)	PA-T		Lancaster and Lebanon Counties, PA	Not detected during surveys. No adverse impacts expected.
Umbrella magnolia (*Magnolia tripetala*)	PA-T	PA-R	Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
Oblique milkvine (*Matelea oblique*)	PA-E		Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
Beck's water-marigold (*Megalodonta beckii*)	PA-E		Luzerne and Wyoming Counties, PA	Not detected during surveys. No adverse impacts expected.
Minniebush (*Menziesia pilosa*)	PA-R		Lebanon and Schuylkill Counties, PA	Not detected during surveys. No adverse impacts expected.
Broad-leaved water-milfoil (*Myriophyllum heterophyllum*)	PA-E	SP	Luzerne County, PA	Not detected during surveys. No adverse impacts expected.
Stiff cowbane (*Oxypolis rigidior*)	PA-TU	PA-T	Wyoming [f] County, PA	Detected during surveys outside of Project workspace. No adverse impacts expected.
Blackseed needlegrass (*Piptochaetium avenaceum*)	PA-N	PA-E	Lebanon County, PA	Not detected during surveys. No adverse impacts expected.
White fringed-orchid (*Platanthera blephariglottis*)	PA-N	PA-E	Susquehanna County, PA	Not detected during surveys. No adverse impacts expected.

TABLE 4.7.3-1 (cont'd)

State-Listed Species Potentially Occurring in the Atlantic Sunrise Project Area

Species Name	Current State Status [a]	Pennsylvania Proposed Plant State Status [b]	County/State of Potential Occurrence Within Project Area [c]	Determination of Effect
Braun's holly fern (*Polystichum braunii*)	PA-E		Luzerne County, PA	Not detected during surveys. No adverse impacts expected.
Vasey's pondweed (*Potamogeton vaseyi*)	PA-E		Lycoming County, PA	Not detected during surveys. No adverse impacts expected.
Sand cherry (*Prunus pumila var. depressa*)	none	PA-E	Wyoming County, PA	Not detected during surveys. No adverse impacts expected.
Hairy mountain-mint (*Pycnanthemum verticillatum var. pilosum*)	PA-TU	PA-X	Lebanon, PA	Not detected during surveys. No adverse impacts expected.
Swamp currant (*Ribes lacustre*)	PA-TU	PA-E	Luzerne County, PA	Not detected during surveys. No adverse impacts expected.
Tooth-cup (*Rotala ramosior*)	PA-R		Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
River bulrush (*Schoenoplectus fluviatilis*)	PA-R		Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
Northeastern bulrush (*Scirpus ancistrochaetus*)	PA-E	PA-T	Columbia, Luzerne, and Clinton Counties, PA	See section 4.7.2.6.
Sida (*Sida hermaphrodita*)	PA-E		Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
Leaf-cup (*Smallanthus uvedalius*)	PA-N	PA-R	Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
Shining ladies'-tresses (*Spiranthes lucida*)	PA-N	PA-T	Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
White twisted-stalk (*Streptopus amplexifolius*)	PA-T	PA-E	Luzerne County, PA	Not detected during surveys. No adverse impacts expected.
Cranefly orchid (*Tipularia discolor*)	PA-R		Lancaster and Lebanon Counties, PA	Detected during surveys within the project workspace. Individuals would be transplanted. No adverse impacts expected.
Declined trillium (*Trillium flexipes*)	PA-TU	PA-T	Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
Horse-gentian (*Triosteum angustifolium*)	PA-TU	PA-E	Lebanon County, PA	Not detected during surveys. No adverse impacts expected.
Great-spurred violet (*Viola selkirkii*)	PA-N	PA-R	Luzerne County, PA	Not detected during surveys. No adverse impacts expected.
Appalachian gametophyte fern (*Vittaria appalachiana*)	PA-T		Lancaster County, PA	Not detected during surveys. No adverse impacts expected.
Netted chainfern (*Woodwardia areolata*)	PA-N	PA-T	Lebanon and Schuylkill Counties, PA	Not detected during surveys. No adverse impacts expected.

Key: PA = Pennsylvania; NC = North Carolina; VA = Virginia; MD = Maryland

[a] E = endangered; T = threatened; C = candidate; R = rare; SC = special concern; TU = tentatively undetermined; X = extirpated; SP = special concern population; N = no status

[b] Annual review sessions recommend additions to or changes in the status of plants classified as extirpated, endangered, threatened, or rare under state regulations. Pennsylvania Biological Survey – Vascular Plant Technical Committee.

[c] Only county locations of possible occurrence based on state resource agency feedback are listed. State status is listed for all states although occurrence has not been identified within the project area in some states.

[d] Protected throughout the United States under the Bald and Golden Eagle Protection Act and the MBTA.

[e] PADCNR, Threatened and Endangered Plant Species and Species of Concern List, as of May 2015.

[f] Although not identified in the PADCNR letter as potentially occurring in the project vicinity, Transco identified a location during 2014 botanical surveys where the species could potentially occur.

Transco's activities in the vicinity of the first nest along Deep Creek would be outside of the recommended work buffer zones. Transco's activities in the vicinity of the second nest would also be beyond the recommended 330- and 660-foot work buffer zones. A small section of the CPL South route (MPs 24.4 to 24.9) would be within the 0.5-mile blasting buffer zone, but Transco indicated it does not anticipate the need to blast in this area. Therefore, the Project would be in compliance with the Bald and Golden Eagle Protection Act and management guidelines and avoid adverse impacts on nesting bald eagles.

Transco will continue to monitor the bald eagle mapping tool to identify any new nest sites that may be added to the database subsequent to its current review. Should any new occupied nest sites be discovered within 0.5 mile of the proposed route, Transco would take appropriate steps to avoid adverse impacts on them.

4.7.3.2 Maryland

The MDNR determined that there are no records of state-listed rare, threatened, or endangered species within the boundaries of the project area (i.e., existing Compressor Station 190) (Byrne, 2014).

4.7.3.3 North Carolina

The NCDENR indicated that there are no records of rare species in the state's natural heritage database at the existing Compressor Station 150 or 160 sites. The NCDENR identified occurrences of the eastern small-footed bat in Davidson County near Compressor Station 155 (see section 4.7.3.4). There is also historical documentation of the pygmy rattlesnake in southeastern Cleveland County near Compressor Station 145 (Weakley, 2014). The NCDENR indicated that the natural heritage database does not show any records for rare species at existing meter or regulator stations, although rare species occurrences are documented within a mile of these facilities (Weakley, 2015).

The NCWRC also identified the state-listed and special concern species occurring at or near the project area in North Carolina (Bryant, 2015). The historical occurrence of pygmy rattlesnake near Compressor Station 145 was identified. The pygmy rattlesnake is a special concern species in North Carolina (Weakley, 2014). The workspace at Compressor Station 145 is situated within the fence line of the existing facility and does not provide suitable habitat for the pygmy rattlesnake (e.g., pine flatwoods, oak woodlands, swamps). Therefore, no project-related effects on pygmy rattlesnake are anticipated at Compressor Station 145.

Species identified by the NCWRC at compressor and M&R stations included the pygmy rattlesnake and eastern small-footed bat, as well as three aquatic species (Roanoke hogsucker [*Hypentelium roanokense*], Carolina darter [*Etheostoma collis*], notched rainbow [*Villosa constricta*]), timber rattlesnake, and the star-nosed mole (*Condylura cristata*). Project activities in North Carolina primarily include modifications at existing facilities and would not have impacts on aquatic resources nor would project facilities provide suitable habitat for the identified state-listed and special concern species.

The NCWRC stated that it does not anticipate the need for additional surveys for any of the state-listed species that may occur near project sites, but did provide general recommendations to minimize impacts. These recommendations include avoiding waterbodies and wetlands, and protecting wide forested riparian buffers and floodplains to minimize aquatic impacts. Impacts on terrestrial wildlife resources could be minimized by collocating along existing utility corridors, constructing or expanding facilities in previously disturbed areas or along forest edges, and avoiding bisecting large forested blocks.

The NCWRC indicated that more detailed avoidance and minimization recommendations would be provided pending additional information regarding construction activities.

4.7.3.4 Pennsylvania

Allegheny Woodrat

The Allegheny woodrat has special status in Pennsylvania, Maryland, and North Carolina; and project activities would occur within the species' range in Wyoming, Columbia, Northumberland, and Schuylkill Counties in Pennsylvania (Taucher, 2014a, 2014b).

The Allegheny woodrat is found in areas of closely spaced surface rock surrounded by unfragmented forest. Outcrops, cliffs, ledges, boulder fields, and caves are essential, providing protection and locations for nests and food caches. The average adult weighs less than 1 pound and is about 17 inches in total length, including an 8-inch tail. The species is largely solitary, but is briefly more tolerant of other woodrats' presence during the breeding season. The Allegheny woodrat emerges at dusk to forage for a variety of food, including leaves, fruit, nuts, seeds, fungi, and twigs. Radio-telemetry studies indicate that woodrats may change den locations during summer, but after mid-autumn they retain one den for winter, though they do not hibernate. The Allegheny woodrat has disappeared from the southeastern portion of Pennsylvania and has declined in much of the rest of the state, but populations remain in the southwestern, south-central, and north-central counties, and a few remnant populations still occur in eastern counties (PNHP, 2014).

Due to the presence of suitable habitat within the project area, the PGC requested that Allegheny woodrat habitat assessments (Phase I surveys) be completed along 16 distinct segments of the CPL North and CPL South routes in Wyoming, Columbia, Northumberland, and Schuylkill Counties. Transco had a PGC-recognized qualified Allegheny woodrat surveyor conduct a Phase I habitat survey of the segments during summer 2014 and in January 2015. Where habitat was identified, the surveyor conducted a Phase II woodrat sign survey, looking for signs of recent occupation. The surveys were completed for 14 of the 16 segments identified by the PGC and were partially completed in one other area. Transco submitted its results in an Allegheny woodrat habitat survey report, which was provided to the PGC on February 20, 2015. Transco was not able to complete the surveys in the other two areas due to lack of property access. Transco surveyed these two areas on April 18 and 26, 2016, once access from the landowners was obtained. Suitable habitat was not present at the remaining site in Schuylkill County, and habitat at the Wyoming County site was considered marginal. No evidence of current or past woodrat activity was found during the survey.

Twelve of the areas that were surveyed contained suitable habitat (one in Columbia County, three in Northumberland County, and four each in Wyoming and Schuylkill Counties), two of which also contained evidence of occupation by woodrats within the past 5 years (one each in Columbia and Northumberland Counties). A total of 152.6 acres of suitable woodrat habitat were identified within the survey area, of which about 14.2 acres would be affected. The remaining areas that were surveyed contained no suitable habitat.

The PGC provided Transco with preliminary guidance on possible measures that could be implemented to avoid, minimize, or mitigate effects on the Allegheny woodrat where the pipeline would cross areas of suitable and/or occupied habitat. Although there is no seasonal restriction for impacts on woodrat habitat, avoidance and mitigation measures may include restoring disturbed habitats, constructing new habitat, and constructing travel corridors across the permanent right-of-way to allow safe passage for the woodrats. The PGC stated that a reroute of the pipeline to avoid suitable/occupied habitat would only be required in exceptional cases (Taucher, 2014c). Transco submitted the results of its Allegheny woodrat surveys and proposed mitigation measures to the PGC in May 2016. The mitigation measures pertaining to the Allegheny woodrat include:

- Disturbed areas near activity centers would be revegetated using a combination of seeding and planting. Seeding would take place on wet days if possible to allow the soils to absorb the seed easily.

- Plantings would consist of shrub and vine species known to provide both hard and soft mast sources used by woodrats.

- Transco would construct rock habitats in order to provide connectivity across the right-of-way near activity center 1. The rock habitat would be constructed of rock found on site during construction. A qualified biologist would be on site to oversee the construction of this habitat.

- If the areas within 300 feet of activity centers have site conditions where it appears that seeding and/or planting would not be successful, the same acreage of right-of-way would be seeded and planted outside of the 300-foot buffer, as conditions allow, and as close as possible to the rock structure habitat.

- Other field changes would be completed as needed through consultation with a qualified biologist, should site conditions present issues that result in other minor plan modifications.

The PGC reviewed and approved the Allegheny woodrat mitigation measures proposed by Transco on May 27, 2016.

Eastern Small-Footed Bat

The eastern small-footed bat is listed as threatened in Pennsylvania and is a species of special concern in North Carolina. Project activities would occur within the range of the species in Wyoming, Northumberland, and Schuylkill Counties in Pennsylvania and Davidson County near Compressor Station 155 in North Carolina.

Eastern small-footed bats are one of the smallest bats in the United States, weighing only about 0.1 ounce, and have a wingspan of 8 to 10 inches. The fur is brownish, often with a golden sheen, which contrasts with the blackish-brown wings and tail membrane. Eastern small-footed bats are fairly widespread in their range, but spottily distributed and rarely found in large numbers. They typically hibernate individually in caves or mines and are among the hardiest of cave bats because they are one of the first to enter caves in autumn and often hibernate near the entrances where temperatures fall below freezing and humidity is relatively low. Summer roosts include caves, mines, hollows and under bark in trees, cracks and crevices in rock walls, and ridge-top talus fields (Butchkoski, 2010b; Harvey et al., 2011).

Due to potentially suitable day roost habitat within the project area, the PGC requested that Transco survey locations of potential day roost habitat along 13 distinct segments of the CPL North and CPL South routes in Wyoming, Northumberland, and Schuylkill Counties (Taucher, 2014a, 2014b). Transco had a PGC-recognized qualified biologist review these areas and delineate the extent of the suitable habitat. Transco did not conduct surveys for small-footed bats near Compressor Station 155 in North Carolina because construction at this site would be confined to a previously developed area and there is no suitable eastern small-footed bat summer or winter habitat (talus piles, caves, or mines) at this location.

During mist net surveys in 2014, Transco captured six eastern small-footed bats. The captures included two bats each in Luzerne and Schuylkill Counties, and one bat each in Wyoming and Susquehanna Counties. Of the six bats captured, four were radio-tracked in accordance with the Indiana bat and northern long-eared bat work plan and *Standard and Minimum Effort Requirements for Qualified Bat Surveyor Netting within the Commonwealth of Pennsylvania for Environmental Review Projects* (PGC and FWS, n.d.). None of the radio-tagged eastern small-footed bats were found to be roosting within the project area; however, one eastern small-footed bat was captured at an abandoned mine portal along the proposed project route.

Transco completed surveys for the eastern small-footed bat at all 13 sites requested by the PGC and submitted the results of its surveys and proposed mitigation measures to the PGC in May 2016. The mitigation measures pertaining to the eastern small-footed bat include:

- Transco would construct nine habitat structures to be placed as close to the right-of-way as practicable for optimal solar exposure. Eight of these structures would be placed within the Northumberland survey area and one within the Schuylkill survey area.

- Starting in the fall of 2016, annual monitoring/surveying would be conducted over a period of 5 years at the abandoned mine portal located within 100 feet of the Project. About 0.7 acre of tree clearing is proposed within 300 feet of this portal. Surveys would be conducted between October 7 and 15, weather permitting. Results would be submitted to the PGC by December of each year.

- In the event that habitat disturbance cannot be completed outside of the April 1 to November 15 window recommended by the PGC, Transco would:

    - attempt to exclude all mapped eastern small-footed bat habitat from the construction area. Exclusion methods include completely burying any rocky habitat under at least 4 inches of wood chips or using sheeting to cover larger areas and to weigh down or bury the edges. All exclusion areas would be inspected by a Pennsylvania Qualified Bat Surveyor; and

    - complete emergence count surveys by a qualified biologist during the restriction period. Surveys would begin 30 minutes before sunset and continue for 2 hours for one evening. Surveys would cover the entire roost area located within the areas affected by the Project.

The PGC reviewed and approved the eastern small-footed bat mitigation measures proposed by Transco on May 27, 2016.

Timber Rattlesnake

The timber rattlesnake is a candidate species for listing in Pennsylvania. Candidate species are at risk for becoming endangered or threatened in the future and are legally protected in Pennsylvania. According to the PFBC, portions of CPL South and Chapman Loop would be within the range of the timber rattlesnake in Lebanon, Northumberland, Schuylkill, and Clinton Counties (Smiles, 2014, 2015a).

The timber rattlesnake is a large, venomous snake that reaches up to 5 feet long. Its diet consists primarily of small mammals such as voles, mice, and chipmunks. The timber rattlesnake has a broadly triangular head with many small scales on the crown bordered by a few large scales. They are found in mountainous deciduous forests with rocky outcroppings, steep ledges, and rock slides. Hibernacula are typically found on warm, south-facing rocky slopes with large crevices that can provide shelter during the winter months (PFBC, 2013).

Timber rattlesnakes establish a strong affinity for a particular hibernating site and will return to the same site every winter, possibly for their entire lifetime. They emerge from their hibernacula in mid- to late April and remain active through late September/October, when they enter their dens for winter dormancy. Individuals are often found basking in front of the hibernacula in the spring and fall. Adult males are known to travel up to 2 miles from the hibernacula, often moving to valleys and low-lying areas before returning in the fall. Non-mating females have been known to travel up to 1 mile away from the hibernacula; however, breeding females stay very close to the den, moving less than 200 yards. Mating occurs from mid-July through September. Females produce broods of eight young on average, once every 3 to 5 years (PFBC, 2013a).

The PFBC requested that Transco conduct habitat assessments, or Phase I surveys, followed by Phase II denning presence/absence surveys along 19 miles of the proposed pipeline route and access roads. A PFBC-recognized qualified timber rattlesnake surveyor conducted the requested surveys from July through October 2014, between January and May 2015, and from April through May 2016. The Phase I surveys were conducted in accordance with habitat assessment methodology within the *Timber Rattlesnake Presence-Absence Survey Guidelines* (PFBC, 2013a). The Phase II denning presence/absence surveys were also completed following the PFBC timber rattlesnake survey guidelines and data forms.

Transco completed surveys along 100 percent of the survey area. Transco provided copies of its survey reports to the PFBC in July 2015, January 2016, and May 2016. Based on the results of the surveys, a timber rattlesnake den was identified within the survey limits along CPL South in Schuylkill County and along the Chapman Loop. Transco modified the pipeline route to avoid the den along CPL South and provide 40 feet of buffer between the workspace and the den. The PFBC indicated that if construction were to occur outside of the active season (i.e., October 16 to April 14), adverse impacts on this species would not be anticipated. However, if construction were to occur during the active season, the PFBC recommended that Transco retain a PFBC-approved timber rattlesnake biologist to inspect work areas and to relocate timber rattlesnakes that may be present and to use loosely woven erosion control fabric to minimize the potential for entrapment. The Chapman Loop would avoid the den and the gestational habitat. However, given the documented occurrences of timber rattlesnakes along the Chapman Loop, the PFBC recommended that Transco have a PFBC-approved timber rattlesnake biologist present during all construction activities taking place from April 15 to October 15. In a letter to the PFBC dated May 12, 2016, Transco indicated that it would implement these measures to protect timber rattlesnakes.

State-Listed Plant Species

The PADCNR identified several sensitive plant species with the potential to occur within the counties crossed by the pipeline facilities in Pennsylvania. These species are listed in table 4.7.3-1 and include species that are state-listed or proposed for state listing as rare, threatened, or endangered. The PADCNR requested surveys for these species in areas meeting the conditions of each species' suitable habitat (Bowen, 2014).

Transco had qualified botanists conduct plant surveys between June 2014 and May 2016. The plant survey windows were based on the flowering times or other times of year when the plant is most readily apparent. Survey windows for targeted plant species were consistent with the survey windows outlined in *The Plants of Pennsylvania, Second Edition* (Rhoads and Block, 2007).

Transco's surveys identified five of the target plant species. These included:

- the jeweled shooting-star and American holly, which are state-listed as threatened;
- the cranefly orchid and puttyroot, which are state-listed as rare; and
- the stiff cowbane, which is currently listed as "tentatively undetermined," but has been proposed for state listing as threatened.

Transco determined that all or portions of two separate cranefly orchid occurrences and two puttyroot occurrences are within the proposed workspace for the Project. All of the American holly occurrences were determined to be non-native and to have germinated from cultivated populations in adjacent residential areas. As a result, these American holly plants are not of sensitive concern. All of the remaining occurrences of rare plant species identified by Transco were determined to be outside the proposed workspace and would not be affected by the Project.

Transco plans to mitigate the impacts on state-listed plants by transplanting individual listed plant species within the proposed workspace into similar suitable habitat nearby that would not be affected by the Project. Transplanting would occur during the appropriate season with suitable conditions varying by plant species. Transco would also conduct a one-time monitoring event the year following transplant. The PADCNR concurred with the assessment of impacts on and the mitigation plan for state-listed plant species. In areas where access has not been granted, Transco indicated that it would complete state-listed plant surveys and submit survey results and avoidance and mitigation measures to the PADCNR prior to constructing in these areas. Therefore, we have determined that the Project would avoid adverse impacts on Pennsylvania state-listed plants.

Mussels

Although no federally listed mussel species are known to occur in the vicinity of the project facilities in Pennsylvania, the PFBC expressed concerns about native mussel species within the Susquehanna River and potential impacts due to the Project. The PFBC would require a mussel survey and relocation effort at both crossings of the Susquehanna River if impacts on mussel species are anticipated (Smiles, 2015c). While Transco anticipates avoiding impacts at the Susquehanna River due to the use of the HDD crossing method at the two crossing locations, Transco conducted baseline mussel surveys in case an alternative crossing method becomes necessary or other unanticipated impacts could occur. These mussel surveys followed required survey protocols and were completed between September 15 and 18, 2015 prior to the river temperature dropping below 55 degrees. No federally or state-listed species were found during these surveys. Transco's HDD Contingency Plan outlines BMPs to be implemented during HDD construction and Transco's Plan and Procedures and ECP outline sediment and erosion control measures to be implemented during construction of the Project. With the implementation of these measures, we do not anticipate any significant adverse impacts on freshwater mussel species of special concern. The PFBC reviewed the survey report and responded in a December 8, 2015 letter agreeing with these findings.

4.7.3.5 Virginia

Transco requested input from the VADCR and VDGIF regarding state-listed species in Virginia. The VADCR determined that the Project would not affect any documented state-listed plants or insects, but indicated that it could potentially affect the brook floater, which is a mussel species currently listed as endangered by the VDGIF (Baird, 2014).

Brook Floater

The VADCR indicated that Broad Run serves as habitat for the brook floater (Baird, 2014). Populations of the brook floater have been documented in Broad Run downstream of the Project within the last two decades (VDGIF, 2014). The Mainline A and B Replacements would cross the following tributaries to the main stem of Broad Run: one unnamed minor tributary over 1.0 mile upstream and one intermediate tributary (Dawkins Branch) over 0.3 mile upstream.

The brook floater typically inhabits rocky or gravelly substrates in and near riffles and rapids of smaller creeks. It is more common in small- to mid-sized streams or creeks in the upper portions of large watersheds with intact upland forest rather than large rivers, but is reported to be absent from headwater streams (NatureServe, 2014). Poor water quality poses a particular threat because this species is sensitive to silt and nutrient pollution (Baird, 2014). The unnamed tributary to Broad Run does not have suitable habitat to support brook floater, but Dawkin's Branch provides potentially suitable habitat. Transco would cross Dawkin's Branch and the other tributaries to Broad Run using the dam-and-pump method, as described in section 2.3.2.2. This method would allow construction under mostly dry conditions, minimizing the magnitude and duration of any turbidity and sedimentation impacts.

Transco conducted a mussel habitat evaluation and freshwater mussel survey of Dawkin's Branch in July 2016 during suitable water conditions. Although suitable habitat was identified within this waterbody, the mussel survey did not identify the brook floater or other sensitive mussel species. To avoid potential impacts on the brook floater, the VDGIF recommended that Transco implement time-of-year restrictions (avoid construction from April 15 through June 15 and August 15 through September 30) and conduct relocation surveys at two sites (VDGIF, 2016). With implementation of these avoidance measures, impacts on this species are not expected to occur during construction or operation of the Project.

4.8 LAND USE, RECREATION, AND VISUAL RESOURCES

4.8.1 Land Use

This section describes the land requirements for construction and operation of the Project, the current use of the lands, and an evaluation of the project-related impacts. The Project would involve the construction and operation of 185.9 miles of new, greenfield natural gas pipeline and 11.0 miles of new pipeline looping in Clinton, Columbia, Lancaster, Lebanon, Luzerne, Lycoming, Northumberland, Schuylkill, Susquehanna, and Wyoming Counties, Pennsylvania; 2.5 miles of pipeline replacements in Prince William County, Virginia, and associated equipment and facilities in Pennsylvania and Virginia. Of the 199.4 miles of new, looping, and replacement pipeline, about 53.6 miles (27 percent) would be collocated with or adjacent to existing rights-of-way (see section 2.2.2.1).

The Project would also include:

- two new compressor stations, two new meter stations, three new regulator stations, and ancillary facilities (e.g., MLVs, communication facilities, and pig launcher/receivers) in Pennsylvania and Virginia;

- additional compression and related modifications to three existing compressor stations in Pennsylvania and Maryland; and

- minor modifications at existing aboveground facilities at various locations in Pennsylvania, North Carolina, Maryland, South Carolina, and Virginia to allow for bi-directional flow and the installation of supplemental odorization, odor detection, and/or odor masking/deodorization equipment.

In addition to the land associated with the pipeline rights-of-way and aboveground facility sites, Transco would temporarily use 13 contractor yards and 48 staging areas in Pennsylvania and 1 contractor yard in Virginia. Transco would also use 157 temporary access roads of which 42 would be used permanently for operation of the Project.

The proposed facilities are described in detail in section 2.0.

4.8.1.1 Environmental Setting

Eight general land use types would be affected by the Project. Table O-1 in appendix O summarizes the acreage of each land use type that would be affected. The definitions of each land use type are as follows:

- agricultural land – actively cultivated or specialty crops;

- forest/woodland – includes upland deciduous forest, evergreen forest, and mixed (deciduous and evergreen) forest, but does not include forested wetlands;

- industrial/commercial land – manufacturing or industrial plants, paved areas, landfills, commercial or retail facilities, and sand/gravel pits or quarries;

- transportation land – land used for transportation purposes, including interstate highways; state, county, and local highways and roads; and railroad lines;

- residential land – residential areas, including yards of individual residences;

- open land – nonforested and undeveloped land not classified for another use, including land maintained as utility right-of-way for overhead and underground electric transmission, natural gas transmission, and oil transmission facilities;

- wetlands – palustrine wetlands covered with emergent, scrub-shrub, and forested vegetation; and

- open water – includes rivers, streams, creeks, canals, and other linear waterbodies, as well as lakes, ponds, and other nonflowing waterbodies.

Construction of the Project would affect a total of 3,741.0 acres of land. About 75 percent of this acreage would be utilized for the pipeline facilities, including the construction right-of-way (62 percent) and additional temporary workspace (13 percent).[24] The remaining acreage affected during construction would be associated with contractor yards and staging areas (11 percent), new and modified aboveground facilities (8 percent), and access roads (6 percent). Following construction, lands outside of the permanent right-of-way, extra workspace areas, contractor yards, and temporary access roads would be allowed to revert to their original land use type. The primary land use types affected during construction would be agricultural land (48 percent), upland forest (28 percent), open land (12 percent), and industrial/commercial land (7 percent). Transportation, residential, wetlands, and open water would make up the remaining 5 percent of land types affected during construction.

Operation of the Project would require 1,235.4 acres of new land.[25] The easement along the new permanent pipeline right-of-way would account for 1,100.9 acres,[26] or 89 percent of the acreage. The remaining 134.5 acres (11 percent) would be associated with aboveground facilities and permanent access roads. The primary land use types that would be newly affected on a permanent basis are agricultural land (49 percent), upland forest (34 percent), and open land (10 percent). Agricultural, transportation, and residential lands; wetlands; and open water comprise the remaining 7 percent of land use types associated with the permanent right-of-way, aboveground facilities, and permanent access roads.

4.8.1.2 Pipeline Facilities

The pipeline facilities would comprise 185.9 miles of new natural gas pipeline (58.7 miles of 30-inch-diameter and 127.3 miles of 42-inch-diameter pipeline) and 11.0 miles of new pipeline looping (2.5 miles of 36-inch-diameter and 8.5 miles of 42-inch-diameter pipeline) in Pennsylvania; 2.5 miles of 30-inch-diameter pipeline replacements in Virginia; and associated equipment and facilities. Table O-1 in appendix O summarizes the land uses that would be crossed. Predominant land uses would include agricultural land (50 percent) and upland forest (34 percent), followed by open land (10 percent); transportation and residential lands (2 percent each); and wetlands (2 percent). Industrial/commercial land and open water would comprise less than 1 percent each. Residences and other structures within 50 feet of the construction workspace are described in section 4.8.3.1.

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24 MLV and tie-in assemblies sited within the pipeline right-of-way and cathodic protection facilities are included in the construction right-of-way and ATWS totals.

25 Transco's existing permanent easement is not included in the new land affected during operation of the Project.

26 Includes the pipeline right-of-way and MLVs.

In general, land use-related impacts associated with the Project would include the disturbance of existing uses within the right-of-way during construction and a new permanent right-of-way for operation of the pipeline. During construction of the pipeline facilities, Transco proposes to generally use:

- a 90-foot-wide construction right-of-way for the 30-inch-diameter CPL North and Chapman Loop;
- a 100-foot-wide construction right-of-way for the 42-inch-diameter CPL South and Unity Loop; and
- a 150-foot-wide construction right-of-way for the 30-inch-diameter Mainline A and B Replacements, which would comprise the entire width of Transco's existing maintained mainline system easements.

Actual right-of-way configurations and widths would vary based on site-specific conditions including road and railroad crossings, waterbodies, wetland crossings, the need for additional spoil storage, steep topography, the presence or absence of an existing right-of-way, and proximity to adjacent utilities. In wetland areas, Transco proposes to use a 75-foot-wide construction right-of-way except at site-specific locations where modifications have been requested and found to be justified (see sections 2.3 and 4.4.5). Reductions of the construction rights-of-way would be made, where practicable, at various locations to address specific environmental or residential issues along the proposed pipelines.

In addition to the construction right-of-way, various extra workspaces would be used for project construction. As described in section 2.2.3, Transco identified several areas where it stated that site-specific conditions require the use of extra workspace outside of the proposed nominal construction right-of-way. Appendix C lists the locations of these extra workspaces, their dimensions, area affected, justification, and other information.

Where the pipeline would be installed at the same location as existing pipelines or electric transmission lines, the permanent right-of-way could consist of a portion of the existing, cleared permanent right-of-way and some additional new right-of-way (see table 2.2.1-1). The Project would require a new 50-foot-wide permanent right-of-way along the non-collocated greenfield segments of CPL North and CPL South and where CPL North is collocated with Williams (midstream) pipelines and other existing utility rights-of-way. At MLVs, the permanent right-of-way width would be expanded to 92 feet for greenfield segments to allow for access to and around the MLV during operations. Transco proposes to maintain an additional 25 feet of permanent right-of-way (adjacent to its existing permanent right-of-way) along the proposed Chapman and Unity Loops, and the portions of CPL North that would be collocated with the Transco Leidy Line system.

The land retained as new permanent right-of-way would generally be allowed to revert to its former use, except for forested land. Certain activities such as the construction of permanent structures, including houses, house additions, garages, patios, pools, or other objects not easily removable, or the planting of trees, would be prohibited within the permanent right-of-way. To facilitate pipeline inspection, operation, and maintenance, the entire permanent right-of-way in upland areas would be maintained in an herbaceous/scrub-shrub vegetated state. This maintained right-of-way would be mowed no more than once every 3 years, but a 10-foot-wide strip centered over the pipeline might be mowed annually to facilitate corrosion and other operational surveys.

Specific impacts on agricultural, upland forest, industrial/commercial, transportation, and open land are described below. Impacts on residential areas and specialty crops are described in sections 4.8.3.1 and 4.8.4, respectively. Wetlands and surface waters (open water) are described in sections 4.4 and 4.3.2, respectively.

Upland forestland that would be affected by the pipeline comprises mainly deciduous broadleaf forest and woodland, coniferous/evergreen forest, and mixed deciduous/coniferous forests (see section 4.5.1 for additional information). Although trees cleared within temporary construction work areas would be allowed to revert to forest through natural successional processes following construction, impacts on forest resources in these areas would last for several years. Following construction, the maintained portion of the right-of-way would be permanently converted to a non-forested condition. See section 4.5 for more information regarding effects on forested areas, including fragmentation and effects on interior forest. See section 4.4 for more information regarding forested wetlands.

Agricultural lands affected by construction would primarily include active crop lands or hayfields. In general, agricultural lands are distributed along the entire pipeline route. The primary impacts in these areas would be short term and occur during the growing season concurrent with construction. Farmers would experience some loss of crop production in areas directly disturbed by construction-related activities. The residual effect of reduced productivity could persist for 1 to 2 years after construction. Farmers may have to alter sowing patterns in order to best farm areas that may have limited access due to construction activity. Grazing animals may also have to be moved to different areas or other fields, and/or be penned with gates. Following construction, agricultural practices within the pipeline right-of-way would be allowed to resume. Transco would restore all disturbed agricultural areas associated with construction in accordance with its ECP, which includes crop productivity monitoring and farmland restoration procedures, as well as all other applicable federal, state, and local permit requirements. Typical mitigation measures include topsoil segregation, soil decompaction, and repair/replacement of irrigation and drainage structures damaged by construction. Agricultural lands, including specialty crops (fruit, vegetables, Christmas trees, and orchards), are addressed in more detail in section 4.8.4. Impacts on and mitigation for prime farmlands are addressed in section 4.2.2.2.

The majority of the industrial/commercial land that would be affected by the Project comprises contractor/pipe yards where the land is currently not in use. Industrial/commercial land uses could be temporarily affected during construction of the Project by increased dust from exposed soils, construction noise, and traffic congestion. Transco would minimize effects on industrial/commercial land uses by coordinating driveway crossings with business owners to provide access across the construction right-of-way.

Transportation lands that would be affected by the Project include interstate highways; state, county, and local highways and roads; and railroads. A summary of the public and private roadway crossings is included in table 2.3.2-1. More detailed lists of the road and railroad crossings and the proposed crossing methods are provided in tables F-1 and F-2 of appendix F. No roads or railroads would be permanently affected by construction or operation of the Project. Transco would apply for road and railroad crossing permits from the appropriate state or local jurisdiction. Safe and accessible conditions would be maintained during construction at road and railroad crossings in accordance with Transco's BMPs and *Traffic and Transportation Management Plan* (see attachments 2 and 16 of the ECP).

Open lands that would be affected by the Project include non-forested and undeveloped land not classified for another use, including existing utility rights-of way (existing overhead and underground electric transmission, natural gas transmission, and oil transmission facilities). Construction-related impacts on open land would include the removal of vegetation and disturbance of soils. Impacts on open land would be temporary and short term, and would be minimized by the implementation of Transco's ECP. Following construction, most open land uses would be able to continue. However, some activities, such as the building of new commercial or residential structures, would be prohibited on the permanent right-of-way.

4.8.1.3 Aboveground Facilities

The Project would include construction of the following new aboveground facilities:

- 2 new compressor stations (Compressor Stations 605 and 610);
- 5 new M&R stations (the Zick and Springville Meter Stations and the North Diamond, West Diamond, and River Road Regulator Stations);
- 12 new or replacement communication towers at compressor station, M&R, and MLV sites; and
- ancillary facilities, including new MLVs and pig launchers and receivers along CPL North, CPL South, Chapman Loop, Unity Loop, and the Mainline A and B Replacements.

Modifications to the existing aboveground facilities would include:

- additional compression and related modifications to existing Compressor Stations 190, 517, and 520;
- other modifications including valves and piping for bi-directional flow and/or equipment, odor detection, and odor masking/deodorization at existing Compressor Stations 145, 150, 155, 160, 170, and 185;
- modification of the existing Puddlefield Meter Station for shared use of the existing flare system, communication tower, and additional piping to the adjacent new Springville Meter Station;
- modifications to 42 existing M&R stations for supplemental odorization, odor detection, and odor masking/deodorization along Transco's existing Mainline system; and
- installation of odor masking/deodorization equipment at 14 existing MLV locations.

More information regarding the new and modified aboveground facilities is provided in section 2.1.2.

A total of about 306.1 acres of land would be disturbed by construction of these aboveground facilities. Of this total, 109.4 acres would be permanently retained for operation. Table O-1 in appendix O summarizes the land requirements and land uses for the aboveground facilities. The land uses that would be affected by these facilities are industrial/commercial land, agricultural land, open land, and upland forest.

New Aboveground Facilities

Construction of Compressor Station 605 would affect 45.0 acres of agricultural land and 5.1 acres of upland forest. During operation, the facility would permanently affect 36.0 acres of agricultural land and 3.2 acres of upland forest, which would be converted to industrial use. Construction of Compressor Station 610 would affect 32.8 acres of agricultural land, currently consisting of row crops, and 0.7 acre of upland forest, all of which would be permanently affected during operation of the facility. Temporary workspace areas would be allowed to revert to preexisting use following construction, and non-paved and non-graveled areas used during construction would be revegetated. Transco is proposing to install a communication tower within the land required for operation at each of the facilities. Transco would purchase the land required for operation of both facilities. Impacts on visual resources associated with Compressor Stations 605 and 610 are described in section 4.8.8.

Two new meter stations and three new regulator stations, including interconnecting piping, would be constructed along the proposed CPL North and CPL South pipelines. The Zick Meter Station would affect 9.1 acres of agricultural land. About 4.1 acres would be permanently converted to industrial use; the remainder would be allowed to revert to preconstruction uses. The Springville Meter Station and North Diamond, West Diamond, and River Road Regulator Stations would affect a combined total of 11.5 acres of upland forest and 2.8 acres of open land during construction; collectively, 9.7 acres of upland forest and 2.0 acres of open land would be permanently converted to industrial use. Temporary workspace areas would be allowed to revegetate following construction.

The new MLVs, and associated land requirements, would be entirely within the permanent rights-of-way associated with the pipeline facilities (see section 4.8.1.2). Transco is proposing to install 10 communication towers at the MLVs, 2 of which are associated with Compressor Stations 605 and 610. The tie-in assemblies for Chapman Loop and Unity Loop would be installed within the existing Leidy Line right-of-way and upland forest areas contained within the new permanent rights-of-way and MLV sites associated with the Chapman and Unity Loop pipeline facilities (see section 4.8.1.2).

Modifications to Aboveground Facilities

Upgrades to existing Compressor Stations 520, 517, 190, 185, 170, 160, 155, 150, and 145 would take place primarily within the existing fenced boundaries of the compressor stations, which are designated as industrial/commercial land use. The majority of land use affected by construction of the modifications is industrial/commercial land (123.9 acres), with lesser amounts of open land (40.7 acres) and upland forest (6.3 acres) (see table O-1 in appendix O). Operation of Compressor Station 517 would permanently convert about 0.8 acre of upland forest to industrial use. Operation of Compressor Stations 520 and 190 would convert about 15.5 and 3.5 acres of open land, respectively, to industrial use. No new land would be required for operation of modified Compressor Stations 185, 170, 160, 155, 150, and 145; therefore, they would have no permanent effect on existing land uses. The areas within the temporary workspaces required to construct the facilities would be allowed to revert to pre-existing uses following construction.

The existing Puddlefield Meter Station in Pennsylvania would be modified for shared use of the existing flare system, communication tower, and additional piping with the adjacent new Springville Meter Station. The existing flare at the Puddlefield Meter Station would be used for periodic maintenance activities associated with calibration of the odorant injection meters. Modifications to the existing Puddlefield Meter Station would require 0.8 acre of existing industrial/commercial land; however, no new land would be required for operation of the facility.

In addition, modification of 42 existing M&R stations in North Carolina and South Carolina would generally take place within the existing boundaries and permanent easements of these sites. A limited amount of construction workspace and expansion of the existing facility fence lines would be required; however, the majority of land use affected by construction of the modifications would be industrial/commercial land (9.2 acres), with lesser amounts of open land (5.9 acre), upland forest (0.1 acre), and agricultural land (less than 0.1 acre) (see table O-1 in appendix O). About 0.5 acre of land (0.4 acre of open land and less than 0.1 acre if agricultural land) would be newly affected by operation of these facilities and would result in permanent impacts on these resources.

Odor masking/deodorization equipment would be installed at 14 existing MLV locations in North Carolina and South Carolina. The land use affected by construction of the MLV modifications would be industrial/commercial land (5.5 acres) and open land (6.0 acres); however, no new land uses would be affected by operation of these facilities (see table O-1 in appendix O).

4.8.1.4 Contractor Yards and Staging Areas

Transco proposes to use 14 temporary contractor yards (13 in Pennsylvania and 1 in Virginia) and 48 temporary staging areas (all in Pennsylvania) to support construction activities. Use of the contractor yards and staging areas would temporarily affect about 402.6 acres of land, including 263.2 acres of agricultural land, 101.0 acres of industrial/commercial land, 31.7 acres of open land, 2.9 acres of upland forest, 1.8 acres of residential land, 2.0 acres of transportation land, and less than 1.0 acre of wetland (see table O-1 in appendix O). No land uses would be affected by these areas during operation of the Project.

4.8.1.5 Access Roads

In addition to public roads, Transco proposes to use 157 access roads (154 in Pennsylvania and 3 in Virginia) to construct the Project (see maps in appendix B). Of these 157 roads, 42 roads would be permanently maintained for operations and the remaining 115 would be restored to preconstruction conditions following completion of the Project in accordance with Transco's ECP and Plan. The location, description, length, land use, and type of improvement required (if any) for each of the access roads are listed in appendix D.

Of the 42 permanent access roads, 41 would be in Pennsylvania and 1 would be in Virginia. One hundred twenty of the permanent and temporary access roads are existing roads, or would be a combination of existing and new roads, and would either require no modifications or improvements (19) or involve some modifications or expansions (101). The remaining 37 access roads would be newly constructed. Some of the required improvements would include tree, brush, or structure removal; widening; grading; installation or replacement of culverts; and addition of gravel (see appendix D). Transco has proposed a standard access road width of 20 feet. During construction, access roads would affect 210.1 acres of land, of which 25.1 acres would be associated with the permanent access roads retained for operation of the Project.

4.8.2 Land Ownership and Easement Requirements

Pipeline operators must obtain easements from existing landowners to construct and operate authorized facilities, or acquire the land on which the facilities would be located. Easements can be temporary, granting the operator the use of the land during construction (e.g., extra workspaces, temporary access roads, contractor yards), or permanent, granting the operator the right to operate and maintain the facilities once constructed.

Transco's existing permanent easements give it the right to maintain the existing right-of-way as necessary for pipeline operation. Transco would not need to acquire new easements where the proposed pipeline construction activities occur within its existing rights-of-way. However, Transco would need to acquire new easements or land to construct and operate the new pipeline and aboveground facilities. These new easements would convey both temporary (for construction) and permanent rights-of-way to Transco. An easement agreement between a company and a landowner typically specifies compensation for losses resulting from construction, including losses of non-renewable and other resources, damages to property during construction, and restrictions on existing uses that would not be permitted on the permanent right-of-way. Compensation would be fully determined through negotiations between Transco and the landowner.

If an easement cannot be negotiated with a landowner and if the Project is approved by the Commission, Transco may use the right of eminent domain to acquire the property necessary to construct and operate the Project. This right would apply to all project-related workspace covered by an approval, including the temporary and permanent rights-of-way, aboveground facility sites, contractor yards, access roads, and extra workspaces. Transco would still be required to compensate the landowner for the right-of-way and damages incurred during construction. However, if an easement cannot be negotiated, the level of compensation would be determined by a court according to state or federal law.

4.8.3 Existing Residences, Commercial and Industrial Facilities, and Planned Developments

4.8.3.1 Existing Residential and Commercial Structures

As currently designed, about 70.9 acres of residential land would be affected by construction of the Project, all of which would be associated with the pipeline facilities. Following construction, residential lands would be restored to preconstruction conditions to the extent practicable. About 22.1 acres of residential land would be within the new permanent pipeline right-of-way and subject to restrictions such as planting large trees or the placement of certain structures. The remaining 48.8 acres would not be subject to any restrictions. In restoring properties, Transco would adhere to its ECP and any specific requirements identified by landowners and agreed to during negotiations. In most cases, property owners would be able to use the permanent right-of-way as they did before construction as long as the use does not conflict with project operation and the terms of the landowner's negotiated easement agreement.

Table O-2 in appendix O lists existing residential and commercial structures within 50 feet of any proposed construction workspace by milepost, and indicates the distance and orientation of each from the proposed workspaces. There would be 152 residential and commercial structures within 50 feet of the proposed pipeline facilities for the Project, including:

- 27 for CPL North (30 houses or mobile homes, 13 sheds or barns, 8 garages, and 6 other buildings or structures);
- 82 for CPL South (42 houses or mobile homes, 23 sheds or barns, 8 garages, 3 commercial or grain loading structures, and 6 other buildings);
- 3 for Chapman Loop (3 houses);
- 4 for Unity Loop (3 houses and 1 shed); and
- 6 for the Mainline A and B Replacements (5 townhouses and 1 commercial structure).

Transco has developed site-specific residential construction plans for these structures, which are provided in appendix G. No residential structures are within 50 feet of the proposed construction workspace associated with any of the aboveground facilities.

None of the residential structures associated with Chapman Loop or the Mainline A and B Replacements are within the proposed construction workspace for the Project. However, 12 residential or commercial structures are within the proposed construction workspace for the Project (1 house, 1 shed, and 2 structures for CPL North; 3 mobile homes, 3 sheds, and 1 building for CPL South;, and 1 shed for Unity Loop). Of these structures, five would intersect the pipeline centerline, (a structure, a shed, and a house [abandoned hunting cabin] at about MPs 1.2, 20.0, and M-0071 3.6 of CPL North; a shed at about MP 65.2 of CPL South; and a shed at about MP 126.0 of Unity Loop). Transco has compensated or would compensate the landowner for relocation or removal of these structures.

During construction, effects on existing residences and buildings adjacent to the pipeline may include noise and dust from construction equipment and temporary visual effects from removal of vegetation and excavation of soils. Post-construction disturbance would be minimal and related to maintenance activities, including periodic mowing and inspection. Transco would notify landowners of planned construction activities at least 7 days prior to construction on their properties unless more advance notice is required by the landowner agreement. Transco's planned work schedule is six days per week (Monday through Saturday) during daytime hours, with the possible exception of the proposed HDDs, which would typically operate continuously until the HDD is complete.

Construction through or near residential areas would be done in a manner that minimizes adverse effects on residences, including prompt and thorough cleanup. Landowner access to homes would be maintained except for the brief periods essential for laying the new pipeline. Landowners whose property access would be affected by pipeline construction across roadways would receive preconstruction notification, and measures would be implemented to ensure that construction activities do not prevent access to residential areas by fire and emergency vehicles. During any period when a road is completely cut or temporarily closed, steel plates would be available on site to immediately cover the open area to permit travel of emergency vehicles.

Transco would further minimize effects on residential properties by implementing the measures included in its *Traffic and Transportation Management Plan*, FDCP, ECP, and Plan. In addition, Transco would implement the measures included in its site-specific residential construction plans to minimize effects on residences and other structures within 50 feet of the construction right-of-way (see appendix G), including:

- attempting to maintain, where feasible, a minimum distance of 25 feet between any residence and the edge of the construction work area;
- installing safety fencing at the edge of the construction right-of-way for a distance of 100 feet on either side of the residence;
- segregating topsoil from subsoil in residential areas;
- attempting to leave mature trees and landscaping intact within the construction workspace, unless the trees and landscaping interfere with the installation techniques or present unsafe working conditions; and
- completing final cleanup, grading, and installation of permanent erosion control measures within 10 days after backfilling the trench, weather permitting.

To further minimize effects on residences, **we recommend that:**

- **<u>With its Implementation Plan</u>, Transco should file with the Secretary, for review and written approval by the Director of OEP, a complete set of site-specific residential construction plans. For all residences located within 10 feet of the construction work area, the plans should be revised to either 1) modify the construction work area so that it is not closer than 10 feet to a residence, or 2) provide site-specific justification, including documentation of landowner or resident concurrence with the plan, for the use of any construction workspace within 10 feet of a residence.**

We received a comment from a representative of the commercial property at 1010 Susquehannock Drive near CPL South MPs 2.0 and 2.1 regarding the effect of the pipeline route on its existing stormwater management facilities and future plans for expansion of a warehouse facility on the property. To reduce the effects of pipeline construction and operation on the commercial facility, **we recommend that:**

- **<u>Prior to construction across the commercial property at 1010 Susquehannock Drive near CPL South MPs 2.0 and 2.1</u>, Transco should file with the Secretary, for review and written approval by the Director of OEP, a site-specific plan for minimizing impacts on the commercial structures, stormwater management facilities, and planned future warehouse expansion on the property, including documentation of consultation with the owner.**

We received a comment from Justin and Susan Cappiello regarding the proximity of the limits of disturbance of access road AR-LA-012.1 to their newly constructed barn near CPL South MP 12.1. Because the barn is immediately adjacent to the limits of disturbance of access road AR-LA-012.1 and Transco plans to improve the road (widen it and add gravel), **we recommend that:**

- **<u>Prior to construction across the Justin and Susan Cappiello property</u>, Transco should file with the Secretary, for review and written approval by the Director of OEP, a site-specific plan for minimizing construction impacts on the Cappiello's newly constructed barn including documentation of consultation with the landowner.**

Commenters expressed concern about the possible effects on properties adjacent to the pipeline rights-of-way resulting from all-terrain vehicle use. Transco committed to working with individual landowners to determine appropriate measures to discourage the use of all-terrain vehicles along the rights-of-way as needed. In coordination with applicable landowners, these measures could include installation of fences, gates, boulders, or bollards across the right-of-way and placement of "no trespassing" signs. In addition, Transco's ECP and Plan contain measures to minimize access by unauthorized vehicles. We conclude these measures would be sufficient to reduce or minimize access by unauthorized vehicles.

Commenters also expressed concerns regarding possible effects on septic systems/drain fields during construction. Transco will continue to consult with landowners to identify and avoid septic systems on properties crossed by the pipelines. Transco would implement measures to protect septic systems during construction where practicable, which could include avoidance measures or installation of matting. However, if an existing septic system is affected during construction, Transco would compensate the landowner for its repair, replacement, or relocation.

We received a comment from the Conestoga Township expressing concern that the Project would be inconsistent with the Conestoga Township's Comprehensive Plan, Zoning Ordinance, and Official Zoning Map and that it would "substantially diminish natural and esthetic values of the local environment which contributes significantly to a quality of life that deserves protection and will jeopardize the Township's priceless resources." According to the Township, the intent of the Zoning Ordinance is to:

> …protect and promote the public safety, health, and morals, to facilitate coordinated development, to provide for the general welfare by guiding the development and protection of various amenities and conveniences, to promote future governmental, economic, practical, social and cultural facilities, to provide for development and growth, as well as to improve governmental processes and functions, to guide uses of land and structures, types and locations of streets, public areas and other facilities, to promote the conservation of energy through the use of land planning practices and the effective utilization of renewable energy resources, to promote the proper density of population, vehicle parking and loading areas, and to prevent the overcrowding of land, blight, danger, and congestion in travel and transportation, to prevent loss of life, health, or property, where possible, from flood, fire, panic, or other dangers, and to minimize land use conflicts as may presently exist or which may be foreseen. (Conestoga Township, 2005)

The installation of pipeline facility infrastructure is not precluded by the provisions of the Zoning Ordinance. In addition, Transco would implement the mitigation measures described throughout this EIS to minimize impacts on natural and aesthetic values. Therefore, we do not believe the Project is in violation of the Comprehensive Plan or Zoning Ordinance.

We conclude that implementation of the identified mitigation measures, plans, and procedures described above, as well as our recommendations, would minimize or mitigate the impacts of pipeline construction on existing residences and buildings to less than significant levels. Operational impacts would be limited to the encumbrance of a permanent right-of-way, which would prevent the construction of permanent structures within the right-of-way.

4.8.3.2 Planned Residential and Commercial Developments

Transco contacted local and county officials in the affected municipalities, conducted research of publically available websites, and coordinated with local landowners to identify planned residential, commercial, or industrial developments within 0.25 mile of the proposed project facilities. The developments that were identified are provided in table 4.8.3-1. The proposed modifications to existing facilities in Maryland, North Carolina, and South Carolina would not result in any significant expansion of the existing site boundaries; therefore, no effects on new residential or commercial development would be anticipated for these facilities.

As shown in table 4.8.3-1, 11 planned residential and commercial development projects have been identified within 0.25 mile of the proposed project facilities, including:

- 1 planned residential development along CPL North;
- 8 planned residential developments or subdivisions and 1 potential commercial development along CPL South; and
- 1 residential inventory/development along the Mainline A and B Replacements.

No planned residential or commercial developments have been identified within 0.25 mile of Chapman or Unity Loops or any of the new or modified aboveground facilities.

TABLE 4.8.3-1

Planned Residential and Commercial Developments Within 0.25 Mile of the Atlantic Sunrise Project Facilities

State/Facility/County/ Planned Development	Location of Development Activity (approximate distance and direction from the project facilities)	Description	Anticipated Construction Date/Development Status
PENNSYLVANIA			
CPL North			
Luzerne County			
Goodleigh Manor	Crossed from MPs 26.0 to 26.2	Planned residential development	Roads and other infrastructure in place. Lots currently for sale.
CPL South			
Lancaster County			
968F Susquehannock Drive, Martic, PA, 17565	0.2 mile northeast of MP 2.2	Residential	Building permit issued April 2014.
1213 Holtwood Road, Martic, PA, 17565	0.2 mile northeast of MP 2.3	Residential	Building permit issued July 2014.
20 Venture Drive, Martic, PA, 17565	0.2 mile northeast of MP 2.9	Residential	Building permit issued September 2013.
99 Drytown Road, Martic, PA, 17565	0.1 mile southeast of MP 3.6	Residential	Building permit issued June 2014.
53 Drytown Road, Martic, PA, 17565	0.2 mile southeast of MP 3.8	Residential	Building permit issued November 2013.
3 Vestral Drive, Martic, PA, 17565	0.2 mile northeast of MP 6.0	Residential	Building permit issued April 2014.
76 Red Hill Road, Martic, PA, 17565	0.2 mile southwest of MP 6.9	Residential	Building permit issued May 2014.
Lebanon County			
MFS, Inc., d/b/a Eastern Land and Resources Company (ELRC)	Crossed from MPs 45.3 to M-0183 0.6	Potential commercial development	Area is currently zoned as General Commercial and Light Industrial; ELRC plans to develop the area as a commercial and residential mixed-use development
Stone Hill Village LLC	0.2 mile southeast of MP M-0.183 1.7	Residential subdivision	Construction of Phase 1 is underway.
VIRGINIA			
Mainline A and B Replacements			
Prince William County			
Residential Inventory	Crossed from MPs 1,579.2 to 1,579.3, and MPs 1,576.7 to 1,579.6	The residential inventory is part of the build-out analysis completed by Prince William County. These areas have received zoning approval by the Board of Supervisors, and may be at any stage of development.	Residential inventory area REZ1996-0029 is crossed by the Project; construction underway in 2013 and confirmed completed based on review of recent aerial imagery.

The majority of the developments identified would not be subject to adverse effects because they are over 500 feet away from the proposed pipeline route and have a sufficient buffer between the development and the pipeline facilities. However, three developments would be directly crossed by the pipeline.

- Goodleigh Manor is a residential development crossed between MPs 26.0 and 26.2 along the CPL North pipeline route. The Goodleigh Manor subdivision is about 500 acres and has an average lot size of 4 acres.

- The Eastern Land and Resources Company (ELRC) commercial and residential mixed-use development is a 535-acre parcel in South Annville Township, which would be crossed between MPs 45.3 to M-0183 0.6 along the CPL South pipeline route. According to Lebanon County zoning officials, the zoning for the property has been changed to commercial and light industrial, and ELRC filed a proposal to relocate a road within the property. Transco will continue to reach out to the landowner to identify development plans for the property.

- The Prince William County residential inventory area (REZ1996-0029) is a townhome development crossed between MPs 1,579.2 to 1,579.3 and MPs 1,576.7 to 1,579.6 of the Mainline A and B Replacements. The townhome development, Independence Townhome, was approved for 134 units, 100 of which were completed prior to December 31, 2013 (Prince William County Planning Office, 2014). Based on review of recent aerial imagery, buildout of the residential inventory area was completed subsequent to the 2013 Build-Out Report. Because Transco is not proposing to widen its existing permanent right-of-way in this area, we conclude that the proposed Mainline A and B Replacements would not result in a significant impact on the development.

We received comments from Thomas Zagami (representing ELRC) indicating that the property was acquired for the purposes of future development and that ELRC has spent approximately $4,000,000 in connection with the engineering, planning, permitting, and/or construction of necessary infrastructure improvements to service this property. Mr. Zagami indicated that the proposed route would prevent ELRC from developing the property as planned and requested that FERC require Transco to reroute the pipeline as it crosses the development. Transco has been working with the ELRC regarding several possible route deviations through the property. Therefore, **we recommend that:**

- **<u>With its Implementation Plan</u>, Transco should file with the Secretary the final results of consultations with the landowner/developer of the ELRC commercial and residential development, including any project modifications or mitigation measures Transco would implement to minimize impacts on the ELRC development, including copies of correspondence.**

Transco incorporated several route variations into its pipeline route to minimize or avoid impacts on planned developments as described in section 3.0. In addition, Transco would implement the mitigation measures contained in its ECP and Plan, and any additional measures as arranged with specific landowners. We conclude that implementation of the identified mitigation measures, in addition to our recommendation, would minimize or mitigate the impacts of pipeline construction on planned residential and commercial developments to less than significant levels. Operational impacts would be limited to the encumbrance of a permanent right-of-way, which would prevent the construction of permanent structures within the right-of-way.

4.8.4 Agricultural Areas

Construction of the Project would affect a total of about 1,789.2 acres of agricultural land in Pennsylvania, about 602.9 acres of which would be retained during operation of the Project. No agricultural land would be affected by construction of the project facilities in Virginia, Maryland, North Carolina, or South Carolina.

Construction and operation of the Project through agricultural land has the potential to result in effects on its use and productivity caused by:

- mixing of topsoil and subsoil;
- soil compaction within restored rights-of-way;
- damage to subsurface drainage systems/drain tiles;
- introduction of excess rock into the subsoil;
- loss of crop production or reduction of crop yields;
- temporary loss of access to agricultural land outside of the construction rights-of-way for equipment and/or livestock;
- temporary or permanent loss of specialty crops such as Christmas or fruit trees;
- modification of surface and groundwater flow patterns; and
- introduction of invasive species/noxious weeds.

Transco has developed an Agricultural Plan for the Project, which documents the measures Transco would follow to minimize and mitigate effects on agricultural lands. The Agricultural Plan is provided as attachment 6 of Transco's ECP. Measures that would be used by Transco to prevent or minimize impacts on agricultural lands include:

- preservation, segregation, and replacement of up to 12 inches of topsoil across the full construction right-of-way;
- removal of rock (4 inches in size or larger) to a depth of 12 inches or to the subsoil horizon;
- repair or replacement of drain tiles or irrigation systems damaged during construction;
- a minimum depth of cover over the pipeline of 48 inches in active agricultural lands (e.g., corn, soybeans) and 36 inches in other agricultural lands (e.g., hayfield, pasture), depending on landowner agreements;
- maintenance of landowner access to fields, storage areas, structures, and other agricultural facilities during construction to the extent practicable;
- landowner compensation for crop losses and other damages caused by construction; and
- initiation of a monitoring program to assess the yields of restored areas post-construction.

Agricultural land in the construction rights-of-way would generally be taken out of production for one growing season and would be restored to previous uses following construction. While agricultural inspectors are not required in Pennsylvania, Transco has proposed to provide an on-site agricultural inspector to monitor construction activities within agricultural lands. The agricultural inspector would work closely with the EIs for the Project. In addition, Transco would hire a subject matter expert to provide guidance to ensure these lands are restored to their original uses and crops yields. Agricultural lands would be properly restored using approved, modern mitigation techniques designed to restore the full productive reuse of the agricultural lands, which typically occurs within 3 years. See section 4.8.6.2 for information regarding agricultural conservation programs and easements.

We received comments on the draft EIS from landowner Christopher McCallum regarding potential effects of the Project on his market garden and a previously unidentified greenhouse structure. **Therefore, we recommend that:**

- **<u>Prior to construction across the McCallum property</u>, Transco should file with the Secretary, for review and written approval by the Director of OEP, a plan to minimize impacts on the market garden and previously unidentified greenhouse structure.**

Table 4.8.4-1 identifies the known specialty agricultural areas that would be crossed by the Project. About 33.7 acres of specialty agricultural areas (i.e., orchards and tree farms) would be affected during construction of CPL North and CPL South in Pennsylvania, 12.6 acres of which would be retained for operation of the Project. No specialty crop areas would be crossed by Chapman Loop, Unity Loop, or the Mainline A and B Replacements. No sugar maple stands used for maple syrup production, vineyards, or hop fields would be crossed by the project facilities.

TABLE 4.8.4-1

Specialty Agricultural Areas Crossed by the Atlantic Sunrise Project

Facility/ County [a]	Crop Type	Begin Milepost	End Milepost	Crossing Length (feet)	Permanent Right-of-Way Width (feet)	Land Affected During Construction (acres)	Land Affected During Operation (acres)
CPL North							
Luzerne	Orchard	M-0141 0.0	M-0141 0.2	463	50	1.1	0.5
CPL South							
Schuylkill	Tree farm	77.2	77.2	106	50	0.3	0.1
Columbia	Tree farm	98.7	98.9	1,214	50	5.2	1.8
Columbia	Tree Farm	100.5	M-0179 0.1	3,340	50	10.2	3.8
Columbia	Tree farm	115.8	116.1	1,403	50	5.6	1.5
Columbia	Tree farm	119.1	119.2	158	50	0.4	0.2
Columbia	Tree Farm	120.2	120.4	1,141	50	3.2	1.3
Columbia	Tree farm	120.5	121.0	2,640	50	7.0	3.0
Columbia	Tree farm	122.9	123.0	317	50	0.7	0.4
Project Total				**10,782**	**Not applicable**	**33.7**	**12.6**

[a] All specialty agricultural areas crossed by the proposed project facilities are in Pennsylvania.

We received comments on the draft EIS regarding potential impacts of disease spread to forest industries (i.e., tree farms) from the construction corridor. As described in section 4.5.4, we are recommending that Transco revise its Management Plan to include mitigation measures to prevent disease spread to forest industries. Other impacts on specialty agricultural areas would be minimized through implementation of the mitigation measures included in Transco's Agricultural Plan. In addition, landowners would be compensated for specialty crop losses and other damages caused by construction and/or operation of the Project.

4.8.4.1 Organic Farming

Table 4.8.4-2 identifies the known certified organic farms that would be crossed by the Project. About 123.7 acres of organic farmland would be crossed by the CPL North and CPL South pipelines, 43.7 acres of which would be retained for operation of the Project. No known organic farms would be crossed by the Chapman and Unity Loops, Mainline A and B Replacements, or aboveground facilities.

Construction of the pipeline may result in accidental spilling of fuels, lubricants, or other substances that could result in removal of the affected areas from organic certification by the certifying organization. Pennsylvania Certified Organic (PCO) is one of a number of certifying organizations that certifies organic farms in Pennsylvania and a number of other nearby states. Its policy regarding construction of industrial infrastructure projects on certified organic farmland is to remove the affected areas from certification for a minimum of 3 years if the soil becomes contaminated with any of a variety of chemicals and substances. Removal of certification would apply only to those areas determined to have been contaminated and would not extend to the entire farm (PCO, 2012; Donald, 2014). During construction and operation of the Project, Transco would implement the measures included in its Spill Plan and Agricultural Plan to minimize the risk of an accidental spill.

The PCO requires farmers with certified organic farmland to consult with the PCO prior to any disturbance of soil to identify steps to be taken to minimize risks to their certification and to restore certification for any areas removed from certification. The PCO may conduct on-site inspections prior to soil disturbance (PCO, 2012). Other certifying organizations may have different requirements.

Operation of the pipeline facilities would require maintenance of perennial vegetation within the right-of-way. Such maintenance typically involves mowing and some use of herbicides, depending on the type of vegetation, accessibility, and other factors. Transco's Agricultural Plan for the Project specifies vegetation maintenance activities to meet the operational needs of organic farms and to address the specific concerns and needs of organic farms by incorporating measures designed to protect their specific certification requirements.

We received a number of comments from landowners with concerns regarding their ability to maintain organic certification during and after construction of the Project through their properties. To ensure that organic certification is protected, **we recommend that:**

- **<u>Prior to construction</u>, Transco should file with the Secretary, for review and approval by the Director of OEP, an organic certification mitigation plan developed in consultation with the PCO to ensure organic certification is maintained on the organic farms crossed by the Project. The plan should include:**

    a. specific mitigation measures to be implemented to maintain certification during and after construction of the Project;

    b. a plan for addressing complaints from landowners regarding loss of certification during and after construction, including measures to facilitate reinstatement of certification or to compensate the landowner if certification is lost or canceled; and

    c. copies of consultations with the PCO.

TABLE 4.8.4-2							
Organic Farms Crossed by Atlantic Sunrise Project							
Facility/ County/Tract [a]	Crop Type	Begin Milepost	End Milepost	Crossing Length (feet)	Permanent Right-of-Way Width (feet)	Land Affected During Construction (acres)	Land Affected During Operation (acres)
CPL North							
Wyoming County							
PA-WY-050.000	Tomatoes	35.2	35.8	3,380	50	12.1	3.9
CPL South							
Lancaster County							
PA-LA-078-B.000	Tobacco	6.1	6.5	2,587	50	7.9	2.9
PA-LA-006.C.000		M-0405 0.9	M-405 1.0	817	50	2.7	0.9
PA-LA-123-B.000	Tobacco	10.1	10.5	2,165	50	4.8	1.9
PA-LA-135-B.000	Tobacco	11.7	11.9	1.584	50	10.5	3.5
PA-LA-243-B.000	Corn	20.2	20.3	528	50	1.9	0.6
Lebanon County							
PA-LE-014.000	Corn, soy beans, wheat	37.9	38.5	3,274	50	10.0	3.8
PA-LE-016.200	Corn, soy beans, wheat	38.5	39.2	3,485	50	10.0	4.0
PA-LE-031.000	Corn, soy beans, wheat	40.0	M-0226 0.2	1,348	50	4.0	1.6
PA-LE-046.000	Corn, soy beans, wheat	41.1	41.7	2,957	50	7.5	3.4
PA-LE-063.000	Corn, soy beans, wheat	43.8	44.3	2,323	50	6.7	2.7
PA-LE-228.000	Corn, soy beans, wheat	62.1	62.5	1,690	50	10.0	3.8
PA-LE-229.100	Trees	62.5	63.1	3,168	50	13.2	6.4
Columbia County							
PA-CO-002.000	Soy beans	91.1	91.2	950	50	4.0	1.5
PA-CO-092.000	Poultry	104.1	104.3	634	50	2.8	1.4
PA-CO-204.000	Soy beans	116.1	116.3	1,003	50	7.9	2.2
PA-CO-252.000	Fruit	124.7	125.0	1,267	50	19.8	3.1
Project Total				**28,198**	**Not applicable**	**123.7**	**43.7**

[a] All organic farms crossed by the project facilities would be in Pennsylvania.

4.8.4.2 No-till Farming

Table 4.8.4-3 identifies the known no-till farms[27] that would be crossed by the Project. About 165.0 acres of no-till farmland would be crossed by the CPL South pipeline, 58.5 acres of which would be retained for operation of the Project. No known no-till farms would be crossed by CPL North, Chapman and Unity Loops, the Mainline A and B Replacements, or the aboveground facilities.

[27] No-till farming (also called zero tillage or direct drilling) is an agricultural technique that involves growing crops without disturbing the soil through tillage, which increases the infiltration of water, cycling of nutrients, and retention of organic matter.

TABLE 4.8.4-3

No-till Farms Crossed by the Atlantic Sunrise Project

Facility/County/Tract [a]	Begin Milepost	End Milepost	Crossing Length (feet)	Permanent Right-of-Way Width (feet)	Land Affected During Construction (acres)	Land Affected During Operation (acres)
CPL South						
Lancaster County						
PA-LA-008-B.000	Not applicable	Not applicable	Not applicable	Not applicable	0.1	0.0
PA-LA-099-B.000	8.2	M-0405 0.3	2,450	50	7.5	2.8
PA-LA-115-B.000	M-0405 1.4	M-0405 1.6	1,059	50	3.1	1.2
PA-LA-117-B.000	M-0405 1.6	10.1	763	50	2.2	0.9
PA-LA-118-B.000	10.1	10.2	837	50	2.5	1.0
PA-LA-345-B.100	30.7	30.9	1,214	50	3.4	1.4
PA-LA-348-B.100	31.2	31.5	1,690	50	5.0	2.0
PA-LA-357-B.100	31.5	32.3	3,800	50	12.3	4.3
PA-LA-359-B.100	32.3	32.7	2,165	50	6.3	2.5
PA-LA-364-B.100	32.7	33.0	1,640	50	5.1	1.9
Lebanon County						
PA-LE-102.000	50.1	50.1	342	50	1.2	0.4
PA-LE-110.00	50.6	50.8	1,100	50	3.4	1.3
PA-LE-112.000	50.8	51.1	1,690	50	5.4	2.0
PA-LE-129.00	52.5	52.9	1,848	50	6.6	2.1
PA-LE-154.100	54.7	54.9	2,718	50	8.4	3.1
PA-LE-209.00	M-0200 0.0	M-0200 0.2	845	50	3.2	1.0
Columbia County						
PA-CO-032.000	94.7	94.8	581	50	1.6	0.7
PA-CO-033.000	94.8	94.9	845	50	2.4	1.0
PA-CO-036.000	94.9	95.2	1,317	50	9.6	1.5
PA-CO-037.000	95.3	95.4	580	50	1.6	0.7
PA-CO-040.000	95.4	95.7	1,531	50	5.2	1.8
PA-CO-046.000	M-0197 0.0	97.0	3,536	50	10.5	4.1
PA-CO-050.000	97.0	97.4	2,110	50	6.5	2.4
PA-CO-052.000	97.4	97.5	160	50	0.4	0.2
PA-CO-052.001	97.5	97.5	315	50	0.9	0.3
PA-CO-054.000	97.5	97.9	1,850	50	5.3	2.1
PA-CO-056.000	97.9	M-0174 0.4	3,127	50	5.3	2.0
PA-CO-057.000	M-0174 0.4	98.8	2,060	50	6.2	2.4
PA-CO-083.000	102.0	M-0423 0.1	1,956	50	2.7	1.2
PA-CO-104-A.000	M-0423 3.3	M-0423 3.6	1,936	50	8.6	1.8
PA-CO-134.100	M-0171 0.1	M-02360.0	612	50	2.0	0.7
PA-CO-143.001	M-0214 0.2	108.5	4,839	50	13.2	5.6
PA-CO-144.001	108.5	108.6	475	50	2.4	0.6
PA-CO-148.000	108.7	109.0	1,267	50	4.9	1.5
Total			**53,258**	**Not applicable**	**165.0**	**58.5**

[a] All no-till farms crossed by the project facilities would be in Pennsylvania.

Disturbance of long-term no-tilled fields by pipeline construction activities may affect the soil conditions. Transco has consulted with subject matter experts to provide guidance regarding constructing through no-till cropland, including impact avoidance and mitigation measures. These recommendations, which have been incorporated into Transco's Agricultural Plan, include use of additional cover crops and other methods to improve soil structure and organic matter content during restoration. These methods would be implemented by Transco during construction and operation of the Project to reduce impacts on no-till farms.

4.8.5 Coastal Zone Management

In 1972, Congress passed the Coastal Zone Management Act (CZMA) to "preserve, protect, develop, and where possible, to restore or enhance, the resources of the nation's coastal zone for this and succeeding generations" and to "encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone" (16 USC 1452, section 303 (1) and (2)).

Section 307 (c)(3)(A) of the CZMA states that "any applicant for a required federal license or permit to conduct an activity, in or outside the coastal zone, affecting any land or water use or natural resource of the coastal zone of that state shall provide a certification that the proposed activity complies with the enforceable policies of the state's approved program and that such activity will be conducted in a manner consistent with the program." In order to participate in the CZMP, a state is required to prepare a program management plan for approval by the NOAA, Office of Coast and Management (OCRM). Once the OCRM has approved a state's plan, including its enforceable program policies, the state program gains "federal consistency" jurisdiction. This means that any federal action (e.g., a project requiring federally issued licenses or permits) that takes place within the state's coastal zone must be found to be consistent with state coastal policies before the action can take place.

The proposed project facilities are not within the coastal zones of Pennsylvania, Maryland, North Carolina, and South Carolina. However, the Mainline A and B Replacements would involve activities within the coastal zone of Virginia and require federal permits and approvals and, therefore, are subject to a federal Coastal Zone Consistency Review. The VDEQ has issued a blanket Coastal Zone Consistency as a condition to Norfolk District of the USACE Nationwide Permit Regional Conditions. Therefore, Coastal Zone Consistency has been granted for the Project through the use of a non-reporting Nationwide Permit No. 3 for the replacement activities.

4.8.6 Public Land, Recreation, and Other Special Interest Areas

USGS topographic maps; aerial photographs; correspondence with federal, state, and local agencies and private landowners; field reconnaissance; internet and public database searches; and other publically available information were used to identify public land, conservation land, recreation areas, and other designated or special use areas in the vicinity of the Project.

4.8.6.1 Recreation and Special Interest Areas

Table 4.8.6-1 lists the federal, state, and municipal lands and recreation areas that would be crossed by the Project or within 0.25 mile of the construction right-of-way. We received numerous comments during scoping and the draft EIS comment period regarding the potential effects of the Project on Fishing Creek and the Kelly's Run, Tucquan Glen, Shenk's Ferry, and Rock Springs Preserves; however, based on the distance from the proposed Project or alternative routes under consideration, these features were not determined to have the potential to be affected by the Project.

TABLE 4.8.6-1

Federal, State, and Municipal Lands, and Recreation Areas Within 0.25 Mile of the Atlantic Sunrise Project Facilities

Facility/County/ Designated Area	Description of Area	Milepost(s) (if crossed)	Distance Crossed (miles)	Distance (miles) and Direction from Project	Land Affected During Construction [a] (acres)	Land Affected During Operation [b] (acres)
PENNSYLVANIA						
CPL North						
Luzerne County						
Ricketts Glen State Park	State park managed by the PADCNR for recreational and preservation purposes	7.4 to 7.9 and 8.4	0.5	Crossed	4.9	0.9
SGL 206	State game land managed by the PGC for recreational purposes	11.0 to 11.3 and 11.7 to 12.4	1.0	Crossed	11.1	3.1
CPL South						
Lancaster County						
Fishing Creek Scalpy Hollow Nature Preserve	Nature preserve managed by the Lancaster County Conservancy for preservation and recreational purposes	Not crossed	Not applicable	0.25 mile southeast of MP 0.0	Not applicable	Not applicable
Camp Andrews	Christian youth camp managed by Camp Andrews	Not crossed	Not applicable	0.2 mile northeast of MP 0.0	Not applicable	Not applicable
Enola Low Grade Trail	Non-contiguous trail developed by right-of-way landowner, Lancaster County, and local municipalities	7.1	<0.1	Crossed	<0.1	<0.1
Conestoga Trail	Trail managed by the Lancaster Hiking Club	8.2	<0.1	Crossed	<0.1	<0.1
Lebanon County						
Lebanon Valley Rail-Trail	Trail managed by Lebanon Valley Rails to Trails	37.5	<0.1	Crossed	<0.1	<0.1
Horse-Shoe Trail	Trail managed by the Horse-Shoe Trail Club	41.2	<0.1	Crossed	<0.1	<0.1
Swatara Creek Water Trail	Water trail designated by PFBC, but managed by volunteer and other groups	49.3	<0.1	Crossed	<0.1	<0.1
Fort Indiantown Gap National Guard Training Center	National Guard Training Site managed by the Pennsylvania National Guard	54.9, M-0168, 0.4 to 0.8, 56.8 to 57.1, and 57.6 to 57.7	0.9	Crossed	6.5	3.1
Swatara State Park	State park managed by the PADCNR for recreational purposes	Not crossed	Not applicable	0.1 mile west of MP 58.5	Not applicable	Not applicable
SGL 211	State game land managed by the PGC for recreational purposes	59.8 to M-200 0.3	0.3	Crossed	2.9	1.5
Appalachian Trail	2,000-mile-long continuous trail managed by the National Park Service and other entities for recreational purposes	M-200 0.1	<0.1	Crossed	<0.1	<0.1

TABLE 4.8.6-1 (cont'd)

Federal, State, and Municipal Lands, and Recreation Areas Within 0.25 Mile of the Atlantic Sunrise Project Facilities

Facility/County/ Designated Area	Description of Area	Milepost(s) (if crossed)	Distance Crossed (miles)	Distance (miles) and Direction from Project	Land Affected During Construction [a] (acres)	Land Affected During Operation [b] (acres)
Twin Grove RV Resort and Cottages	Privately- owned park/resort used for recreational purposes	Not crossed	Not applicable	<0.1 mile northwest of MP 62.5	Not applicable	Not applicable
Schuylkill County						
SGL 229	State game land managed by the PGC for recreational purposes	Not crossed	Not applicable	0.1 mile northwest of MP 70.7	Not applicable	Not applicable
Rausch Creek Off-Road Park	Off-road trails managed by Rausch Creek Off-Road Park	71.4 to 72.0	1.4	Crossed	89.5	3.5
SGL 132	State game land managed by the PGC for recreational purposes	78.9 to 79.7	0.8	Crossed	14.3	4.5
Schuylkill and Northumberland Counties						
SGL 084	State game land managed by the PGC for recreational purposes	M-0194 1.0 to 83.4	0.8	Crossed	11.8	5.1
Northumberland County						
Anthracite Outdoor Adventure Area	6,500-acre recreational area managed by the Anthracite Outdoor Adventure Area Authority for recreational purposes	83.8 to 84.4	0.6	Crossed	19.6	8.5
Chapman Loop						
Clinton County						
Sproul State Forest	State forest managed by the PADCNR for preservation and recreational purposes	L186.1, L187.2, L187.6 to L187.8, and L188.3 to L188.6	0.9	Crossed	8.7	2.6
Unity Loop						
None identified						
VIRGINIA						
Mainline A and B Replacements						
Prince William County						
Manassas National Battlefield Park	National Park managed by National Park Service for preservation of two civil war battle sites.	Not crossed	Not applicable	0.2 mile northwest	Not applicable	Not applicable
Prince William County Designated Open Space	Designated open space includes an asphalt trail used by residents for walking and riding bicycles.	1,578.7 to 1,579.0	0.3	Crossed	5.1	0.0d

[a] Construction impacts include the area within the permanent right-of-way and ATWS.
[c] Operational impacts associated with maintenance of permanent right-of-way.
[d] Transco is not proposing to maintain any new permanent right-of-way for the Mainline A and B Replacements; therefore, there would be no operational impact.

During pipeline construction within 0.25 mile of the areas identified in table 4.8.6-1, effects associated with increased traffic, noise, and dust, as well as effects on visual resources, could occur. However, these effects would be temporary and limited to the time of construction. One of the primary concerns when crossing recreation and special interest areas is the effect of construction on the recreational activities, public access, and resources the area aims to protect. Construction would alter visual aesthetics by removing existing vegetation and disturbing soils (see section 4.8.8). Construction would also generate dust and noise, which could be a nuisance to recreational users and may interfere with or diminish the quality of the recreational experience by affecting wildlife movements or disturbing trails.

In general, the effects of the Project on recreational and special interest areas occurring outside of forestland would be temporary and limited to the period of active construction, which typically lasts several weeks or months in any one area. These effects would be minimized by implementing the measures in Transco's ECP, BMPs, and other construction plans. In addition, Transco would implement specific mitigation measures as described below for some of the recreation and special interest areas that would be affected by the Project.

Following construction, most open land uses would be allowed to revert to their former uses. However, forestland affected by the temporary construction right-of-way and ATWS areas would experience long-term effects due to the time required to restore the woody vegetation to its preconstruction condition. Further, forestland within the new permanent right-of-way would experience permanent effects because it would be precluded from being reestablished within the maintained portion of the right-of-way. Transco would continue to consult with the owners and managing agencies of recreation and special interest areas regarding the need for specific construction mitigation measures.

Implementation of the measures identified above would minimize or eliminate impacts on most of the public lands, recreation, and other public interest areas identified in table 4.8.6-1. We conclude that the Project would not result in significant impacts on these areas. Areas requiring additional site-specific considerations are discussed in detail in the sections below.

We received comments from the PADCNR on the draft EIS regarding its policies regarding conversion of property interests acquired or developed with federal land and water funds. Therefore, **we recommend that:**

- **<u>With its Implementation Plan</u>, Transco should file copies of correspondence with the PADCNR confirming all PADCNR-funded properties crossed by the Project have been identified and any change in use or transfer of rights for the PADCNR-funded properties is in compliance with PADCNR's conversion policies.**

Pennsylvania

<u>Ricketts Glen State Park</u>

Ricketts Glen State Park, managed by the PADCNR, is a 13,050-acre park in Luzerne, Sullivan, and Columbia Counties. Recreational activities within Ricketts Glen State Park include hiking, horseback riding, picnicking, swimming, boating, fishing, hunting, cross-country skiing, snowmobiling, ice fishing, camping, and education (PADCNR n.d.(a)). None of the facilities supporting these recreational activities are within 0.25 mile of the proposed project facilities. The park is open year-round, though some trails and camping areas are closed during the winter months. The peak season for camping is generally from the second Friday of June to the third Friday in August. A 2012 study estimated that the park had over 319,000 visitors in 2010 (PADCNR 2012).

CPL North would cross the southernmost tip of Ricketts Glen State Park at two locations, one between MPs 7.4 and 7.9 and the other at MP 8.4, for a total crossing distance of about 0.5 mile in Luzerne County. The entire portion of CPL North that would cross Ricketts Glen State Park is collocated with Transco's existing Leidy Line system. A total of 4.9 acres of Ricketts Glen State Park would be affected during construction. Transco is developing a site-specific crossing plan in consultation with the PADCNR for Ricketts Glen State Park. Following construction, Transco would maintain an additional 1.7 acres of permanent right-of-way adjacent to its existing right-of-way through the park. A total of about 0.9 acre of upland forest would be permanently converted to open land for operation of CPL North. Transco has minimized impacts on the park and its visitors by siting CPL North at the southernmost tip of the park and collocating the pipeline with the existing Leidy Line.

Glens Natural Area, a National Natural Landmark within Ricketts Glen State Park, is about 0.4 mile north of the proposed CPL North pipeline route. Due to its distance from the Project, no impacts on Glens Natural Area are anticipated.

Transco submitted a right-of-way permit application to the PADCNR in April 2015, and met with the agency in July 2015 and March 2016 to discuss the Project and potential impact minimization measures. Transco is developing a site-specific crossing plan for Ricketts Glen State Park that would include all required conditions of the right-of-way license, including timing restrictions, notification measures, and safety and other mitigation measures. This plan would be filed with Transco's Implementation Plan prior to construction of the Project. Transco continues to work with the PADCNR to identify suitable measures to minimize disturbance to the park and its visitors.

Pennsylvania State Game Land 206

Pennsylvania SGLs are managed by the PGC. Recreational activities allowed on SGLs include hunting and trapping, hiking, berry picking, photography, fishing, and canoeing (PGC, 2013a). No mountain bike or equestrian trails are in SGL 206; however, it does contain a public shooting range, including a 100-yard rifle range and a 25-yard pistol range, that is open year round (Monday through Saturday from 8:00 a.m. to sunset and Sunday from noon to sunset) (PGC, 2013c). According to the PGC, no special hunting, fishing, or other events take place within SGL 206.

CPL North would cross the northern edge of SGL 206 at two locations in Luzerne County, between MPs 11.0 and 11.3 and again between MPs 11.7 and 12.4. The SGL 206 public shooting range is within about 800 feet of CPL North near MP 11.0. The portion of CPL North that would cross SGL 206 is collocated with Transco's existing Leidy Line system. A total of 11.1 acres within SGL 206 would be affected during construction. Following construction, Transco would maintain an additional 3.1 acres of permanent right-of-way adjacent to its existing right-of-way through SGL 206. Transco has been coordinating with the PGC to identify suitable measures to minimize disturbance to SGL 206 and its visitors. The PGC has requested that no work be conducted within SGL 206 from October 1 to December 30 and during a 3-week period in the spring related to the turkey season (exact dates to be determined for 2016 and 2017). Transco submitted a right-of-way application for SGL 206 to the PGC in September 2015 and is developing a site-specific crossing plan that would include all required conditions of the right-of-way license related to timing restrictions, notification measures, and safety and other mitigation measures. This plan would be filed with Transco's Implementation Plan prior to construction of the Project.

Enola Low-Grade Trail

The Enola Low-Grade Trail (formerly known as the Atglen-Susquehanna Trail) is a 29-mile-long, noncontiguous trail extending from the Susquehanna River to Atglen, Pennsylvania. It consists of portions of the former, abandoned Enola Low-Grade Railroad right-of-way and was developed as a Rails-to-Trails project through negotiations with the abandoned railroad owner, Lancaster County, and municipalities along the trail (Rails-to-Trails Conservancy, 2014; Lancaster County Planning Commission, 2006). The Trail is currently planned for biking, walking, horseback riding, and cross-country skiing. The sections of the trail currently open for use can be accessed from dawn to dusk (Enola Low-Grade Rail Trail, n.d.).

CPL South would cross the Enola Low Grade Trail near MP 7.1 in Lancaster County, Pennsylvania. The pipeline route would be collocated with an existing overhead transmission line at this location, minimizing long-term alteration of the surrounding landscape. On February 19, 2015, Transco met with Martic Township officials to identify suitable measures to minimize disturbance to the trail and its visitors during construction. Martic Township officials indicated that, while the section of the trail that would be crossed by CPL South was not yet open, funding had been secured to pave the entire length of the trail within the township prior to the anticipated start of construction of CPL South.

Transco proposes to cross the Enola Low-Grade Trail using conventional pipeline construction methods. Construction activities would last about 12 weeks. Transco determined that establishing an alternate trail route during construction was infeasible and that two temporary trail closures, lasting about 4 to 6 days each, would be necessary. Transco developed a site-specific crossing plan for the Enola Low-Grade Trail. Measures Transco would implement to minimize effects on the trail and its users include but are not limited to: advance notification of the construction schedule to Martic Township officials; advance installation of signage notifying users of construction work and trail closures; installation of chain-link safety fencing to prevent access to the construction area; use of monitors and flagmen when construction equipment traverses the trail outside of scheduled closures; and restoration of the trail to preconstruction conditions.

Conestoga Trail

The Conestoga Trail, primarily located on private land adjacent to Pequea Creek Road, is a 63-mile-long trail developed, maintained, and protected by the Lancaster Hiking Club. The trail crosses a variety of land uses and provides opportunity to view the varied natural terrain of Lancaster County (Lancaster Hiking Club, n.d.).

CPL South would cross the Conestoga Trail near MP 8.2 in Lancaster County. Transco proposes to cross Pequea Creek Road and the trail using the open-cut method. Although Transco is requesting a new right-of-way at the trail crossing, the current land use is agricultural so there would be no permanent effect on the surrounding landscape.

Transco met with the Lancaster Hiking Club on December 10, 2014, and subsequently prepared a site-specific crossing plan for the trail to address the concerns of the Lancaster Hiking Club's members and to outline special procedures to minimize disturbance to the trail and its users. Construction activities would last about 12 weeks. Transco determined that establishing an alternate trail route during construction was infeasible and that two temporary trail closures, lasting 4 to 6 days each, would be necessary. Measures Transco would implement to minimize effects on the trail and its users include but are not limited to: advance notification of the construction schedule to club members; advance installation of signage notifying users of construction work and trail closures; installation of chain-link safety fencing to prevent access to the construction area; use of monitors and flagmen when construction equipment traverses the trail outside of scheduled closures; and restoration of the trail to preconstruction conditions.

Lebanon Valley Rail-Trail

The Lebanon Valley Rail-Trail is a 12.5-mile-long trail extending from the Lebanon/Lancaster County line to Whitman Road in Cornwall. The trail, which is open from dawn to dusk, is used for biking, walking, and horseback riding (Lebanon Valley Rails to Trails, n.d.). CPL South would cross the Lebanon Valley Rail-Trail near MP 37.5 in Lebanon County. Although Transco is requesting a new right-of-way at the trail crossing, the current land use is agricultural so there would be no permanent effect on the surrounding landscape.

Transco proposes to cross the Lebanon Valley Rail-Trail using conventional pipeline construction methods. Construction activities would last about 12 weeks. Transco determined that establishing an alternate trail route during construction was infeasible and that two temporary trail closures, with a combined duration of about 2 weeks, would be necessary. Transco developed a site-specific crossing plan for the Lebanon Valley Rail-Trail. Measures Transco would implement to minimize effects on the trail and its users include but are not limited to: advance notification of the construction schedule to Lebanon Valley Rails to Trails; advance installation of signage notifying users of construction work and trail closures; installation of chain-link safety fencing to prevent access to the construction area; use of monitors and flagmen when construction equipment traverses the trail outside of scheduled closures; and restoration of the trail to preconstruction conditions.

Horse-Shoe Trail

The Horse-Shoe Trail is a year-round, 140-mile-long hiking and equestrian trail that starts at Valley Forge National Park and runs to the Appalachian Trail north of Harrisburg (Horse-Shoe Trail Conservancy, 2011). CPL South would cross the Horse-Shoe Trail near MP 41.2 in Lebanon County. Transco coordinated with the Horse-Shoe Trail Club to identify suitable measures to minimize disturbance to the trail and its visitors.

Transco proposes to cross the Horse-Shoe Trail using conventional pipeline construction methods. Construction activities would last about 12 weeks, including two temporary trail closures with a total combined duration of about 2 weeks. Based on Transco's discussions with the trail club, there would be no need to establish a reroute of the trail during construction due to the short duration of the trail closures. Transco developed a site-specific crossing plan for the Horse-Shoe Trail. Measures Transco would implement to minimize effects on the trail and its users include but are not limited to: advance notification of the construction schedule to the Trail Club so details can be posted on its website to notify trail users; advance installation of signage at the trail crossing to notify users of construction work and trail closures; installation of chain-link safety fencing to prevent access to the construction area; use of monitors and flagmen when construction equipment traverses the trail outside of scheduled closures; and restoration of the trail to preconstruction conditions.

Swatara Creek Water Trail

The Swatara Creek Water Trail is a 42-mile-long segment within Swatara Creek extending from Jonestown (Lebanon County) to the PFBC's Middletown access in Middletown (Dauphin County). The PFBC designates water trails; however, individual trails are created and maintained by volunteers, property owners, and associations (PFBC, 2005). Water trails are boat routes suitable for canoes, kayaks, and small motorized watercraft. Like conventional trails, water trails are recreational corridors between specific locations. Water trails are comprised of access points, boat launches, day use sites, and overnight camping areas (PFBC, 2014).

CPL South would cross Swatara Creek near MP 49.3 on a parcel of land owned by the Commonwealth of Pennsylvania in Lebanon County. The waterbody is about 145 feet wide at the crossing site, which is about 0.5 mile from the nearest access point. To minimize effects on Swatara Creek and its existing recreational uses, Transco is proposing to use the flume crossing method. Transco continues to consult with the PFBC regarding the timing of the crossing and potential safety measures (e.g., warning signs, website notice, plan for temporary portage). This information would be provided in the Aids to Navigation Plan for the crossing, which would be submitted to the PFBC and filed with FERC as part of Transco's Implementation Plan (see section 4.8.6.3). To minimize impacts on recreational use of Swatara Creek, Transco has committed to using signs and buoys to notify boaters of construction.

Fort Indiantown Gap National Guard Training Center

Fort Indiantown Gap National Guard Training Center is a U.S. National Guard Training Site owned by the Commonwealth of Pennsylvania. Major facilities at the installation include Muir Army Airfield, the Eastern Army Aviation Training Site, a helicopter training center, an educational complex for combat arms training through the 166th Regiment, and the Northeast Counterdrug Training Center. The facility trains over 100,000 troops each year and is the second largest employer in Lebanon County (Fort Indiantown Gap National Guard Training Center, 2013, 2014).

CPL South would cross the Fort Indiantown Gap National Guard Training Center for a total distance of 0.9 mile at four locations in Lebanon County:

- MP 54.9;
- MPs M-0168 0.4 to M-0168 0.8;
- MPs 56.8 to 57.1; and
- MP 57.6.

No facilities or active training areas are known to exist within or in the immediate vicinity of the proposed pipeline route. Construction of CPL South would affect about 6.5 acres of land within the Fort Indiantown Gap National Guard Training Center property, about 3.1 acres of which would be retained as permanent right-of-way. Transco continues to coordinate with the U.S. National Guard regarding the pipeline crossing.

Pennsylvania State Game Land 211 and Appalachian National Scenic Trail

CPL South would cross Pennsylvania SGL 211 between MPs 59.8 to M-200 0.3 in Lebanon County. The proposed CPL South crossing of the Appalachian Trail would be within SGL 211. A total of 2.9 acres of SGL land, all of which is upland forest, would be affected during construction, about 1.5 acres of which would be retained as permanent right-of-way. Transco is requesting a 50-foot-wide permanent easement from the PGC. Transco developed a site-specific plan for a horizontal bore crossing of the Appalachian Trail.

The Appalachian Trail is a 2,185-mile-long public foot trail that extends from Georgia to Maine and crosses scenic, wooded, pastoral, and culturally significant lands in the Appalachian Mountains. The Appalachian Trail is a federal, state, and local partnership that was started by Benton MacKaye in 1922 as a local or regional trail. In 1925, the Appalachian Trail Conference, now known as the Appalachian Trail Conservancy, was formed in Washington, D.C. The National Trails System Act of 1968 authorized the Appalachian Trail as a unit of the National Park System, and the National Park Service (NPS) is the lead federal agency for management of the Appalachian Trail. Today the Appalachian Trail Conservancy coordinates with 31 separate local trail clubs, the NPS, the U.S. Forest Service, and numerous state and local groups to mark and maintain the Appalachian Trail (NPS, 2014a). The Appalachian Trail is open year round; however, sections may temporarily close due to weather or other reasons (NPS, 2015a). The Appalachian Trail Conservancy recommends mid-April to mid-June and September to October for hiking in Pennsylvania but does not recommend hiking during summer months due to the heat and scarcity of water (Appalachian Trail Conservancy, 2015).

The Appalachian Trail extends west to east across the length of Lebanon County, Pennsylvania; therefore, the feature cannot be avoided by the CPL South pipeline route. The proposed CPL South route crosses the Appalachian Trail at MP M-200 0.1 on land owned by the Commonwealth of Pennsylvania and managed by the PGC within SGL 211. One route alternative was incorporated, and others have been considered, related to the trail crossing (see section 3.3.2 for additional information).

On January 29, 2015, Transco met with the PGC to discuss the crossing of SGL 211 and the Appalachian Trail. The PGC stated that it would be responsible for coordinating with the NPS and the Appalachian Trail Conservancy regarding the trail crossing and requested that Transco participate in this coordination. The PGC also indicated that, by agreement with the NPS, it is responsible for avoiding or minimizing impacts on a 200-foot-wide buffer (400 feet in total) on each side of the Appalachian Trail to the extent practicable. Therefore, PGC requested that Transco evaluate the feasibility of a trenchless crossing design in this area to avoid or minimize surface effects within this buffer.

Transco submitted a right-of-way application for crossing SGL 211 to the PGC in September 2015. In consultation with the PGC, Transco developed a site-specific crossing plan for the Appalachian Trail that incorporates all the required conditions of the right-of-way license, including timing restrictions, notification measures, and safety and other measures. Direct impacts on the trail would be avoided by use of the conventional bore crossing method, which would avoid tree clearing between the entry and exit sides of the crossing (a 100-foot forested buffer would be maintained on either side of the trail). Construction is estimated to last a total of about 3 weeks, during which the trail would remain open. Measures Transco would implement to minimize effects on the Appalachian Trail and its users include but are not limited to: advance notification of the construction schedule to the PGC; advance installation of signage on both sides of the trail to notify users of construction work; installation of chain-link safety fencing around the bore site to prevent access to the construction area; use of a spotter at the trail crossing to direct hikers across the right-of-way in a safe and courteous manner; and restoration of the disturbed area within SGL 211 in accordance with all licenses and permits obtained from the PGC.

On July 19, 2016, the PGC's Board of Game Commissioners approved Transco's proposed mitigation for the crossing of the Appalachian Trail and is in the process of executing a right-of-way license agreement. As part of the agreement with the PGC, Transco would convey about 177.0 acres of adjacent land in Eldred Township, Monroe County to SGL 168, and 120.0 acres of adjacent land in Jefferson Township, Lackawanna County to SGL 300. Transco would also compensate the PGC for standard habitat and surface and timber damages, and would remit a standard annual license fee for the lifetime of the right-of-way license.

<u>Rausch Creek Off-Road Park</u>

The Rausch Creek Off-Road Park is a private 3,000-acre park that offers over 30 miles of trails for four-wheel drive vehicles and primitive campsites for visitors (Rausch Creek Off-Road Park, n.d.(a)). The park is open year round, with the exception of Thanksgiving Day, December 25, and part of the deer rifle season in December. CPL South would cross the Rausch Creek Off-Road Park between MPs 71.4 and 72.0 in Schuylkill County. About 89.5 acres of the off-road park's land would be affected during construction, 3.5 acres of which would be retained as permanent right-of-way. Transco coordinated with the park to identify suitable measures to minimize disturbance to the recreation area and its visitors.

Transco proposes to cross Rausch Creek Off-Road Park using conventional pipeline construction methods. Construction activities would last about 16 weeks; however, each affected trail would be closed for only about 1 week. In consultation with the landowner, Transco developed a site-specific crossing plan for the Rausch Creek Off-Road Park. Measures Transco would implement to minimize effects on the trails and their users include but are not limited to: advance notification and frequent updates of the construction schedule to Rausch Creek Off-Road Park; advance installation of signage notifying users of construction work and trail closures; installation of chain-link safety fencing to prevent access to the construction area; use of monitors and flagmen when construction equipment traverses the trail outside of scheduled closures; and repair and restoration of all trails in accordance with all applicable permits and agreements.

Pennsylvania State Game Land 132

CPL South would cross Pennsylvania SGL 132 between MPs 78.9 and 79.7 in Schuylkill County collocated with an existing oil pipeline right-of-way. Although SGL 132 contains hiking trails, these trails would not be crossed by CPL South. The PGC indicated that no special hunting, fishing, or other events take place within SGL 132. A total of 14.3 acres of SGL 132 land would be affected during construction. Following construction, Transco would maintain an additional 4.5 acres of permanent right-of-way adjacent to the existing oil pipeline right-of-way through SGL 132. As part of the application process to cross SGL 132, Transco is coordinating with the PGC to identify suitable measures to minimize disturbance to the SGL and its visitors. During a meeting on January 15, 2015, the PGC requested that no work be conducted within SGL 132 from October 1 to December 30 and during a 3-week period in the spring related to the turkey season (exact dates to be determined for 2016 and 2017). Transco is developing a site-specific crossing plan in coordination with the PGC for SGL 132. Transco submitted a right-of-way application for SGL 132 to the PGC in September 2015 and is developing a site-specific crossing plan that would include all required conditions of the right-of-way license related to timing restrictions, notification measures, and safety and other mitigation measures. This plan would be filed with Transco's Implementation Plan, for FERC's review, prior to construction of the Project.

Pennsylvania State Game Land 084

CPL South would cross Pennsylvania SGL 084 between MPs M-0194 1.0 and MP 83.4 along an existing electric transmission line right-of-way in Schuylkill and Northumberland Counties. Although hiking trails are located on SGL 084, the trails would not be crossed by CPL South. The PGC indicated that no special hunting, fishing, or other events take place within SGL 084. A total of 11.8 acres of SGL 084 land would be affected during construction. Following construction, Transco would maintain an additional 5.1 acres of permanent right-of-way adjacent to the existing right-of-way through SGL 084. Transco is coordinating with the PGC to identify suitable measures to minimize disturbance to SGL 084 and its visitors. During a meeting on January 15, 2015, the PGC requested that no work be conducted within SGL 084 from October 1 to December 30 and during a 3-week period in the spring related to the turkey season (exact dates to be determined for 2016 and 2017). Transco submitted a right-of-way application for SGL 084 to the PGC in September 2015 and is developing a site-specific crossing plan that would include all required conditions of the right-of-way license related to timing restrictions, notification measures, and safety and other mitigation measures. This plan would be filed with Transco's Implementation Plan, for FERC's review, prior to construction of the Project.

Anthracite Outdoor Adventure Area

The Anthracite Outdoor Adventure Area (AOAA) is a 6,500-acre recreation facility in Northumberland County. The facility, which opened for use in 2013, is on county-owned property reclaimed from land strip-mined for coal and managed by the AOAA Authority. The AOAA will eventually offer motorized and non-motorized trails for a wide variety of outdoor recreation, including off-highway vehicle trails, walking trails, hiking trails, primitive and full-service camping areas, horse trails, biking areas, side-by-side trails, and hunting access (Pashek Associates, Ltd., 2011). The AOAA intends to convert trails for snowmobiles, cross-country skiing, and other winter recreational activities, as weather and snowfall levels allow.

CPL South would cross the eastern portion of the AOAA, known as the eastern reserve, between MPs 83.8 and MP 84.4. The eastern reserve, which opened in the spring of 2014, contains all-terrain vehicle trails and is open year round. About 19.6 acres of AOAA land would be affected, 3.4 acres of which would be retained during operation. On December 10, 2014, Transco met with AOAA representatives to discuss the crossing and suitable measures to minimize disturbance to the recreation area. Transco has obtained an easement agreement from Northumberland County to cross the AOAA and, in consultation with the AOAA Authority, has developed a site-specific crossing plan. Transco proposes to cross 14 AOAA trails using conventional pipeline construction methods. Construction activities would last about 16 weeks. Each of the trails would be closed for about 1 week during construction; however, Transco has agreed to maintain at least 12 of the 14 trail crossings available for all-terrain vehicle and four-wheel drive passenger vehicle use at any given time and to maintain a vehicle crossing on an existing dirt road near MP 85.3 for use by emergency response vehicles. Measures Transco would implement to minimize effects on the trails and their users include but are not limited to: advance notification and frequent updates of the construction schedule to the Northumberland County Commissioners and the AOAA Welcome Center; advance installation of signage at each trail crossing to notify users of construction work and trail closures; installation of chain-link safety fencing to prevent access to the construction area; use of monitors and flagmen when construction equipment traverses the trail outside of scheduled closures; and repair and restoration of all trails damaged by construction in accordance with all applicable permits/agreements.

<u>Sproul State Forest</u>

Sproul State Forest is the largest forest in the state forest system, covering over 305,000 acres; it is managed by the PADCNR, Bureau of Forestry. Various recreational activities allowed within the forest include horseback riding, mountain biking, off-road use of all-terrain vehicles, cross-country skiing, and snowmobiling (PADCNR, 2009). In addition, Sproul State Forest is managed for timber production.

Chapman Loop would cross Sproul State Forest at four locations in Clinton County:

- MPs L186.1 to MP L186.1;
- MPs L187.2;
- MPs 187.6 to MP L187.8; and
- MPs L188.3 and L188.6.

The portion of Chapman Loop that would cross Sproul State Forest would be collocated with Transco's existing Leidy Line system. A total of 8.7 acres of Sproul State Forest land would be affected during construction, a portion of which would be within the existing right-of-way. Transco is proposing to install an MLV and communication tower within Sproul State Forest near MP L188.6. The acreage required for construction and operation of the MLV and communication tower is included in the total acreage required for construction. Following construction, Transco would maintain an additional 2.6 acres of permanent right-of-way adjacent to the existing right-of-way through Sproul State Forest.

Transco has minimized potential effects on Sproul State Forest by collocating Chapman Loop with the existing Leidy Line and siting the looping away from any active recreation areas. Transco submitted a right-of-way permit application to the PADCNR in April 2015, and met with the agency in July 2015 and March 2016 to discuss the Project and potential impact minimization measures. Transco is developing a site-specific crossing plan for Sproul State Forest that would include all required conditions of the right-of-way license, including timing restrictions, notification measures, and safety and other mitigation measures. This plan would be filed with Transco's FERC-required Implementation Plan prior to construction of the Project. Transco continues to work with the PADCNR to identify suitable measures to minimize disturbance to Sproul State Forest and its visitors.

Virginia

Prince William County Designated Open Space

Prince William County defines "Open Space" as land not dominated by man-made structures that has been "set aside to preserve natural or cultural resources, provide for passive recreation, [to be] used for cultivated fields or forests, or exist[s] in a natural and undeveloped state." The Mainline A and B Replacements would cross designated Prince William County Open Space between MPs 1,578.7 and 1,579.0 of the Transco Mainline system, which includes a portion of an asphalt trail used by residents for walking and riding bicycles. Transco coordinated with Prince William County regarding the recreational use of the open space to minimize disturbance to the trail during construction. Transco subsequently developed a site-specific crossing plan, which includes specific measures Transco would implement during construction to minimize disturbance to the open space/trail and its users.

Transco proposes to cross the Prince William County Designated Open Space using conventional pipeline construction methods. Construction activities across the trail and in the immediate vicinity would last about 16 weeks. Transco determined that establishing an alternate route for trail users during construction was infeasible and that two temporary trail closures, with a total duration of about 2 weeks, would be necessary. As detailed in Transco's site-specific crossing Plan, Transco would notify Prince William County at least 2 months ahead of the construction start date and post signage alerting trail users of the upcoming closure at least 2 weeks prior to construction. Transco would also install chain-link safety fencing to keep trail users out of the work area during construction periods and would post monitors and flagmen when construction equipment traverses the trail outside of scheduled closures. Following construction, Transco would restore the trail to its preconstruction condition. Because Transco would operate the Mainline A and B Replacements completely within the existing Transco Mainline system permanent right-of-way, effects on the open space area are not expected from operation of the Project.

To further minimize effects on recreation and special interest areas crossed by the Project, **we recommend that**:

- **<u>With its Implementation Plan,</u> Transco should file with the Secretary final site-specific crossing plans for each of the recreation and special interest areas listed as being crossed or otherwise affected in table 4.8.6-1. The site-specific crossing plans should include, as applicable:**

  a. site-specific timing restrictions;

  b. proposed closure details and notifications (e.g., reroutes, signage, public notices);

  c. specific safety measures; and/or

  d. other mitigation Transco would implement to minimize effects on the recreation areas and their users during construction and operation of the Project.

  In addition, the site-specific crossing plan for SGL 206 should include specific safety measures Transco would implement during work activities in the vicinity of the on-site shooting range.

We received comments from the DOI's office of Environmental Policy and Compliance regarding potential effects of the Project on recreational access to the Captain John Smith Chesapeake

National Historic Trail. Because the trail is so extensive and there are numerous public access points, we believe that construction and operation of the Project would have minimal to no effect on recreational access to the trail. Sections 4.10.2 and 4.13.8.6 of this EIS include descriptions of potential effects on cultural resources and evocative landscapes[28] associated with the trail.

4.8.6.2 Conservation Programs

The Project would cross a number of areas enrolled in a variety of federal and Commonwealth of Pennsylvania conservation programs including:

- Conservation Reserve Program (CRP)/Conservation Reserve Enhancement Program (CREP);
- Wetland Reserve Program (WRP);
- Farm and Ranch Lands Protection Program (FRPP);
- Clean and Green Program; and
- Agricultural Security Areas (ASA) and agricultural conservation easements.

The Project would not cross any known Pennsylvania Community Conservation Partnership Program properties.

The NRCS administers the WRP and the FRPP, and the Farm Service Agency administers the CREP and CRP. These programs are described below.

The CRP is a land conservation program administered by the FSA. In exchange for a yearly rental payment, farmers enrolled in the program agree to remove environmentally sensitive land from agricultural production and plant species that will improve environmental health and quality. The long-term goal of the program is to reestablish valuable land cover to help improve water quality, prevent soil erosion, and reduce loss of wildlife habitat (USDA, 2014b).

The CREP is a federal/state natural resource conservation program established to improve the water quality of the Chesapeake Bay. The program is part of a larger effort to address state and nationally significant agriculture-related environmental problems. The Pennsylvania CREP is managed jointly by the Farm Service Agency and the Commonwealth of Pennsylvania, although numerous other federal and state agencies and private conservation groups are partners in the program (USDA, 2011; Pennsylvania CREP, 2014; Commonwealth of Pennsylvania, 2013). Through CREP, program participants receive financial incentives from the USDA to remove cropland or marginal pastureland from agricultural production and convert the land to native grasses, trees, and other vegetation.

Table 4.8.6-2 lists the known properties crossed by the Project that may be enrolled in the CRP and CREP. Pipeline construction across CRP/CREP program lands involving herbaceous cover would result in only temporary effects and would not negatively affect program enrollment. After construction, restoration of the workspace would be tailored in these specific areas to meet the long-term objectives for the land enrolled in these programs. These areas would be seeded with mixes in the property's original conservation plan if the species and cultivars are available. Conversely, construction across land enrolled in CRP/CREP programs with provisions for tree plantings on the proposed permanent right-of-way would have a permanent effect. Transco has not yet determined where all of the CRP/CREP lands involving tree planting are located, but is working with the Farm Service Agency and landowners to identify these areas. Transco would develop restoration measures to ensure enrolled properties remain eligible to participate in the programs.

[28] Evocative landscapes are "places possessing a feeling that expresses the aesthetic or historic sense of a particular period of time" (NPS, 2011).

TABLE 4.8.6-2

Conservation Reserve Program/Conservation Reserve Enhancement Program Properties Crossed by the Atlantic Sunrise Project [a]

Facility/County/Tract	CRP/CREP	Begin Milepost	End Milepost
CPL North			
Columbia County			
PA-CO-276.000	CREP	2.6	2.7
Luzerne County			
PA-LU-187.000	CRP	20.2	20.7
Wyoming County			
PA-WY-080.100	CRP	38.2	38.6
PA-WY-091.000	CREP	39.1	39.8
PA-WY-148.000	CRP	46.7	46.9
Susquehanna County			
PA-SU-004.000	CRP	51.1	51.5
CPL South			
Lebanon County			
PA-LE-026.000	CRP	39.2	40.0
PA-LE-109.000	CREP	50.5	50.6
PA-LE-228.000	CRP	62.1	62.5
PA-LE-229.100	CRP	62.5	63.0
Schuylkill County			
PA-SC-013.200	Unknown	66.4	66.4
PA-SC-014.100	Unknown	66.4	66.8
PA-SC-019.000	Unknown	67.0	67.3
PA-SC-079.000	Unknown	76.1	76.1
PA-SC-079.001	Unknown	76.2	76.6
Northumberland County			
PA-NO-022.000	Unknown	88.1	88.4
Columbia County			
PA-CO-188.000	Unknown	114.2	114.7
PA-CO-201.000	Unknown	115.5	115.9
PA-CO-212.000	Unknown	117.7	118.0
PA-CO-215.000	CREP	118.3	118.6
PA-CO-218.000	CREP	119.0	119.2
PA-CO-218.001	Unknown	119.2	119.6
Unity Loop			
Lycoming County			
PA-LY-012.000	Unknown	121.1 121.4	121.3 121.5
PA-LY-012.001	Unknown	121.3	121.4
PA-LY-014.000	Unknown	121.5	121.7
PA-LY-060.000	Unknown	127.2	127.7
PA-LY-061.000	Unknown	127.7	127.8
PA-LY-062.000	Unknown	127.8	128.0
PA-LY-064.000	Unknown	128.0	128.1
PA-LY-066.000	Unknown	128.1	128.7
PA-LY-069.000	Unknown	128.8	128.9

[a] All properties that may be enrolled in the CRP/CREP programs are in Pennsylvania.

The WRP was a voluntary wetland conservation program that offered landowners the opportunity to protect, restore, and enhance wetlands on their property through measures designed to establish long-term conservation and wildlife practices and protection. The purpose of WRP is to restore, protect, and enhance wetlands on eligible private or tribal lands while maximizing wildlife habitat benefits. The program was managed by the NRCS from 1990 to 2013, when funding for the WRP expired and the program was superseded by the Agricultural Conservation Easement Program, which was established under the Agricultural Act of 2014.

The FRPP was a program that provided matching funds to help purchase development rights to keep productive farm and ranchland in agricultural uses. The purpose of FRPP is to protect agricultural use and related conservation values of eligible land by limiting nonagricultural uses of the land. State, tribal, or local governments and non-governmental organizations, as well as other entities that could become certified, had more flexibility and a shorter process to acquire easements (USDA, n.d.(b)). The Agricultural Act of 2014 also repealed the FRPP.

Although the WRP and FRPP were repealed, the Agricultural Act of 2014 does not affect the terms or validity of any WRP or FRPP contract, agreement, or easement entered into prior to the date of enactment (February 7, 2014) or any associated payments required to be made in connection with any existing WRP or FRPP contracts, agreements, or easements (USDA, 2014b).

One known WRP easement is near the proposed CPL North route near MP 43.5 in Wyoming County. Because the CPL North workspace would not cross this WRP easement, construction and operation of CPL North would not likely affect it.

Our consultation with the NRCS identified five NRCS conservation easements crossed by the CPL South route:

- two in Lancaster County, one at about MP 12.7 and one at about MPs M-0164 0.0 to 34.5;
- two in Lebanon County at about MPs 42.5 to 42.6 and MPs 44.5 to 45.0; and
- one in Schuylkill County at about MPs 80.3 to 80.5.

NRCS deed terms are attached as addendums to agricultural preservation easements granted to the Commonwealth of Pennsylvania or to a county Agricultural Lands Preservation Board. The underlying easements contain a provision specifically allowing the landowner to continue to grant rights-of-way for natural gas pipelines in and through the preserved land. In addition, the granting of rights-of-way for natural gas pipelines approved by FERC, whether through condemnation or an agreement with the landowner, is specifically exempted from Agricultural Lands Condemnation Approval Board review per Title 3 Pennsylvania Statutes and Consolidated Statutes section 913(b). The Project would not permanently affect the tilling of the soil, and any effects on prime, unique, or important soils would be temporary and limited to the period of construction. In addition, Transco would implement the mitigation measures included in its Agricultural Plan to minimize effects on agricultural lands. The NRCS has requested to be notified 1 week prior to the start of construction activities within the NRCS-held easement acreage so that the installation process can be monitored to ensure that work stays within the right-of-way boundaries, soil compaction is minimized, and vegetation cover is established on all acreage within the disturbance area. Therefore, **we recommend that:**

- **Transco should notify the NRCS at least <u>1 week prior to the start of construction activities within each NRCS-held easement</u> to facilitate NRCS monitoring of**

construction and restoration of disturbed areas within the NRCS-held easements. The NRCS notifications should be documented in Transco's <u>weekly</u> status reports.

The Clean and Green Program (Act 319) is administered by the Pennsylvania Department of Agriculture with the goal of preserving agricultural land and forestland. Lands that meet the requirements of this program are subject to tax breaks. Once enrolled in the program, lands must maintain the specified acreage and use indefinitely or incur roll-back taxes for the last 7 years plus 6 percent interest. Land devoted to subsurface transmission or gathering lines is not subject to the roll-back tax (The General Assembly of Pennsylvania House Bill No. 144). Additionally, amendments to Act 319 (Act 88 of 2010 and Act 34 of 2011) allow portions of the lands enrolled in the Clean and Green Program to be used for oil and gas exploration and extraction and pipe storage yards without the imposition of roll-back taxes on the entire tract (Pepe and Kortlandt, 2010).

The Project would cross 431 tracts enrolled in this program (see table O-3 in appendix O). Due to the amendments to Act 319, the construction and operation of the pipeline facilities would not disqualify landowners currently enrolled in the Clean and Green Program from receiving tax benefits, and those tracts enrolled in the Clean and Green Program would maintain their eligibility and not be subject to any roll-back taxes despite being transected by pipeline facilities. However, portions of the West Diamond, North Diamond, and River Road Regulator Station sites; the Zick Meter Station site; and the Compressor Stations 605 and 610 sites would be on tracts enrolled in the Clean and Green Program. The permanent placement of aboveground facilities on a tract of land would not preclude a landowner's participation in the Clean and Green Program for the entire tract but it would constitute a change in use for land already enrolled in the program and, therefore, the landowner would be liable for roll-back taxes for the portion of the land affected by the aboveground facility. Transco states it would negotiate compensation of fees or penalties, including roll-back taxes and increased annual taxes, as part of the land purchase or easement agreement if the Project would render the tract or a portion of the tract ineligible for the program.

An ASA is a unit of land of 250 or more acres reserved for agricultural production of crops, livestock, or livestock products that have been designated as such under Pennsylvania Code 1967 P.L. 992, No. 442 and 32 P.S. sections 5001–5012. ASA lands are provided protection from laws prohibiting agricultural activities. The ASA designation does not restrict the use of the property, which can be developed in any manner authorized by local ordinances and regulations. An agricultural conservation easement is a protection placed on a tract of land to prevent future development or improvement for any purpose outside of agricultural production (Pennsylvania Farmland Preservation Association, 2012). For a parcel to qualify for an agricultural conservation easement, it typically must first be designated as an ASA, after which the owner may apply for the purchase of an agricultural conservation easement. In addition, the existence of utility facilities does not typically prevent land from being designated as an ASA or agricultural conservation easement.

The known agricultural conservation easements crossed by the Project are listed in table 4.8.6-3. Agricultural conservation easement programs crossed by the Project include the Lancaster Agricultural Preserve, Lancaster County Conservancy, Lancaster Farmland Trust, Lebanon Agricultural Preserve, Lebanon Valley Conservancy, and NRCS FRPP. An ASA designation does not prohibit the landowner from developing oil or gas on the land (Wolfgang, 2011). Therefore, construction and operation of the pipeline facilities would not affect the classification of ASA tracts. Transco would restore agricultural properties with conservation easements in accordance with the methods described in section 4.8.4 and further detailed in the Transco's Agricultural Plan (see attachment 6 of the ECP).

TABLE 4.8.6-3

Pennsylvania Conservation Easements Crossed by the Atlantic Sunrise Project

Facility	Easement Type	Begin Milepost	End Milepost	Land Affected During Construction (acres)	Land Affected During Operation (acres)
CPL North					
Luzerne County					
PA-LU-188.000	PADCNR	20.7	20.7	1.0	0.3
Susquehanna County					
PA-SU-040.000	ASA	M-0062 0.0	56.3	4.7	2.5
CPL South					
Lancaster County					
PA-LA-002-B.000	ASA/Lancaster Agricultural Preserve	0.0	0.1	6.4	0.5
PA-LA-009-B.000	Lancaster Agricultural Preserve	0.5	0.7	5.9	1.6
PA-LA-018-B.000	ASA	0.6	1.9	7.5	2.8
PA-LA-050-B.000	ASA/Lancaster Agricultural Preserve	M-0184 0.0	M-0184 0.4	6.3	2.4
PA-LA-052-B.000	Lancaster Agricultural Preserve	M-0184 0.4	M-0184 0.9	6.9	2.7
PA-LA-071-B.000	Lancaster Farmland Trust	5.3	5.5	3.7	1.5
PA-LA-078-B.000	ASA/Lancaster Agricultural Preserve	6.2	6.6	7.9	2.9
PA-LA-083-B.000	Lancaster County Conservancy	6.9	7.0	0.7	0.2
PA-LA-084-B.000	Lancaster County Conservancy	7.0	7.0	0.4	0.1
PA-LA-095-B.100	Lancaster Farmland Trust/Lancaster County Agricultural Preserve Board	7.9	8.1	3.3	1.4
PA-LA-099-B.000	Lancaster Agricultural Preserve	8.2	8.7	6.8	2.5
PA-LA-101-B.000	ASA	8.7	8.8	2.4	0.9
PA-LA-004-C.000	ASA	9	9.3	1.2	0.4
PA-LA-007-C.000	Lancaster Farmland Trust	10.4	10.8	5.7	2.1
PA-LA-115-B.000	ASA/Lancaster Farmland Trust	9.6	9.9	3.5	1.4
PA-LA-123-B.000	ASA/Lancaster Farmland Trust	10.3	10.6	4.8	1.9
PA-LA-124-B.000	ASA/Lancaster Farmland Trust	10.7	11.1	7.0	2.6
PA-LA-126-B.000	ASA/Lancaster Farmland Trust	11.2	11.3	1.9	0.8
PA-LA-139-B.000	ASA	12.4	12.4	0.1	<0.1
PA-LA-140-B.000	ASA/Pennsylvania Department of Agriculture/FRPP	12.4	12.7	4.2	2.1
PA-LA-145-B.000	Lancaster Agricultural Preserve/ Lancaster Farmland Trust	M-0152 0.0	13.1	7.3	2.4
PA-LA- 187.000	Lancaster Agricultural Preserve	13.8	14.2	6.0	2.4
PA-LA- 191.000	Lancaster Agricultural Preserve	14.6	14.9	4.4	1.7
PA-LA-195.001	ASA	15.3	15.5	3.1	1.3
PA-LA-202.000	ASA/Lancaster Agricultural Preserve	15.6	15.9	5.3	2.0
PA-LA-205.000	Lancaster Agricultural Preserve	15.9	16.1	2.6	1.0
PA-LA209.100	ASA/Lancaster Agricultural Preserve	16.1	16.3	1.3	0.8
PA-LA-213.000	ASA/Lancaster Agricultural Preserve	M-0185 0.1	16.6	5.6	2.1
PA-LA-215.000	ASA	16.7	16.9	4.0	1.6
PA-LA-216.000	ASA	16.9	17.2	5.2	2.0
PA-LA- 224.000	Lancaster Agricultural Preserve	17.9	18.3	6.9	2.6
PA-LA- 225.000	ASA	18.3	18.8	8.6	3.3
PA-LA-227.000	ASA/Lancaster Agricultural Preserve	18.8	19.3	7.6	2.9
PA-LA-236.000	Lancaster Agricultural Preserve	19.3	19.6	3.8	1.5

TABLE 4.8.6-3 (cont'd)

Pennsylvania Conservation Easements Crossed by the Atlantic Sunrise Project

Facility	Easement Type	Begin Milepost	End Milepost	Land Affected During Construction (acres)	Land Affected During Operation (acres)
PA-LA-236.002	ASA/Lancaster Agricultural Preserve	19.6	19.9	4.0	1.5
PA-LA-251.000	Lancaster Agricultural Preserve and Lancaster Farmland Trust	21.1	21.5	6.3	2.2
PA-LA-254.000	ASA/Lancaster Agricultural Preserve and Lancaster Farmland Trust	21.9	22.1	3.8	1.6
PA-LA-294.100	Lancaster Agricultural Preserve	24.2	24.4	4.9	1.7
PA-LA-295.100	Lancaster Agricultural Preserve	24.45	24.45	0.4	0.2
PA-LA-334.000	ASA	29.7	29.9	3.8	1.3
PA-LA-357-B.100	ASA/Lancaster Agricultural Preserve	31.5	32.2	12.1	4.3
PA-LA-372-B.000	ASA/Lancaster Agricultural Preserve/FRPP	M-0164 0.0	34.5	7.5	2.8
PA-LA-374-B.000	ASA	34.45	34.58	1.6	0.7
PA-LA-375-B.000	Lancaster Agricultural Preserve	34.6	34.8	3.8	1.4
PA-LA-376-B.000	Lancaster Agricultural Preserve	34.8	35.1	4.1	1.6
PA-LA-377-B.000	ASA/Lancaster Agricultural Preserve	35.1	35.5	6.8	2.5
PA-LA-379-B.000	ASA/Lancaster Agricultural Preserve	35.5	35.6	1.8	0.7
PA-LA-381-B.000	ASA/Lancaster Agricultural Preserve	36.1	36.2	2.8	1.0
Lebanon County					
PA-LE-014.000	ASA/Lebanon Agricultural Preserve/CREP	37.9	38.5	9.9	3.7
PA-LE-051.100	ASA/Lebanon Agricultural Preserve/FRPP				
PA-LE-051.110	ASA	42.7	42.7	0.9	0.4
PA-LE-051.120	ASA	42.7	43.0	4.9	1.9
PA-LE-051.130	ASA	43.0	43.0	0.3	0.1
PA-LE-051.140	ASA	43.01	43.2	3.1	1.2
PA-LE-066.000	ASA/Lebanon Agricultural Preserve	44.3	44.4	2.7	1.0
PA-LE-067.000	ASA/Lebanon County Agricultural Preservation Board/FRPP	44.42	44.8	8.3	3.1
PA-LE-070.000	ASA/Lebanon Agricultural Preserve	45.0	45.3	6.3	2.2
PA-LE-088.000	ASA/CREP	47.6	48.0	6.0	2.4
PA-LE-129.000	ASA/Lebanon Agricultural Preserve	52.5	52.9	6.6	2.1
PA-LE-157.100	ASA	54.9	55.3	5.8	2.3
PA-LE-175.000	ASA	56.6	56.7	2.2	0.8
PA-LE-228.000	ASA/Lebanon Valley Conservancy	62.1	62.5	5.2	2.0
PA-LE-229.100	Lebanon Valley Conservancy	62.5	63.0	6.7	3.2
Schuylkill County					
PA-SC-108.000	ASA / Schuylkill County Agricultural Preservation Board/FRPP	80.3	80.5	2.3	0.7
PA-SC-114.000	ASA	81.0	81.4	5.2	2.1
PA-SC-116.000	ASA	M-0194 0.3	M-0194 0.5	3.9	1.5
PA-SC-118.000	ASA	M-0194 0.5	M-0194 0.8	1.6	0.6
PA-SC-118.001	ASA	82.2	82.3	1.8	0.7
Columbia County					
PA-CO-056.000	ASA	97.9	M-0174 0.1	5.3	2.0
PA-CO-057.000	ASA	M-0174 0.4	98.8	12.4	4.8
PA-CO-154.000	ASA	109.5	109.6	2.4	0.9

We received comments from the PADCNR suggesting that the Project may cross several properties previously funded through the Land and Water Conservation Fund, including Ricketts Glen State Park, Sproul State Forest, and SGLs 84, 206, 211, and 229. Transco consulted with the PADCNR and PGC and confirmed that SGLs 84 and 211 were not previously funded through the Land and Water Conservation Fund and SGL 229 is not crossed by the Project. Transco is working with the PADCNR and PGC to develop site-specific crossing plans that would include all required conditions of the right-of-way licenses for the crossings of Ricketts Glen State Park, Sproul State Forest, and SGL 206 (see section 4.8.6.1).

We received a number of comments on the draft EIS regarding local and private conservation easements not identified in table 4.8.6-3, including Lancaster Farmland Trust and Lebanon Valley Conservancy easements. Transco provided an updated list of conservation easements crossed by the Project in August 2016. However, to ensure that all conservation easements have been identified prior to construction of the Project, **we recommend that:**

- **<u>With its Implementation Plan</u>, Transco should file with the Secretary a revised table 4.8.6-3 that includes any newly identified conservation easements including copies of correspondence documenting any mitigation measures Transco would implement based on its consultation with the administering agency(ies).**

4.8.6.3 Other Special Use Lands

Pennsylvania State Scenic Rivers

The Pennsylvania Scenic Rivers Act (P.L. 1277 Act No. 283, as amended by Act 110, May 7, 1982) established procedures and criteria for designating rivers for inclusion in the Scenic Rivers System. To be eligible for inclusion in the Scenic Rivers System, a river must be recommended by the PADCNR, be free-flowing, and possess outstanding aesthetic and recreational values of present and potential benefit to the citizens of Pennsylvania. Rivers included in the Scenic Rivers System are classified as wild, scenic, pastoral, recreational, or modified recreational. Individual waterbodies in Pennsylvania require specific legislative action for designation. The Project would cross one waterbody, Tucquan Creek, that is designated as Wild and Scenic by the Pennsylvania Scenic Rivers Act. CPL South would cross Tucquan Creek in a corridor managed by the Lancaster County Conservancy near MP 3.9. While the PADCNR is responsible for designating scenic rivers, the approval of the crossing would be part of PADEP permitting process. The existing land use where CPL South would cross the Tucquan Creek scenic corridor is agricultural land.

Transco investigated crossing Tucquan Creek using the conventional bore method; however, after review of the geotechnical testing results Transco determined the method was not feasible. As currently proposed, Transco would cross Tucquan Creek using the dam-and-pump crossing method but would reduce the construction right-of-way width to 75 feet. Construction would temporarily impact the visual character at the crossing location, but the effect would be temporary because the crossing would be in an agricultural area, which would be quickly restored following installation of the pipeline. Following construction, land within the permanent right-of-way would be allowed to revert to the pre-existing agricultural use.

Pennsylvania Recreationally Navigable Streams

The mission of the PFBC is "to protect, conserve and enhance the Commonwealth's aquatic resources and provide fishing and boating opportunities." The PFBC is responsible for promoting fishing and boating and regulating and enforcing fishing and boating laws and regulations in Pennsylvania. In order to ensure safe operation of recreational boats, the PFBC uses aids to navigation within recreationally navigable streams (PFBC, 2013b). Through consultation with the PFBC, Transco identified 23 waterbody crossings in Pennsylvania where Aids to Navigation Plans are requested (see table 4.8.6-4). The plans would include signage and buoys to alert waterway users of the construction ahead, as well as to guide waterway users through or around the Project during construction. Transco would submit Aids to Navigation Plans to the PFBC as part of the state permitting process. **We recommend that:**

- **Prior to construction, Transco should file with the Secretary copies of the Aids to Navigation Plans approved by the PFBC for each of the waterbody crossings listed in table 4.8.6-4.**

TABLE 4.8.6-4

Pennsylvania Waterbody Crossings with Required Aids to Navigation Plans for the Atlantic Sunrise Project

Facility/County	Milepost (s)	Waterbody Name	Surveyed Stream Width at Crossing Location (linear feet)
CPL North			
Columbia County	1.3	Fishing Creek	68
Luzerne County	14.5	Huntington Creek	25
	18.1	Harvey's Creek	43
Wyoming County	35.0	Susquehanna River (HDD crossing)[a]	615
	43.7	South Branch Tunkhannock Creek	74
	49.3	Tunkhannock Creek	80
CPL South			
Lancaster County	8.2	Pequea Creek	89
	12.3	Conestoga River[b]	142
	23.9	Chiques Creek	58
	34.5	Little Chiques Creek	14
Lebanon County	37.5	Conewago Creek	18
	49.3	Swatara Creek[b]	145
Schuylkill County	76.1	Pine Creek	13
	78.0	Deep Creek	35
	80.3	Mahantango Creek	40
Northumberland County	83.4	Mahanoy Creek	56
	86.0	Shamokin Creek[c]	< 5
Columbia County	91.8 and 92.3	South Branch Roaring Creek[c]	< 5
	95.9	Roaring Creek	54
	99.7	Susquehanna River (HDD Crossing)[a]	949
	107.0	Little Fishing Creek	40
Unity Loop County			
Lycoming County	L120.6	West Branch Little Muncy Creek	31
	L127.1	Sugar Run	14

[a] Aids to Navigation Plan would not be needed if no areas of work or equipment staging pose impacts on water recreation or pose a safety issue for recreational users.
[b] Streams wider than 100 feet at the crossing site would require a buoy permit in addition to the Aids to Navigation Plan.
[c] Further determination by the PFBC is needed to determine if an Aids to Navigation Plan is required due to stream width.

BicyclePA Routes

BicyclePA routes follow existing roadways and rail-trails and were designed by experienced bicyclists (Pennsylvania Department of Transportation [PennDOT], n.d.). The Project would cross the following three BicyclePA routes:

- BicyclePA Route Y – CPL North would cross BicyclePA Route Y at MP 43.9, which corresponds to the proposed Route 6 crossing near Factoryville Township in Wyoming

County. Route Y is 409 miles long and is the second longest BicyclePA bicycle route in the state (PennDOT n.d.).

- <u>BicyclePA Route S 2</u> – CPL South would cross BicyclePA Route S at MP 20.6, which corresponds to the proposed Columbia Avenue crossing in West Hempfield Township in Lancaster County.

- <u>BicyclePA Route J-1</u> – CPL South would cross BicyclePA Route J-1 at MP 27.6, which corresponds to the proposed East Main Street crossing in Rapho Township in Lancaster County.

Transco is consulting with PennDOT on these BicyclePA routes as part of the road crossing permit process. However, no direct effects on any of the BicyclePA routes would be anticipated because Transco is proposing to cross the bicycle routes and adjacent roadways using the conventional bore crossing method.

Other Areas

Thomas and Joan Byron (Byrons) submitted comments and indicated that their property is enrolled in Pennsylvania's Clean and Green Program and that it is used for a variety of public uses, such as hosting soccer and lacrosse games and cross country running events, including recent use by 17 Division III colleges for the Mid-American Conference cross country championship. The Byrons proposed a minor route alternative (CPL North Alternative 11) that would move the pipeline route to their property boundary to minimize effects. See section 3.3.2 for more information regarding this alternative.

4.8.7 Landfills and Hazardous Waste Sites

Based on field and database research, as well as consultations with federal, state, county, and local agencies, Transco identified potential contaminated sites within 0.25 mile of Project. Additional information on contaminated soil, groundwater, and sediments near the proposed facilities is provided in sections 4.2.2.6 and 4.3.1.6. Transco's and our research and consultations identified one potential railroad bed landfill located near CPL South MP 66.8. Based on discussions between Transco and the property owner, the site potentially contains tree stumps, tin cans, household wastes, tires, and home appliances buried about 40 feet below the ground surface. Transco completed a geophysical investigation to evaluate the extent of buried waste associated with the potential landfill and determined that subsurface debris could be encountered within the pipeline workspace. If subsurface debris is encountered, Transco would implement the measures in its *Unanticipated Discovery of Contamination Plan* and manage any excavated subsurface debris in accordance with applicable state and federal solid waste management regulations. Such protocols include the suspension of construction activities when suspected contamination is encountered, evacuations if necessary, proper notifications, and follow-up actions as appropriate including mobilization of emergency response personnel and regulatory agency coordination.

4.8.8 Visual Resources

4.8.8.1 Pipeline Facilities

Visual resources along the proposed pipeline route are a function of geology, climate, and historical processes, and include topographic relief, vegetation, water, wildlife, land use, and human uses and development. A portion of the new, looping, and replacement pipelines (about 27 percent) would be installed within or parallel to existing rights-of-way. As a result, the visual resources along these portions of the Project have been previously affected by other similar activities.

The typical construction and permanent right-of-way widths are described in detail in section 4.8.1.2; however, some areas would be wider to provide extra workspace for MLVs, road and railroad crossings, waterbody and wetland crossings, additional spoil storage for topsoil segregation or other spoil, steep topography, existing utility right-of-way crossings, and adjacent utilities.

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

Visual impacts would be greatest where the pipeline route parallels or crosses roads and the pipeline right-of-way may be seen by passing motorists; from residences where vegetation used for visual screening or for ornamental value is removed; and where the pipeline is routed through forested areas. The duration of visual impacts would depend on the type of vegetation that is cleared or altered. The duration of impact from clearing would be shortest in open areas where the reestablishment of vegetation following construction would be relatively rapid. The predominant land use that would be crossed by the pipelines is agricultural land, which accounts for 51 percent of the lands crossed. Visual impacts associated with pipeline construction in agricultural areas along the route would be temporary and include the presence of equipment during the construction period as well as post-construction visual scarring. Any visual scarring would be evident until new crops are planted. After planting of the crops, the visual impact of pipeline construction would be minor, but the visual evidence of construction may last for a few years until crop productivity on the right-of-way matches the adjacent off right-of-way areas.

The duration of visual impacts would be greater in forested land, which comprises about 30 percent of the lands crossed. After construction, all disturbed areas, including forested areas, would be restored in compliance with Transco's ECP and Plan; federal, state, and local permits; landowner agreements; and easement requirements. Generally this would include seeding the restored areas with grasses and other herbaceous vegetation, after which trees would be allowed to regenerate within the temporary workspaces. The visual effects of construction on forested areas would be permanent on the maintained right-of-way where the regrowth of trees would not be allowed, and would be long term, lasting several years, in the temporary work spaces. The greatest potential visual effect would result from the removal of large specimen trees, but even the visual effects of removing smaller trees would last for several years.

Visual effects are also often associated with recreation areas, trails, and water trails that are valued for their scenic quality. Recreational areas valued for scenic qualities that would be crossed by the pipeline facilities include the Appalachian Trail, Tucquan Creek, Ricketts Glen State Park, and Swatara State Park. These areas are discussed in more detail below.

Appalachian National Scenic Trail

The proposed CPL South route crosses the Appalachian Trail in a forested area within SGL 211 at MP M-200 0.1 on land owned by the Commonwealth of Pennsylvania and managed by the PGC. Transco evaluated the feasibility of a trenchless crossing design in this area to minimize surface impacts, including visual effects. Transco developed a site-specific crossing plan and proposes to cross the Appalachian Trail using the conventional bore crossing method. The plan indicates that tree clearing would be avoided between the entry and exit sides (a 100-foot forested buffer would be maintained on either side of the trail), and the trees cleared from the workspaces at the entry and exit sides of the crossing would be restored. Use of the conventional bore method to cross the Appalachian Trail, maintaining the trees between the entry and exit sites, and restoring the trees cleared from the workspaces would minimize the visual effects of the pipeline crossing on the trail.

Tucquan Creek

CPL South would cross Tucquan Creek, classified as a Pennsylvania State Scenic River, in a corridor managed by the Lancaster County Conservancy near MP 3.9. The existing land use where CPL South would cross the Tucquan Creek scenic corridor is agricultural land. Transco investigated crossing Tucquan Creek using the conventional bore method; however, after review of the geotechnical testing results Transco determined the method was not feasible. As currently proposed, Transco would cross Tucquan Creek using the dam-and-pump crossing method but would reduce the construction right-of-way width to 75 feet. Construction would affect the visual character at the crossing location but the effects would temporary because the land within the permanent right-of-way would be allowed to revert to the pre-existing agricultural use.

Ricketts Glen State Park

CPL North would cross the southernmost tip of Ricketts Glen State Park at two locations, one between MPs 7.4 and 7.9 and the other at MP 8.4 (see section 4.8.6.1). The entire portion of CPL North that would cross Ricketts Glen State Park is collocated with Transco's existing Leidy Line system. Because the visual resources along this portion of CPL North have been previously affected by other similar activities, the effects on visual resources would be limited primarily to the period of construction. The long term impact would include an incremental and permanent widening of the existing corridor but the visual effect would be consistent with the existing conditions.

Swatara State Park

The CPL South pipeline route would be about 0.1 mile west of Swatara State Park at MP 8.5 in Lebanon County, Pennsylvania. Due to the distance between CPL South and Swatara State Park and because they are separated by a forested area, the pipeline right-of-way would not likely be visible from the park. Therefore, no effects on the existing views from Swatara State Park would be anticipated.

Captain John Smith Chesapeake National Historic Trail

We received comments from the DOI's office of Environmental Policy and Compliance regarding potential effects of the Project associated with the Captain John Smith Chesapeake National Historic Trail. Transco conducted a visual assessment of the Project to determine where the new permanent right-of-way may be visible from the Susquehanna River due to tree clearing and post-construction vegetation maintenance. Sections 4.10.2 and 4.13.8.6, provide a detailed description of the Project's potential impacts on the trail.

4.8.8.2 Aboveground Facilities

No visually sensitive recreation areas were identified within 0.25 mile of the new aboveground facilities; however, new compressor stations have the potential to be viewed by nearby residences. In addition, Transco is proposing to construct 12 new or replacement communication towers at aboveground facilities, some of which may be visible from nearby residences due to height. Transco would implement measures to reduce the visibility of the compressor stations and communication towers as described below.

Compressor Stations

The following mitigation measures would be employed to minimize the visibility at the new compressor stations:

- Each station would be surrounded by a perimeter fence.
- Outdoor lighting would be limited to the minimum amount required for security during unmanned nighttime operation, while maintaining Occupational Safety and Health Administration safety standards for lighting.
- The main gates, yards, and all building entry and exit doors would have lighting for security; however, these lights would have directional control or would be directed in a downward position to minimize their visibility in the direction of local residences. New communication towers associated with the compressor stations would not have lighting.

Compressor Station 605 would be within a rural residential and agricultural area surrounded by forested land. The closest residence would be 0.3 mile west of the site. Because the existing vegetation would provide sufficient visual screening; Transco is not proposing to install additional visual screening measures at Compressor Station 605. However, as described below, the proposed communication tower may be visible.

Compressor Station 610 would be within a rural residential and agricultural area with scattered forests. The existing land cover surrounding Compressor Station 610 comprises upland forest to the north and east, and agricultural land to the south and west. The closest residence is 0.1 mile west of the site. Transco has committed to providing additional visual screening, comprising landscaping and evergreen tree plantings, along the majority of the southern side of the property to minimize the visibility of Compressor Station 610 from the south.[29] The existing vegetation would provide visual screening to the northeast. We received a letter from Congressman Lou Barletta regarding a landowner's (Mr. Harry Mathias, Jr.) request that Transco design Compressor Station 610 to look like other modern barns in the area. Mr. Mathias, Jr.'s property is about 0.6 mile east of the compressor station. An existing tree line to the east of the compressor station would provide visual screening; however, the communication tower would be partially visible from Mr. Mathias, Jr's property. Because only a portion of the communication tower would be visible from the property, we conclude that designing the compressor station to look like a barn would not provide any additional visual screening of Compressor Station 610 from the Mr. Mathias Jr.'s property and, therefore, would not be necessary.

Communication Towers

Land cover data collected during field surveys and a review of aerial photography were used to identify the existing land uses, conditions, and nearest visual receptor at each of the 12 proposed new or replacement communication tower sites (see table 4.8.8-1). A description of the potential visual effects at each location is provided below.

[29] A more detailed description of the plant species, quantity, installed height and spread, and mature height and spread is available on the FERC website at http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20160920-5019 (see attachment 3).

TABLE 4.8.8-1

Land Use Types and Visual Receptors Associated with the Proposed Communication Towers for the Atlantic Sunrise Project

Facility/ID	Milepost	Proposed Tower Height (feet)	Closest Sensitive Receptor	Approximate Distance and Direction to Receptor	Existing Land Use
CPL North					
West Diamond Regulator Station/ CN-MLV-01	0.0	40	Private residence	950 feet southeast	Agricultural land with isolated forested areas
CN-MLV-02	6.7	90	Private residence	500 feet north	Upland forest
North Diamond Regulator Station/CN-MLV-03	21.2	90	Private residence	1,000 feet southeast	Agricultural land and upland forest
Compressor Station 605/ CN-MLV-05	44.9	190	Private residence	1,700 feet west	Agricultural land with isolated forested areas
Zick Meter Station/ CN-MLV-06	57.3	190	Private residence	700 feet south	Agricultural land, upland forest, and isolated industrial areas (Zick Compressor Station)
CPL South					
CS-MLV-08	67.7	90	Private residence	350 feet south	Agricultural land
CS-MLV-09	80.8	90	Private residence	1,500 feet northwest	Agricultural land
Compressor Station 610/ CS-MLV-12	122.5	190	Private residence	750 feet west	Agricultural land and upland forest
Chapman Loop					
LFC-MLV-01	L186.0	90	Sproul State Forest	500 feet north	Upland forest
LFC-MLV-02	L188.9	90	Sproul State Forest	Not applicable	Upland forest
Mainline A and B Replacements					
MLVs 180A25/180B25	1580.0	90	Private residence	900 feet west	Upland forest, transportation land, and open land
Modified Aboveground Facilities					
Compressor Station 520	N/A	100a	Private residence	500 feet west	Open land and upland forest

[a] The existing communication tower at Compressor Station 520 would be replaced with a free-standing tower.

West Diamond Regulator Station/CN-MLV-01

The 40-foot-tall communication tower associated with the West Diamond Regulator Station and MLV CN-MLV-01 would be adjacent to the existing Leidy Line system right-of-way surrounded by upland forest and agricultural land. The nearest residence is about 950 feet southeast of the proposed communication tower. Existing forested areas would provide natural visual screening of the communication tower from the residence. The tower would not be lighted.

CN-MLV-02

The 90-foot-tall communication tower associated with MLV CN-MLV-02 would be adjacent to the existing Leidy Line system right-of-way surrounded by upland forest. The nearest residence is about 500 feet north of the proposed communication tower. Existing forested areas would provide natural visual screening of the communication tower from the residence. The tower would not be lighted.

North Diamond Regulator Station/CN-MLV-03

The 90-foot-tall communication tower associated with the North Diamond Regulator Station and MLV CN-MLV-03 would be adjacent to the existing Leidy Line system right-of-way surrounded by upland forest and agricultural land. The nearest residence is about 1,000 feet southeast of the proposed communication tower. Existing forested areas would provide natural visual screening of the communication tower from the residence. The tower would not be lighted.

Compressor Station 605/CN-MLV-05

As described above, Compressor Station 605 would be within a rural residential and agricultural area surrounded by forested land. The nearest residence is about 1,700 feet west of the proposed free-standing lattice-type communication tower. The existing surrounding forested areas would provide natural visual screening of a portion of the communication tower; however, the tower would be partially visible from the residence due to its height (190 feet). The tower would not be lighted.

Zick Meter Station/CN-MLV-06

The 190-foot-tall communication tower associated with the existing Zick Meter Station and MLV CN-MLV-06 would be surrounded by agricultural land and upland forest. The nearest residence is about 700 feet south of the proposed tower. The residence and the communication tower site would be separated by agricultural land, which would not provide any natural visual screening. However, Transco proposes to site the tower adjacent to an existing industrial facility to minimize any alteration of existing views. The tower would not be lighted.

CS-MLV-08

The 90-foot-tall monopole communication tower associated with MLV CS-MLV-08 would be in a rural residential and agricultural area with scattered forests. The nearest residence is 350 feet south of the proposed tower site. The existing forested areas would provide visual screening of the tower from the nearest residences to the northeast and south; however, the tower would be partially visible above the tree line. The tower would not be lighted.

CS-MLV-09

The 90-foot-tall monopole communication tower associated with MLV CS-MLV-09 would be in an agricultural area adjacent to an existing junk yard. The nearest residence is 1,500 feet northwest of the proposed tower site. Any impacts on existing views from nearby residences would be minimal due to the tower's proximity to the existing junk yard. The tower would not be lighted.

Compressor Station 610/CS-MLV-12

As described above, the free-standing lattice-type communication tower associated with Compressor Station 610 and CS-MLV-12 would be within a rural residential and agricultural area with scattered forests. The existing land cover surrounding the Compressor Station 610 site is upland forest to the north and east and agricultural land to the south and west. The closest residence is about 750 feet west of the proposed tower. Transco has committed to providing additional visual screening on the southern side of the property to minimize the visibility of the compressor station and communication tower. However, the tower would be partially visible from the residence due to its height (190 feet). The tower would not be lighted.

LFC-MLV-01

The 90-foot-tall communication tower associated with MLV LFC-MLV-01 would be within the existing Leidy Line system right-of-way surrounded by upland forest. The nearest residence is about 500 feet north of the proposed tower. The surrounding forest vegetation would minimize visibility of the communication tower; however, it would be visible from portions of Sproul State Forest. The tower would not be lighted.

LFC-MLV-02

The 90-foot-tall communication tower associated with MLV LFC-MLV-02 would be within the existing Leidy Line system right-of-way surrounded by upland forest. The surrounding forest vegetation would minimize visibility of the communication tower; however, it would be visible from portions of Sproul State Forest. The tower would not be lighted.

MLVs 180A25/180B25

The 90-foot-tall communication tower associated with MLVs 180A25/180B25 would be within the existing Transco Mainline right-of-way. The surrounding land uses would comprise transportation land, upland forest, and open land. The closest residence is about 900 feet west of the proposed tower. The forested areas between the residence and the communication tower would provide natural visual screening. The tower would not be lighted.

Compressor Station 520

The communication tower associated with Compressor Station 520 would be within the existing fence line for the compressor station. Transco is proposing to replace the existing 60-foot-high communication tower with a new 100-foot-high communication tower. The nearest residence is about 500 feet west of the proposed tower. Because the site already contains a communication tower, the effects of the new tower on existing views from nearby residences would likely be minimal. The tower would not be lighted.

4.9 SOCIOECONOMICS

The socioeconomic conditions and impacts associated with construction and operation of the Project are described below. The analysis focuses on the pipeline facilities, compressor stations, and meter stations in Pennsylvania. It does not include an analysis of the Mainline A and B Replacements in Virginia, proposed facility modifications at nine existing compressor stations (Compressor Stations 520, 517, 190, 185, 170, 160, 155, 150, and 145), or other modifications to the existing aboveground facilities in Maryland, North Carolina, and South Carolina. The socioeconomic effects of the proposed replacements and facility modifications in Virginia, Maryland, North Carolina, and South Carolina would be minor in nature and insignificant and, as such, are not further evaluated in this EIS.

The primary socioeconomic impacts of the Project include population effects associated with the influx of construction workers and the impacts of these workers on public services and temporary housing during construction. Secondary socioeconomic effects include increased vehicle traffic necessary to move materials, equipment, and workers to and from the right-of-way, increased property tax revenue, job opportunities, and income associated with local construction employment.

4.9.1 Population and Employment

Table 4.9.1-1 provides a summary of selected demographic and socioeconomic conditions for the communities that would be affected by the Project in Pennsylvania. The major occupations in the project area are in the fields of education, health and social services, manufacturing, and retail trade.

TABLE 4.9.1-1

Existing Economic Conditions for the Area Surrounding the Atlantic Sunrise Project Components in Pennsylvania

County [a]	2013 Population [b]	Population Density (persons/ sq. mi.) [b]	Per Capita Income ($US dollars) [b]	Unemployment Rate for 2014 (percent) [c]	Civilian Workforce [b]	Top Three Industries [b,d]
Susquehanna	42,677	51.8	25,012	5.7	21,121	A, B, C
Wyoming	28,120	70.8	24,327	6.4	14,114	A, B, C
Luzerne	320,894	360.4	24,689	6.9	159,326	A, C, B
Lycoming	116,921	95.2	23,285	5.7	59,202	A, B, C
Clinton	39,733	44.7	22,190	6.6	19,069	A, B, C
Columbia	65,855	136.3	23,780	5.4	32,857	A, B, C
Northumberland	94,366	205.9	22,695	6.2	45,185	A, C, B
Schuylkill	147,303	189.2	23,281	6.6	70,569	A, B, C
Lebanon	135,119	373.4	26,148	4.5	70,133	A, B, C
Lancaster	526,549	557.9	26,093	4.1	274,355	A, B, C

Source:
[a] Counties are ordered from north to south.
[b] U.S. Census Bureau, 2013
[c] U.S. Department of Labor, 2014
[d] Industry Key:
A = Educational Services and Health Care and Social Assistance
B = Manufacturing
C = Retail Trade

The population in potentially affected Pennsylvania counties ranges from 28,120 to 526,549, and population densities range from 44.7 to 557.9 people per square mile (U.S. Census Bureau, 2013). The county-level civilian workforces range from 14,114 to 274,355 people. Based on 5-year estimates, average per capita incomes in these counties range from $22,190 to $26,148, which are lower than the Pennsylvania average of $28,502. Unemployment rates within the potentially affected Pennsylvania counties range from 4.1 to 6.9 percent (U.S. Department of Labor, 2014).

Construction of the Project would temporarily increase the population in the affected counties and possibly some adjacent counties. Table 4.9.1-2 lists the size of the estimated construction workforce for the Project. We estimate that the highest concentration of workers would occur throughout 2017. Workforce numbers at any given facility would vary during this period depending on the activity, but would generally range from a low of about 58 workers to a high of about 985 workers. The peak construction workforce across all project components would total about 2,496 workers (see table 4.9.1-2). Once the pipeline, compressor stations, and meter stations are completed, the workforce numbers would decrease substantially.

TABLE 4.9.1-2

Estimated Workforce and Work Schedule for the Atlantic Sunrise Project Components in Pennsylvania

Project Facility	County/State	Crossing Length (miles) [a]	Construction Duration (months)	Construction Workforce (Min–Max)
Pipeline Facility				
CPL North	Susquehanna	6.7	12	580–656
	Wyoming	23.4		
	Luzerne	22.3		
	Columbia	5.0		
CPL South	Columbia	34.4	12	810–985
	Northumberland	8.1		
	Schuylkill	18.4		
	Lebanon	28.4		
	Lancaster	36.8		
Pipeline Loops				
Chapman Loop	Clinton	2.9	4	170-195
Unity Loop	Lycoming	8.6	6	145-164
Aboveground Facilities				
Compressor Station 605	Wyoming	N/A	12	66–88
Compressor Station 610	Columbia	N/A	12	66–88
Zick Meter Station	Susquehanna	N/A	6	58–64
Springville Meter Station	Wyoming	N/A	6	58–64
North Diamond Regulator Station	Luzerne	N/A	6	58–64
West Diamond Regulator Station	Columbia	N/A	6	58–64
River Road Regulator Station	Lancaster	N/A	6	58–64

[a] Crossing lengths were calculated based on start and end milepost, thus they may not reflect the true crossing length.
N/A = Not applicable

As shown in table 4.9.1-3 the increase in the transient construction workforce would account for an increase of 1.0 percent of the existing 2013 county population totals.

TABLE 4.9.1-3

Transient and Local Construction Workforce by County in the Vicinity of the Atlantic Sunrise Project

County [a]	Local Construction Workforce	Transient Construction Workforce	Total Construction Workforce	Peak Transient Workforce as a Percentage of 2013 Population (percent)
Susquehanna	51–57	152–171	203–223	0.4
Wyoming	67–79	202–237	269–316	0.8
Luzerne	51–57	152–171	203–228	<0.1
Lycoming	36–41	109–123	145–164	0.1
Clinton	43–49	127–146	170–195	0.4
Columbia	108–128	323–385	431–513	0.6
Northumberland	41–49	121–148	162–197	0.2
Schuylkill	41–49	121–148	162–197	0.1
Lebanon	41–49	121–148	162–197	0.1
Lancaster	55–65	165–196	220–261	<0.1

Source: U.S. Census Bureau, 2013
[a] All counties are in Pennsylvania. Counties are ordered from north to south.

Assuming the construction workforce comprises a maximum of 2,496 individuals and about 75 percent of the total workforce would be non-local, there would be an influx of about 1,873 workers into the area due to construction of the Project. The project effects on the total population could be higher than just the number of non-local workers if these workers bring family members with them. The U.S. Census Bureau (2013) reports the average household size as 2.60 persons. If all of the non-local workers are accompanied by average-sized families, the population in the area could increase by about 6,490 people during construction. Given the population of the project area (totaling 1,517,537[30]) and distribution of the construction workforce, the addition of 6,490 people would not be a significant change.

During the operations phase, the Project would employ about 15 permanent full-time personnel, in addition to the current full-time personnel, to maintain and operate the pipeline, compressor stations, and associated facilities. It is anticipated that these additional staff would include 2 managers, 2 maintenance coordinators, 1 measurement specialist, and 10 technicians. These personnel either would be hired locally or would be permanently relocated to the region and would have a negligible impact on the local population.

Construction would result in a temporary but positive impact on employment for counties within the project area. Transco anticipates hiring between 534 and 623 local Pennsylvania construction workers with the requisite experience for the installation of the natural gas facilities. Local hires also would include paving, landscape, fencing, or hauling contractors; appraisers; and industrial suppliers in Pennsylvania, and would likely come from the affected or nearby counties. Additional construction personnel hired from outside the project area would include supervisory personnel and inspectors who would temporarily relocate to the project area. Local hiring could temporarily decrease the unemployment rate in the affected counties. According to the U.S. Department of Labor, the average unemployment rate in 2014 ranged from a low of 4.1 percent in Lancaster County to a high of 6.9 percent in Luzerne County (see table 4.9.1-1); thus, ample workers would likely be available to meet the Project's needs. If a larger than anticipated percentage of non-local workers is required to meet peak workforce requirements, sufficient workers should be available in the labor pool in the surrounding counties and states.

In addition to direct hires, we expect that the Project would also provide a number of temporary indirect jobs associated with purchases of food, clothing, lodging, gasoline, and entertainment by non-local workers. These indirect jobs would have a temporary, stimulatory effect on the local economy.

4.9.2 Housing

Housing statistics for the counties that would be affected by the Project are presented in table 4.9.2-1. Based on a 5-year average (2009 to 2013), the number of vacant housing units across the 10 potentially affected counties in Pennsylvania ranged from a high of 18,785 vacant units in Luzerne County to a low of 2,360 vacant units in Wyoming County (U.S. Census Bureau, 2013). Rental vacancy rates varied from 6.0 percent in Clinton County, to 1.0 percent in Wyoming County.

[30] This total reflects the combined population of Susquehanna, Wyoming, Luzerne, Lycoming, Clinton, Columbia, Northumberland, Schuylkill, Lebanon, and Lancaster Counties.

TABLE 4.9.2-1

Housing Statistics by County in the Vicinity of the Atlantic Sunrise Project

County [a]	Owner Occupied	Renter Occupied	Median Monthly Housing Costs ($US dollars)	Seasonal, Recreational, or Occasional Use	Vacant Units	Rental Vacancy Rate (percent)	Number of Hotels/ Motels
Susquehanna	13,190	3,962	691	4,155	5,765	3.6	210
Wyoming	8,551	2,347	687	1,413	2,360	1.0	276
Luzerne	86,495	42,919	669	2,905	18,785	3.0	3,518
Lycoming	31,984	13,600	705	3,099	6,854	4.4	1,136
Clinton	10,637	4,158	627	2,810	4,191	6.0	512
Columbia	18,164	7,859	673	1,226	3,476	2.3	731
Northumberland	27,968	11,282	600	515	5,693	3.3	510
Schuylkill	43,857	15,307	609	1,619	9,892	4.7	545
Lebanon	36,948	15,120	749	788	3,604	2.2	842
Lancaster	134,601	59,297	884	839	10,563	4.1	5,958

Source: U.S. Census Bureau, 2013

[a] All counties are in Pennsylvania. Counties are ordered from north to south.

Temporary housing availability varies seasonally and geographically within the counties and communities near the proposed facilities. The demand for temporary housing in the project area is generally greatest during the summer months when tourism is at its highest. Temporary housing is available in the form of daily, weekly, and monthly rentals in motels and hotels. Table 4.9.2-1 provides the approximate number of hotels/motels in the counties that would be crossed by the Project. Other available temporary housing such and bed and breakfast facilities, apartments, and vacation properties are not included. Therefore, the actual availability of temporary housing is greater than presented in table 4.9.2-1.

Construction of the Project could temporarily decrease the availability of housing in the area. The Project could have short-term positive impact on the area rental industry through increased demand and higher rates of occupancy; however, no significant impacts on the local housing markets are expected. Assuming that the local construction workers do not require new housing, a total of 1,873 housing units for the non-local project workforce may be required during peak construction activities. Given the vacancy rates (1.0 to 6.0 percent) and the number of vacant housing units in the Pennsylvania counties that would be affected by the Project, construction crews should not encounter difficulty in finding temporary housing. At a maximum, the workforce would utilize less than 0.1 percent of the vacant housing units. While some of the construction activity would be conducted during the peak tourism season, sufficient temporary housing is still likely to be available, but may be more difficult to find and/or more expensive to secure. Additional housing options for construction workers (as well as tourists) not reported here include campgrounds, bed and breakfast lodges, and inns. We also find that there is no evidence that existing, interstate natural gas pipelines in Pennsylvania have resulted in a decrease in tourism. Therefore, impacts on tourism due to the construction of the Project are expected to be minimal. The estimated 15 new permanent employees required for operation of the Project would have no measureable impact on local housing stocks.

4.9.3 Public Services

The counties that would be affected by the Project in Pennsylvania offer a wide range of public services and facilities including full-service law enforcement, paid and volunteer fire departments, schools, and hospitals. All 10 counties also have sheriff/police departments, and there are several hospitals in the area; the three closest being the Geisinger-Bloomsburg Hospital in Columbia County (about 3 miles), Good Samaritan Hospital in Lebanon County (about 6 miles), and Tyler Memorial Hospital in Wyoming County, Pennsylvania (about 7 miles).

Table 4.9.3-1 provides an overview of selected public services available in the larger municipalities in the project area.

TABLE 4.9.3-1

Public Service Infrastructure for the Atlantic Sunrise Project

County [a]	Number of Fire Department and Emergency Medical Services	Number of Police Precincts/ Departments [b]	Number of Public School Districts (number of schools) [c]	Number of Hospitals (number of beds)
Susquehanna	17	7	6 (15)	2 (46)
Wyoming	8	4	2 (11)	1 (48)
Luzerne	60	43	11 (95)	3 (836)
Lycoming	22	14	13 (88)	3 (252)
Clinton	16	6	1 (35)	1 (47)
Columbia	21	10	6 (35)	2 (173)
Northumberland	41	15	6 (53)	1 (89)
Schuylkill	129	45	12 (55)	3 (350)
Lebanon	29	16	6 (68)	1 (172)
Lancaster	79	33	16 (528)	4 (1,123)

Sources: Pennsylvania Department of Education, 2014; Pennsylvania Department of Health, 2014; Pennsylvania Office of the State Fire Commissioner, 2013; USACOPS, 2014

[a] All counties are in Pennsylvania. Counties are ordered from north to south.

[b] Includes municipal and university police departments, state police offices, sheriff's offices, and constables.

[c] Includes public, private, and Amish schools.

Based on the number of police and fire stations, schools, and hospitals, there appears to be adequate public service infrastructure in the project area to accommodate the temporary needs of the 1,873 non-local construction workers and their families.

Transco would require each of its contractors to have a health and safety plan, covering location-specific or work-specific requirements, to minimize the potential for the on-the-job accidents. The contractor and Project's site safety staff are responsible for monitoring compliance with the plans. In the event of an accident, police, fire, and/or medical services could be needed, depending on the type of emergency. However, the anticipated demand for these services is not expected to exceed the existing capabilities of the emergency service infrastructure. Short-term impacts on certain other public services are possible, which would include the need for localized police assistance or certified flaggers to control traffic flow during construction activities. Additional information regarding traffic and public safety assistance necessary to support traffic controls is provided in section 4.9.4. Based on the duration of the construction schedule, we expect that only a portion of the non-local workers would relocate families to the area, because this would require temporarily switching students to a new school, and presumably back to their previous school the following year. Those students that are relocated would reside throughout the project area and would be dispersed among multiple schools and school districts. Based on the number and size of schools in the project area, there appears to be adequate education infrastructure in the vicinity of the proposed pipeline to accommodate any temporary educational needs of the non-local construction workers and their families.

Transco has established a community grant program that would benefit the local communities within the counties traversed by the Project. The grant program was established to identify and help fund noteworthy projects that benefit the surrounding communities. Some of these projects may include improvements to local public services.

In summary, there are ample public services available in the area to meet the needs of the Project during both construction and operation. The effects on public services would be greater during construction due to the size of the construction workforce, but these effects would be temporary. Operation of the pipeline would require the addition of 15 full-time permanent positions. The impacts on public services due to these employees would be negligible, but permanent.

4.9.4 Transportation and Traffic

A network of interstate highways, state and county routes, and local roads traverse the project area and would facilitate access to the pipeline facilities and worksites. Furthermore, freight rail lines run by Class 1 Railroad Operators, including Canadian Pacific and Norfolk Southern Railway, serve almost all of the project area counties in Pennsylvania (PennDOT, 2014).

In Pennsylvania, Interstate 81 (I-81) conveys traffic through the upper and middle regions of the project area, running east of the CPL North and CPL South pipeline corridor from northernmost Susquehanna County to Lebanon County. In Lebanon County, I-81 crosses to the west side of CPL South and continues west, where I-83 becomes the primary north-to-south interstate serving Lebanon and Lancaster Counties within the southern project area. The other major north-to-south routes that serve the area are U.S. Highway 11 and U.S. Highway 6. U.S. Route 220 provides north-to-south access near the northern Pennsylvania counties, and U.S. Route 222 primarily serves the Lancaster County portion of the project area.

Three major east-to-west interstate highways traverse the middle and southern regions of the Pennsylvania portion of the Project, providing ready access to a majority of the pipeline facilities. Listed from north to south, the intersecting interstate highways are I-80, I-78, and I-76, which cross through Columbia, Lebanon, and Lancaster counties. In the northern portion of the project area, CPL North crosses U.S. Route 6. Several other U.S. highways cross the remaining Pennsylvania counties, including U.S. Routes 209, 422, and 222. In general, transportation infrastructure in the middle and southern portions of the project area is more robust than in the northern portion.

The majority of the pipeline would be in rural areas, and most of the roads affected by the Project would be county or private roads. Construction of the Project could affect transportation and traffic across and within roadways and railroads due to increased vehicle traffic associated with the commuting of the construction workforce to the work area as well as the movement of construction vehicles and delivery of equipment and materials.

During construction, Transco would utilize equipment tracking mats, special construction entrances, or other appropriate measures to minimize the amount of soil tracked from the right-of-way onto roadways. In accordance with Transco's ECP, construction crews would remove any dirt or debris that is tracked onto roadway surfaces at construction entrances. Once construction is complete, Transco would be responsible for repairing any damage to roads resulting from construction activities.

Construction of the pipeline would require a peak workforce of 2,496 workers distributed along the length of pipeline route. Transco expects the majority of the workforce to be on site prior to peak morning commuting hours and to depart after peak evening commuting hours. Transco also proposes to utilize buses to transport workers from designated parking locations to the construction work areas.

When buses are not practicable, workers would be encouraged to carpool to further reduce any potential effects on the traffic.

4.9.4.1 Construction Across and Within Roadways and Railroads

The Project would require crossings of 401 public and private roads and 11 railroads (10 active and 1 abandoned). Detailed lists of the road and railroad crossings and the proposed crossing methods are provided in tables F-1 and F-2 of appendix F. Roads would be crossed by the open-cut, convention bore, or HDD methods. Three railroads would be crossed using the HDD method, two of which are associated with the HDD crossing of the Susquehanna River. All other railroads would be conventionally bored. Descriptions of the conventional bore and HDD construction techniques are provided in section 2.3. Open-cut road crossing methods are described below. The use of conventional bore and HDD crossing methods would avoid surface impacts for 111 road crossings and all of the railroad crossings, but the use of the open-cut crossing method would not.

The open-cut crossing method would be used at 307 private and public roads, and driveway crossings. Transco would install traffic controls as needed prior to excavating, and would excavate the trench across the road, one lane at a time. One lane would be left open for the majority of the process, except for the short period of time when the pipeline is lowered into the trench. Steel plates would be kept on site and available to be placed across the trench if necessary to allow vehicle access in the event of an emergency. If alternate routes around any particular crossing location are necessary, Transco may temporarily close the road and detour traffic around the area.

Transco developed a *Traffic and Transportation Management Plan*, which is included as attachment 16 of Transco's ECP. This plan contains details regarding:

- the locations and types of temporary traffic control measures that would be used, including signage, channelization devices, barricades, and flagmen;
- a communication plan for notifying the public about the location and duration of road closures;
- the crossing of private driveways; and
- emergency access management procedures, covering the use of temporary travel lanes and the use of steel plate bridges to cover the open trench in the event that emergency vehicles need to use the roadway.

We find that Transco's plan would adequately reduce impacts on traffic flow; and based on the mitigation measures listed above, we expect the impacts from construction across and within roadways to be minor and temporary.

Construction activities associated with the compressor stations and meter stations could result in short-term impacts on transportation infrastructure. These activities would be similar to those associated with the pipeline and would include increased traffic flow due to movement of construction vehicles, personnel, and equipment; and potential damage to local roadways from heavy construction equipment. Given the relatively low numbers of workers that would commute, we do not expect traffic delays associated with construction of the compressor stations or meter stations.

4.9.5 Property Values and Mortgages

We received comments regarding the potential effect of the Project on property values and/or the party responsible for paying property taxes for the pipeline easement. The property owner would be responsible for any property taxes associated with the area encompassed by a permanent easement. Property taxes for a parcel of land are generally based on the actual use of the land. Construction of the Project would not change the general use of any parcels crossed; however, where Transco has proposed new pipeline right-of-way, the new pipeline would preclude the construction of permanent structures on the right-of-way. If the landowner believes that the presence of the pipeline easement reduces the value of his/her land, resulting in an overpayment of property taxes, the landowner may appeal the issue of the assessment and subsequent property taxation to the local property taxation agency.

As described in section 4.8.2, Transco would acquire easements for both the temporary (construction) and permanent rights-of-way and compensate landowners for the easements, the use of workspace during construction, and any construction-related damages. Transco would offer farmland owners and/or tenants (owner/tenant) a compensation plan for crop damages that includes provisions for the owner/tenant to identify crop yield deficiencies. Additional details regarding compensation for crop damages are included in Transco's Agricultural Plan, which is included as attachment 6 of Transco's ECP.

About 1,054.5 acres of forested land (1.043.2 acres of upland forest and 11.3 acres of forested wetland) would be affected during construction of the Project. Transco has retained local appraisers to review the route, and timber appraisals would be conducted on an individual property basis. Landowners would be compensated for any marketable timber that is removed from their property. Impacts on agricultural land and forestland are described in sections 4.5 and 4.8.

Land values would be determined by appraisals that take into account objective characteristics of the property such as size, location, and any improvements. The value of a tract of land would be related to many tract-specific variables, including the current value of the land, the utilities and services available or accessible, the current land use, and the values of the adjacent properties. The valuations generally do not consider subjective aspects such as the potential effect of a pipeline. That is not to say that the presence of a pipeline, and the restrictions associated with a pipeline easement, could not influence a potential buyer's decision to purchase a property. If a buyer is looking for a property for a specific use, which the presence of the pipeline renders infeasible, then the buyer may decide to purchase another property more suitable to their objectives. For example, a buyer wanting to develop the land for a commercial property with sub-surface structures may not find the property suitable, but a farmer looking for land for grazing or additional cropland could find it suitable for their needs. This would be similar to other buyer-specific preferences that not all homes have, such as close proximity to shopping, relative seclusion, or access to high-quality school districts.

Several studies examined the effects of pipeline easements on sales and property values and evaluated the impact of natural gas pipelines on real estate. The first study, *Pipeline Impact Study: Study of a Williams Natural Gas Pipeline on Residential Real Estate: Saddle Ridge Subdivision, Dallas Township, Luzerne County, Pennsylvania* prepared by the firm of Allen, Williford & Seale, Inc., assessed the impact on the sale price of undeveloped lots and single-family residences that have a natural gas transmission line easement on the property (Allen, Williford & Seale, Inc., 2014). The report compared units in a subdivision in Luzerne County that had an existing natural gas transmission line located within it. Differences between the sale prices of undeveloped lots and houses with the pipeline easement and those that did not have an easement were analyzed. The report found that, when the sales prices of the encumbered residences were compared with the sales prices of the unencumbered residences, there was no indication that the pipeline easement had any effect on the sales prices of homes in Saddle Ridge.

Likewise, when the sales prices of encumbered lots were compared with the sales prices of unencumbered lots, the differential in price could be explained by the reduction in lot size associated with the easement area.

In 2001 the Interstate Natural Gas Association of America Foundation (INGAA) published the results of a study, *Natural Gas Pipeline Impact Study*, to determine the effects of natural gas pipelines on real estate values. The study was conducted over several years, and included data from both rural and suburban areas. The ultimate finding of the study was that proximity to natural gas pipelines has no discernable effect on real estate values (INGAA, 2001). In February 2016, INGAA published a second study, *Pipeline Impact to Property Value and Property Insurability*, which was a rigorous study of properties in four separate areas of the country in 2015. The findings indicate that the presence of pipelines does not affect the value of a property, its insurability, its desirability, or the ability to obtain a mortgage (INGAA, 2016).

Fruits (2008) studied the effect of the South Mist Pipeline Extension on residential property values in Clackamas and Washington Counties, Oregon. The analysis found no statistically significant effect from natural gas pipeline development on residential property values.

Palmer (2008) also looked at the effect of the South Mist Pipeline Extension on residential property values in Clackamas and Washington Counties, Oregon. This market study, conducted on behalf of Palomar Gas Transmission, LLC, used data from 2004 to 2008 to compare sales of properties along pipeline corridors with comparable sales of non-affected properties. The study found no measurable effect on property values resulting from the construction and operation of natural gas pipelines.

More recently, the January/February 2011 edition of the International Right of Way Association publication, *Right of Way*, includes the article *The Effect of Natural Gas Pipelines on Residential Value*. This study did not identify a systematic relationship between proximity to the pipeline and sale price or value (International Right of Way Online, 2011).

Additionally, a 2012 study by Gnarus Advisors LLC, examined whether the proximity to pipelines, particularly natural gas pipelines, had an effect on residential property values. The study contained a literature review specific to pipelines and property values, with a focus on actual sales data. The authors concluded that there was "no credible evidence based on actual sales data that proximity to pipelines reduces property values" (Gnarus Advisors LLC, 2012).

Several comments were filed regarding the effect the Project would have on the ability of property owners to obtain or maintain a mortgage. We are not aware of landowners having problems obtaining mortgages for properties crossed by pipelines. A comment was filed supporting this view from a senior vice president of the Lancaster-based Fulton Bank. It states that, while the presence of a utility easement is always accounted for during the appraisal process, the presence of a pipeline is not taken into account when the final determination is made on whether to offer financing (Beck, 2014).

4.9.6 Insurance

Based on information obtained to date by Transco, insurance underwriters have not considered the presence of a transmission pipeline when determining the cost and coverage of property insurance. Transco is fully insured and maintains insurance coverage that extends to landowners from the start of the survey process through the lifetime of the pipeline. Transco would pay for damage caused by construction and operation of its facilities. FERC has reviewed this topic in several final EISs for gas pipelines and liquefied natural gas terminals. In March 2012, FERC issued its final EIS for the proposed New Jersey – New York Expansion Project (Docket No. CP11-56-000), which addressed the potential for insurance adjustments related to pipeline proximity, and concluded that, "Regarding the potential for insurance premium adjustments associated with pipeline proximity, insurance advisors consulted on other natural gas projects reviewed by FERC indicated that pipeline infrastructure does not affect homeowner insurance rates."

Several landowners expressed concern that their insurance policy holder would either cancel their homeowner's insurance due to the presence of a natural gas pipeline on the property or amend the policy so it would no longer cover the effects of a potential pipeline incident. We have not found that to be the case; however, to address any potential insurance-related issues, **we recommend that:**

- **Transco should file with the Secretary reports describing any documented complaints from a homeowner that a homeowner's insurance policy was cancelled, voided, or amended due directly to the grant of the pipeline right-of-way or installation of the pipeline and/or that the premium for the homeowner's insurance increased materially and directly as a result of the grant of the pipeline right-of-way or installation of the pipeline. The reports should also identify how Transco has mitigated the impact. <u>During construction</u>, these reports should be included in Transco's <u>weekly</u> status reports (see recommendation 8 in section 5.2) and in <u>quarterly</u> reports for a <u>2-year period</u> following in-service of the project.**

For these reasons, and with implementation of our recommendation, we do not anticipate that the Project would adversely affect homeowners' insurance rates, the ability to acquire a new homeowner's insurance policy, or that insurance policies would be discontinued due to the presence of a natural gas pipeline on a property.

4.9.7 Economy and Tax Revenues

Construction and operation of the Project would have a beneficial impact on local sales tax revenue. Table 4.9.7-1 provides the estimated payroll, cost of materials purchased locally, and projected sales tax revenues associated with project construction. Payroll taxes would also be collected from the workers employed on the Project. Transco anticipates that its total payroll would be about $501.6 million during the construction phase (Blumsack and Kleit, 2015).

TABLE 4.9.7-1

Total Construction Payroll and Cost of Materials Purchased Within the Atlantic Sunrise Project Area[a]

	Construction (in millions)	
County [b]	Total Construction Payroll	Cost of Materials Purchased Locally [c]
Susquehanna County	$15.2	$6.6
Wyoming County	$89.7	$32.5
Luzerne County	$49.3	$21.5
Lycoming County	$26.6	$10.5
Clinton County	$15.1	$6.6
Columbia County	$109.1	$47.0
Northumberland County	$17.0	$7.4
Schuylkill County	$39.4	$17.2
Lebanon County	$59.9	$26.1
Lancaster County	$80.3	$35.0
Total	**$501.6**	**$210.4**

a Only payroll expenditures and material costs associated with construction of the pipelines and new compressor stations are included in this table. Work at existing compressor stations and at M&R stations is not included in these estimates.
b All counties are in Pennsylvania. Counties are ordered from north to south.
c Includes consumables, materials, fuel, and equipment purchases and rentals made locally.

Data related to existing Pennsylvania tax statutes were obtained from the Pennsylvania Department of Revenue. The fiscal information used in this report was obtained from the Pennsylvania Department of Community and Economic Development. This data source provided the most accurate tax and revenue information available at the time of analysis.

According to Pennsylvania tax statutes, the underground portions of natural gas transmission pipelines are exempt from Public Utility Realty Tax and the Realty Transfer Tax. However, local governments may impose applicable ad valorem property taxes on aboveground facilities. In addition, sales and use taxes can be assessed on all qualified purchases (Pennsylvania Department of Revenue, 2004, 2015).

Table 4.9.7-2 provides basic fiscal data, including total revenues, total expenditures, and amount of local tax revenues estimated for fiscal year 2013 for the counties in the project area. In most Pennsylvania counties, local tax revenues accounted for only one-third of the total revenues received in fiscal year 2013.

TABLE 4.9.7-2

Total Revenues, Local Tax Revenues, and Total Expenditures for Counties in the Atlantic Sunrise Project Area for Fiscal Year 2013 [a]

County [b]	Total Revenues (in millions)	Local Tax Revenues (in millions)	Total Expenditures (in millions)
Susquehanna County	$22.9	$8.1	$21.7
Wyoming County	$28.4	$8.5	$27.1
Luzerne County [c]	$176.0	$92.3	$189.0
Lycoming County	$62.2	$27.3	$68.6
Clinton County	$27.0	$11.3	$24.8
Columbia County	$29.0	$11.3	$28.4
Northumberland County	$68.3	$17.3	$64.7
Schuylkill County	$79.3	$30.4	$81.6
Lebanon County	$87.4	$24.2	$85.6
Lancaster County	$331.6	$124.2	$345.5

Source: Pennsylvania Department of Community & Economic Development, 2015a, 2015b, 2015c, 2015d, 2015e

[a] Pennsylvania fiscal data only includes “Government Fund” data.

[b] All counties are in Pennsylvania. Counties are ordered from north to south.

[c] The most recent data available for Luzerne County are for 2011.

Construction and operation of the Project would have a positive effect on tax generation in Pennsylvania. Construction activities are expected to generate about $16.9 million in additional state taxes. This figure includes corporate and personal income taxes, excise taxes, custom taxes, other production taxes, statewide sales and use taxes, and other personal or consumption taxes. Table 4.9.7-3 provides a breakdown of this estimate by county.

Local tax revenues may increase slightly during the construction phase of the Project, but the impact is expected to be minor. In most jurisdictions in Pennsylvania, sales and use tax is collected only at the state level, and only a limited number of counties and municipalities have the authority to levy additional sales and use taxes. Therefore, local governments would not experience an increase in revenue from this source. Some minor increases in tax receipts associated with the Earned Income Tax, which is levied by local governments on employee earnings, may occur; however, this increase is expected to be small because many municipalities exempt nonresidents from this tax.

TABLE 4.9.7-3	
Estimated Tax Implications During Construction of the Atlantic Sunrise Project	
County [a]	State Tax Receipts
Susquehanna County	$1,095,000
Wyoming County	$1,290,000
Luzerne County	$2,159,000
Lycoming County	$883,000
Clinton County	$156,000
Columbia County	$4,083,000
Northumberland County	$627,000
Schuylkill County	$1,535,000
Lebanon County	$1,446,000
Lancaster County	$3,674,000
Total	**$16,948,000**

Source: Blumsack and Kleit, 2015
[a] All counties are in Pennsylvania. Counties are ordered from north to south.

During the operations phase of the Project, state tax receipts would not increase substantially. As described previously, expenditures on payroll and materials purchased within the state are expected to be relatively minor. Therefore, income tax receipts and sales and use tax receipts from these expenses would be negligible.

As described above, the underground portions of natural gas transmission pipelines are exempt from ad valorem property taxes in Pennsylvania; however, local taxing entities may tax aboveground facilities within their jurisdiction. If that occurs, ad valorem property tax would be levied against Compressor Station 605 in Wyoming County and Compressor Station 610 in Columbia County. To provide an estimate of the potential ad valorem property tax, Transco assumed a market value of $50 million per compressor station and applied the 2013 Common Level Ratios and current (2015) county and municipal millage rates. The results indicate that Compressor Station 605 would generate about $190,000 annually in ad valorem property tax for Wyoming County and $37,000 annually for Clinton Township (Pennsylvania Department of Community & Economic Development, n.d.[b], 2015b, 2015c). Using the same assumptions, Compressor Station 610 would generate about $145,000 annually in ad valorem property tax receipts for Columbia County and about $21,000 annually for Orange Township (Pennsylvania Department of Community & Economic Development, n.d.[b], 2015a, 2015d).

4.9.8 Environmental Justice

Demographic and income information for this report was collected from the 2011 to 2013 American Community Survey (3-year estimates) (U.S. Census Bureau, 2013). These data sources provide the most current and accurate demographic information available at the time of analysis.

Executive Order 12898 on Environmental Justice recognizes the importance of using the NEPA process to identify and address, as appropriate, any disproportionately high and adverse health or environmental effects on federal programs, policies, and activities on minority populations and low income populations. In accordance with Executive Order 12898, the CEQ has called on federal agencies to actively scrutinize the following issues with respect to environmental justice (CEQ, 1997a):

- the racial and economic composition of affected communities;
- health-related issues that may amplify project effects on minority or low-income individuals; and

- public participation strategies, including community or tribal participation in the process.

The EPA's Environmental Justice Policies focus on enhancing opportunities for residents to participate in decision making. The EPA states that environmental justice involves meaningful involvement so that:

> (1) potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that would affect their environment and/or health; (2) the public's contributions can influence the regulatory agency's decision; (3) the concerns of all participants involved would be considered in the decision-making process; and (4) the decision-makers seek out and facilitate the involvement of those potentially affected (EPA, 2011b).

As described in section 1.3, there have been many opportunities for the public to comment on and provide input about the Project. Transco met with many different stakeholders during the initial development of the route including local residents and affected landowners. These efforts included Transco holding a number of open houses in the project area for the affected communities and local authorities. Transco also established, and is maintaining, a website to share information about the Project with the public.

Transco also used the FERC's pre-filing process (see section 1.3). One of the major goals of this process is to increase public awareness and encourage public input regarding every aspect of a project before an application is filed. As part of this process, FERC staff participated in all of Transco's open houses to receive input from the public about the Project and to explain FERC's review process and the opportunities it provides for public input. Interested parties have had, and will continue to be given, opportunities to participate in the NEPA review process. To date, this has included the opportunity to participate in FERC's public scoping meetings to identify concerns and issues that should be covered in the EIS, and the opportunity to submit written comments about the Project to FERC. Interested parties were also invited to comment on the draft EIS either electronically, in writing, or at the draft EIS comment meetings held in the project area in June 2016 (see section 1.3). All comments on the draft EIS will be responded to in the final EIS.

Guidance from the CEQ states that "minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis" (CEQ, 1997a). Minority populations are defined as Hispanics, Asian-Americans and Pacific Islanders, African-Americans, and American Indians and Alaskan Natives persons.

Table 4.9.8-1 provides an overview of the racial characteristics of the population in the counties in the project area in 2013. In Pennsylvania, minorities comprise an estimated 18.1 percent of the total population. The percentage of minorities in the Pennsylvania counties that would be crossed by the Project ranges from 2.0 to 11.6 percent. Therefore, none of the counties that would be affected by the Project in Pennsylvania have the potential to be an environmental justice community based on race.

In three of the counties in the project area, the proportion of individuals who identified themselves as being Hispanic or Latino was greater than the proportion of Hispanic and Latinos in the total state population. An estimated 8.0 percent of the residents of Luzerne County, 10.4 percent of residents of Lebanon County, and 9.3 percent of residents of Lancaster County identified themselves as being Hispanic or Latino, compared to 6.1 percent of the residents in Pennsylvania as a whole.

TABLE 4.9.8-1

Racial/Ethnic Statistics for the Area Surrounding the Atlantic Sunrise Project

County [a]	Racial/Ethnic Group (percent) White	Black	Native American and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Persons Reporting Two or More Races	Persons of Hispanic or Latino Origin (percent) [b]
Pennsylvania	**81.9**	**10.9**	**0.2**	**2.9**	**<0.1**	**2.0**	**6.1**
Susquehanna County	98.1	0.6	0.2	0.2	0.0	0.7	1.6
Wyoming County	97.4	0.7	0.1	0.5	0.0	1.0	1.7
Luzerne County	90.7	3.5	0.2	1.0	0.0	1.6	8.0
Lycoming County	92.2	4.9	0.2	0.7	0.0	1.7	1.6
Clinton County	96.2	1.5	0.2	0.5	0.0	1.5	1.2
Columbia County	95.7	2.0	0.1	1.2	0.0	0.5	2.3
Northumberland County	95.2	3.1	0.2	0.2	0.0	0.8	2.7
Schuylkill County	94.6	2.6	0.1	0.5	0.0	1.5	3.2
Lebanon County	88.4	1.9	0.2	1.2	0.0	2.2	10.4
Lancaster County	88.9	3.8	0.1	2.0	0.0	2.1	9.3

Source: U.S. Census Bureau, 2013

[a] Counties are ordered from north to south.

[b] The U.S. Census Bureau and Executive Order 12898 define minority populations based on race alone. Hispanic or Latino populations are defined by ethnicity, not race. Therefore, non-white populations have not been combined with Hispanic or Latino populations due to the potential for double counting.

The U.S. Census Bureau defines "low-income populations" as those living below the established poverty level. The U.S. Census Bureau also reports the percentage of county populations with an income below the poverty level, which is presented in table 4.9.8-2. In order to evaluate the potential for a low-income population to be affected disproportionately, we compared the poverty level rates for the affected counties with the state levels.

TABLE 4.9.8-2

Economic Statistics for the Area Surrounding the Atlantic Sunrise Project (5-year Average: 2009 to 2013)

State/County [a]	Median Household Income	Persons below Poverty (percent)	Households Receiving Cash Public Assistance (percent)	Households Receiving Food Stamp/SNAP Benefits in the Past 12 Months (percent)
Pennsylvania	**52,548**	**13.3**	**3.5**	**11.8**
Susquehanna County	48,231	12.9	2.5	9.0
Wyoming County	48,482	12.1	2.8	11.0
Luzerne County	44,402	15.6	3.4	14.8
Lycoming County	45,430	14.2	3.0	12.0
Clinton County	42,184	16.1	4.1	13.9
Columbia County	44,807	16.6	2.3	9.3
Northumberland County	41,208	14.2	2.8	11.5
Schuylkill County	45,012	12.8	3.3	13.0
Lebanon County	54,818	10.7	3.4	9.7
Lancaster County	56,483	10.4	3.2	8.7

Sources: U.S. Census Bureau, 2013

[a] Counties are ordered from north to south.

Note: SNAP = Supplemental Nutrition Assistance Program

Five of the counties that would be crossed have poverty rates higher than the respective state level (Luzerne, Lycoming, Clinton, Columbia, and Northumberland Counties). While these statistics are indicative of a potentially disproportionate effect on low-income communities, the county levels are only slightly higher than their respective state levels. By this criterion, Luzerne, Lycoming, Clinton, Columbia, and Northumberland would be environmental justice communities based on low-income populations.

As described above, the Project would have negligible to minor negative impacts and minor to moderate positive impacts on socioeconomic characteristics and economies within the region of influence. As described throughout this EIS, potentially negative environmental effects associated with the Project would be minimized and/or mitigated, as applicable. Although the racial and economic composition of the counties that would be traversed by the Project shows some deviations from state-level statistics, there is no evidence that the Project would cause a disproportionate share of adverse environmental or socioeconomic impacts on any racial, ethnic, or socioeconomic group.

Emissions associated with the new compressor stations, which has been raised as an issue on other projects, would not be a concern because electric motor driven compressors would be used. The primary health issues related to the Project would be the risk associated with an unanticipated pipeline or compressor station failure. Section 4.12 describes the localized risks to public safety that could result from a pipeline failure and describes how applicable safety regulations and standards would minimize the potential for these risks. Because the Project would generally traverse sparsely populated areas, the number of persons who would be at risk of injury due to a pipeline failure would be low; and there is no evidence that such risks would be disproportionately borne by any racial, ethnic, or socioeconomic group.

Construction of the Project would result in minor positive impacts due to increases in payroll taxes, purchases made by the workforce, and expenses associated with the acquisition of material goods and equipment. Operation of the Project would also have a minor to moderate positive effect on the counties and local communities due to the increase to property taxes that would be collected.

4.9.9 Conclusion

Construction of the Project would not have a significant adverse impact on local populations, housing, employment, or the provision of community services. There would be temporary increases in traffic levels due to the commuting of the construction workforce to the area of the Project as well as the movement of construction vehicles and delivery of equipment and materials to the construction right-of-way. To address traffic impacts related to in-street construction, Transco developed a *Traffic and Transportation Management Plan*.

With respect to the potential effect of the Project on property values, we are not aware of any studies indicating that property values would be adversely affected by the presence of a natural gas pipeline. However, no study can predict specific circumstances for any given property and the presence of a natural gas pipeline could influence a potential buyer's decision to purchase a property. Concerning the potential effect of the Project on mortgages and property insurance, we have not been able to document any specific trends regarding adverse effects of pipelines on mortgages or the ability of landowners to obtain mortgages, and we have cited several studies and sources that conclude the Project would not have these effects. We do not anticipate that the Project would adversely affect homeowners' insurance rates, the ability to acquire a new homeowner's insurance policy, or that insurance policies would be discontinued due to the presence of a natural gas pipeline on a property. However, we are recommending that Transco file reports with the Secretary describing any documented complaints from homeowners regarding cancelled, voided, or amended homeowner's insurance policies to address any potential insurance-related issues (see section 4.9.6).

The primary health issues related to the Project would be the risk associated with an unanticipated pipeline or compressor station failure. Section 4.12 discusses the localized risks to public safety that could result from a pipeline failure and describes how applicable safety regulations and standards would minimize the potential for these risks. Because the Project would generally traverse sparsely populated areas, the number of persons who would be at risk of injury due to a pipeline failure is low; and there is no evidence that such risks would be disproportionately borne by any age group or racial, ethnic, or socioeconomic group. Based on our research and analysis, there is no evidence that the Project would result in disproportionately high and adverse health or environmental effects on children, the elderly, sensitive populations, or minority or low-income communities.

The long-term socioeconomic effect of the Project is likely to be beneficial, based on the increase in tax revenues that would accrue in the counties affected by the Project. Based on the analysis presented, and our recommendation, we conclude that the Project would not have a significant adverse effect on the socioeconomic conditions of the project area.

4.10 CULTURAL RESOURCES

Section 106 of the National Historic Preservation Act (NHPA), as amended, requires FERC to take into account the effects of its undertakings on properties listed on or eligible for listing on the NRHP and afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment. Transco, as a non-federal party, is assisting us in meeting our obligations under section 106 of the NHPA and the implementing regulations at 36 CFR 800 by preparing the necessary information, analyses, and recommendations, as authorized by 36 CFR 800 2(a)(3).

4.10.1 Cultural Resources Consultations

On July 18, 2014, we sent copies of our NOI for the Project to a wide range of stakeholders, including the appropriate State Historic Preservation Offices (SHPO),[31] federal and state agencies, federally recognized tribes (tribes) that may have an interest in the project area, and other stakeholders. The NOI contained a paragraph about section 106 of the NHPA, and stated that we use the notice to initiate consultations with SHPOs, and to solicit their views and those of other government agencies, interested tribes, and the public on the Project's potential effects on historic properties.

In addition to the FERC's notification process, Transco separately contacted the SHPOs, other agencies, stakeholders, and tribes that might attach cultural or religious significance to cultural resources in the project area.

4.10.1.1 State Historic Preservation Officers

Transco contacted the appropriate SHPOs to provide information and request comments on the Project. Where the respective SHPO has concurred with specific findings and recommendations below, we also concur.

Pennsylvania

Transco met with the Pennsylvania SHPO on May 1, 2014, to introduce the Project and discuss archaeological and aboveground resources methodologies. During the meeting, the Pennsylvania SHPO provided initial comments regarding the definition of the area of potential effects (APE) and guidance on making NRHP eligibility recommendations. In an email dated May 6, 2014, the Pennsylvania SHPO

[31] The SHPO is represented by the Pennsylvania Historical and Museum Commission in Pennsylvania; Virginia Department of Historic Resources in Virginia; Maryland Historical Trust in Maryland; North Carolina Department of Cultural Resources, Division of Archives and History in North Carolina; and the South Carolina Department of Archives and History in South Carolina.

agreed to provide comments regarding eligibility of historic properties during ongoing archaeological survey and prior to the submittal of a Phase I report. For aboveground resources, the Pennsylvania SHPO agreed to provide comments regarding the eligibility based on information provided in Abbreviated Historic Resource Survey Forms. In a letter dated June 11, 2014, the Pennsylvania SHPO concurred with Transco's proposed field survey methodology and definition of the APE for both archaeological and aboveground resources, with the comment that for archaeological resources at least 5 percent of the APE designated as low to medium probability should be tested at a high probability interval. In a meeting on September 19, 2014, Transco submitted revisions to the survey methodology for Lancaster County, including an increase in the percentage of areas with a high probability to contain cultural resources. In an email dated February 17, 2015, the Pennsylvania SHPO concurred with the revised methodology.

On March 24, 2015, Transco submitted archaeological, geomorphological, and architectural resource survey reports to the Pennsylvania SHPO. In a letter dated June 2, 2015, Transco submitted a revised plan for unanticipated discoveries during construction. To date, Transco has not filed the Pennsylvania SHPO's response to the revised plan.

In a letter dated September 21, 2015, the Pennsylvania SHPO concurred with the findings presented in the March 2015 archaeological report and requested further information on the geomorphology at Tunkhannock Creek in Wyoming County, Pennsylvania as well as geomorphological and archaeological excavation of two precontact rock shelter sites (36WO0010 and 36WO0051) that have the potential to contain deeply buried cultural deposits. On December 4, 2015, Transco submitted a report to the SHPO with the results of the geomorphological investigations at Tunkhannock Creek. To date, Transco has not filed the Pennsylvania SHPO's comments on this report.

In a letter dated November 9, 2015, Transco submitted a site avoidance plan for site 36NB0196, a historic-era mining operation. The Pennsylvania SHPO concurred with this avoidance plan in a letter dated December 7, 2015, and stated that the Project would have no effect on site 36NB0196.

Transco met with the Pennsylvania SHPO on November 24, 2015, to discuss the archaeological survey status and preliminary determinations of eligibility for sites identified within the APE. Based on this meeting, the Pennsylvania SHPO recommended additional testing of site 36WO0115 and an avoidance plan for site 35WO0118. In a letter dated December 18, 2015, the Pennsylvania SHPO concurred with Transco's avoidance plan for site 36WO0118 and requested the results of further testing of site 36WO0115.

Transco met with the Pennsylvania SHPO on March 8, 2016, to discuss the archaeological survey status and preliminary determinations of eligibility for sites identified within the APE. In a letter dated March 8, 2016, the Pennsylvania SHPO concurred that six sites (36LA1566, 36LE0540, 36NB0196, 36CO0051, 36WO0108, and 36WO0115) should be avoided or further evaluated to assess their NRHP eligibility. Site 36LA0001 would be avoided by an HDD. The Project would be confined to an existing disturbed portion of site 36LA1555 and therefore would have no effect on the site. The portions of three sites affected by the Project (36LA1531, 36LA1570, and 36SC0092) would not contribute to their overall eligibility and, therefore, warrant no additional work. However, protective measures would need to be implemented during construction to avoid affecting these sites because they are adjacent to the Project. Transco completed a site evaluation of 36CO0051 and submitted the report to the Pennsylvania SHPO on May 12, 2016. In a letter dated July 14, 2016, the Pennsylvania SHPO concurred that site 36CO0051 is not eligible for listing on the NRHP.

In a letter dated April 22, 2015, the Pennsylvania SHPO concurred with the architectural resource survey report. As additional architectural surveys were completed, reconnaissance survey forms were submitted to the Pennsylvania SHPO on a county-by-county basis requesting concurrence with preliminary determinations of eligibility, a process that was agreed upon during a meeting on

November 18, 2015. The Pennsylvania SHPO provided comments on these forms throughout 2015, requesting further work as needed:

- May 27, 2015 (Lancaster, Lebanon, Schuykill, Northumberland, Columbia, Wyoming, and Susquehanna Counties);
- June 9, 2015 (Lancaster County);
- July 27, 2015 (Lebanon, Northumberland, and Susquehanna Counties); and
- December 14, 2015 (Columbia and Luzerne Counties).

The Pennsylvania SHPO provided formal eligibility determinations and assessment of effects on historic properties on January 4, 2016; February 17, 2016; March 16, 2016; April 12, 2016, and June 15 and 17, 2016.

On May 11, 2016, Transco submitted an eligibility evaluation and assessment of effects for the Nesbitt Estate Rural Historic District (862240). In a letter dated June 15, 2016, the Pennsylvania SHPO recommended that this rural historic district is eligible for listing on the NRHP, and removal of historic stone walls during construction would represent an adverse effect. Also in a letter dated June 17, 2016, the Pennsylvania SHPO considered that Pedrick Farm (862236) was eligible for listing on the NRHP, and that removal of historic stone walls during construction would represent an adverse effect. FERC staff is compiling information to notify the ACHP of adverse effects on historic properties for the Project.

In a letter dated June 17, 2016, the Pennsylvania SHPO considered that the Conestoga Township Rural Historic District (862230), the Manor Township Rural Historic District (862231), and the South Annville Rural Historic District (862229) are eligible for the NRHP, but requested additional mapping for each of the districts in order to assess the project effects. The SHPO also requested additional information for five individual architectural resources, including Walker Farm (862061), Leroy Adams, Sr. Farm (862059), Lawrence Shaw Farmstead (862171), Brecht Rohrbach Farm (861994), and Bruce and Mary Althouse Farm (861966). Transco provided the requested information for the three rural historic districts and the five individual sites on July 29, 2016. To date, the Pennsylvania SHPO has not provided comment.

On July 21, 2016, FERC staff discussed tribal consultation efforts in Pennsylvania with the Pennsylvania SHPO and the Narragansett Indian Tribe's request to consult for the Project.

Virginia

Transco initiated consultation with the Virginia SHPO in a letter dated October 16, 2014. In a letter dated November 16, 2014, the Virginia SHPO recommended an archaeological survey in areas not previously disturbed, an assessment of previously recorded archaeological sites within the project facilities, and an assessment of indirect effects on aboveground resources resulting from the installation of new MLV assemblies and the construction of new temporary and permanent access roads.

The results of the recommended survey were submitted to the Virginia SHPO on February 19, 2015; in a letter dated March 13, 2015, the Virginia SHPO concurred that no further archaeological survey or architectural study would be warranted. Although the Project intersects a portion of the Battle of Second Manassas battlefield, the Virginia SHPO commented in the March 13, 2015 letter that the battlefield is unlikely to be adversely affected. We agree that there will be no adverse effects on the battlefield. In a letter dated June 2, 2015, Transco submitted a revised plan for unanticipated discoveries during construction. To date, Transco has not filed the Virginia SHPO response to the revised plan.

On November 19, 2015, Transco submitted a Phase I archaeological survey letter report for investigations completed in February 2015, within Prince William and Appomattox Counties. Four newly identified workspaces along the existing pipeline right-of-way and two new contractor yards were documented as previously disturbed, and therefore no further work was recommended. To date, Transco has not filed the Virginia SHPO's comments on this letter report.

Maryland

In a letter dated April 24, 2012, the Maryland SHPO entered into a categorical exemption agreement with Transco. Consultation with the Maryland SHPO regarding the proposed Project was initiated by Transco in a letter dated October 17, 2014, including a request for review of modifications to the existing compressor station, which is covered by the categorical exemption agreement. In a letter dated November 12, 2014, the Maryland SHPO commented that the proposed modifications to the compressor station would not have an adverse effect on historic properties. In a letter dated June 2, 2015, Transco submitted a revised plan for unanticipated discoveries during construction. To date, Transco has not filed the Maryland SHPO response to the revised plan.

North Carolina

In a letter dated April 26, 2012, the North Carolina SHPO entered into a categorical exemption agreement with Transco. Consultation with the North Carolina SHPO for the proposed Project was initiated by Transco in a letter dated October 6, 2014, including requests for review of modifications to 28 existing M&R stations. In a letter dated October 23, 2014, the North Carolina SHPO concluded that no archaeological surveys would be recommended, and the Project would have no effect on historic properties. Although the Salisbury and Frontier Appalachian M&R Station and the Park Road Power Plant M&R Station are located adjacent to the NRHP-listed Griffith-Sowers House, the North Carolina SHPO commented in the October 23, 2014 letter that the Project would have no effect on the Griffith-Sowers House. In a letter dated March 12, 2015, Transco submitted a revised plan for unanticipated discoveries during construction. To date, Transco has not filed the North Carolina SHPO response regarding this plan.

South Carolina

Transco initiated consultation with the South Carolina SHPO by letter on October 6, 2014, including requests for review of modifications to nine existing M&R stations. In a letter dated October 9, 2014, the South Carolina SHPO concluded that the Project would have no effect on historic properties. In a letter dated October 15, 2015, Transco requested review of additional modification involving the installation of new MLVs at MP 1237.58 in Cherokee County, and in a letter dated October 21, 2015, the South Carolina SHPO concluded that the proposed modification would have no effect on historic properties. In a letter dated June 2, 2015, Transco submitted a revised plan for unanticipated discoveries during construction. To date, Transco has not filed the South Carolina SHPO response to the revised plan.

4.10.1.2 Other State and Federal Agencies

In January 2015, Transco initiated consultation with the PGC regarding the CPL South crossing of the Appalachian Trail. The Appalachian Trail was determined eligible for listing on the NRHP in 2008, and is significant for its role in U.S. recreational history. The PGC confirmed it would conduct consultation with the NPS and the Appalachian Trail Conservancy. As a result of this consultation, the CPL South route was relocated and now would cross the trail on land managed by the PGC. See section 3.3.2 for an evaluation of alternative Appalachian Trail crossing locations.

On July 8, 2016, the NPS requested to be a consulting party in the section 106 process for the Appalachian Trail and the Captain John Smith Chesapeake National Historic Trail. Transco continues to consult with the NPS regarding both trails and conducted a visual assessment of the Captain John Smith Chesapeake National Historic Trail.

Consultation with the Fort Indiantown Gap National Guard Training Center was initiated by Transco in October 2014. Two archaeological sites and the Fort Indiantown Gap Historic District are located on the National Guard Training Center. In January 2015, several routing options were considered to avoid the archaeological resources. One route alternative was reviewed, but removed from analysis. In its June 2016 supplemental filing, Transco indicated that it had completed consultations with the Pennsylvania SHPO regarding the previously recorded archaeological resource. The Pennsylvania SHPO recommended that the cultural resource site was not eligible for listing on the NRHP. As a result, Transco did not incorporate the route alternative into the proposed route. See section 3.3.2 for a discussion of route alternatives.

The second archaeological site was avoided by reducing the construction corridor width. The Project would not be visible from the core area of the Fort Indiantown Gap Historic District; therefore, the historic district would not be adversely affected by the construction or operation of the Project. Transco provided a copy of the Phase I report presenting the archaeological survey results of the National Guard Training Center on June 15, 2016. In an email dated July 13, 2016, a preliminary assessment of no effect on the Fort Indiantown Gap Historic District was summarized. Transco continues to consult with the U.S. National Guard.

Consultation with the Maryland Commission on Indian Affairs was initiated by Transco on June 23, 2014. To date, Transco has not filed a response from the Maryland Commission on Indian Affairs regarding the Project.

On July 21, 2016, FERC staff contacted the USACE's Baltimore District to discuss tribal consultation within the district and the Narragansett Indian Tribe's request to consult for the Project. FERC staff misstated the Philadelphia District in the email and, on July 21 and August 9, 2016, the USACE clarified the tribes with which it consults in the project area.

4.10.1.3 Federally Recognized Tribes

FERC contacted 20 tribes to provide them an opportunity to identify any concerns about properties of traditional religious or cultural significance that may be affected by the Project. In addition, Transco contacted the same tribes. The 20 federally recognized tribes include:

- Absentee Shawnee Tribe of Oklahoma;
- Catawba Indian Tribe;
- Cayuga Nation;
- Cherokee Nation;
- Delaware Nation;
- Delaware Tribe of Indians;
- Eastern Band of Cherokee Indians;
- Eastern Shawnee Tribe of Oklahoma;
- Oneida Nation;
- Oneida Nation Wisconsin;
- Onondaga Indian Nation;
- Saint Regis Mohawk Tribe;
- Seneca-Cayuga Tribe of Oklahoma;
- Seneca Nation of Indians;

- Shawnee Tribe;
- Stockbridge-Munsee Community of Wisconsin;
- Tonawanda Seneca Nation;
- Tuscarora Nation;
- United Keetoowah Band of Cherokee; and
- Wyandotte Nation.

Transco received comments from the Catawba Indian Tribe and the Oneida Nation requesting a copy of the Phase I report(s). Transco submitted copies of the Phase I report to the Catawba Indian Tribe and the Oneida Nation on April 1, 2015. Transco provided the Catawba Indian Tribe and the Oneida Nation information regarding additional resources identified during 2015 in letters dated September 17, 2015. The Catawba Indian Tribe responded on October 14, 2015, stating it had no concerns, but requested to be notified of any unanticipated discoveries that are identified during construction, use, or maintenance of the Project. The Cayuga Nation, Delaware Nation, Saint Regis Mohawk Tribe, and Shawnee Tribe would like to be notified of any unanticipated discoveries that are identified during construction, use, or maintenance of the Project. In a letter dated January 23, 2015, we sent letters to 20 tribes for the Project. FERC received comments from the Delaware Tribe of Indians in a letter dated July 17, 2014, which requested to be a consulting party. Under the section 106 of the NHPA, all 20 tribes consulted for the Project are consulting parties. Transco submitted copies of the Phase I reports for Pennsylvania and Virginia to the Delaware Tribe of Indians on April 17, 2015. In a letter dated March 12, 2015, the Delaware Nation requested mitigation of sites that cannot be avoided by the Project in Lancaster County, Pennsylvania. We respect the request of the Delaware Nation. However, all of those resources could not be avoided or require mitigation because the resources are not historic properties. Thirty-eight archaeological sites were identified within the APE during surveys in Lancaster County. Of these 38 sites, 1 multi-component site (26LA0001) is NRHP-listed and would be avoided by an HDD, and 1 multi-component site (36LA1541) is recommended eligible by the Pennsylvania SHPO and would be avoided or evaluated for its NRHP eligibility. Three sites (36LA1531, 36LA1540, and 36LA1555) have not been evaluated for eligibility by the Pennsylvania SHPO. Site 36LA1540 would be avoided by an HDD, the Pennsylvania SHPO commented that the portions of site 36LA1531 within the APE is non-contributing, and the portion of site 35LA1555 within the project footprint is previously disturbed; therefore, the three unevaluated sites would not be affected during construction of the Project. The remaining 33 sites are not eligible for listing on the NRHP.

In an email to FERC dated April 6, 2015, the Stockbridge-Munsee Community requested to be a consulting party. In a letter dated April 23, 2015, the Stockbridge-Munsee Community provided the following comments on the Phase I report for Pennsylvania: the tribe does not have significant cultural resource concerns for their area of interest; and they would like to be notified of changes to the Project in Susquehanna County, Pennsylvania. On September 17, 2015, Transco sent letters to the Catawba Indian Tribe, Delaware Nation, Delaware Tribe of Indians, Oneida Nation, and the Stockbridge-Munsee Community regarding resources identified along the CPL North route in Wyoming and Luzerne Counties. The Delaware Tribe of Indians and the Oneida Nation requested additional information in communications dated October 9 through November 12, 2015 (Delaware Tribe of Indians), and November 3, 2015 (Oneida Nation). On November 20, 2015, a site visit was conducted with Transco, a representative of the Pennsylvania SHPO, and a representative of the Delaware Tribe of Indians. In a letter dated February 1, 2016, the Delaware Tribe of Indians commented that no tribally significant sites occur within the APE; therefore, the tribe has no concerns regarding the proposed Project. The Oneida Tribe discussed the resources with Transco, the Delaware Tribe of Indians, and the Pennsylvania SHPO. In a letter dated January 11, 2016, the Oneida Nation commented that the features are not related to the tribe's past land use.

In a letter dated June 25, 2016, the Narragansett Indian Tribe commented on resources in Dallas Township, Luzerne County, Pennsylvania that are culturally significant to the Narragansett Indian Tribe and requested to be consulted. On September 22, 2016, Transco provided a copy of the survey results within the APE of the historic property at the specified location in Luzerne County to the tribe for review and comments. We sent an email on September 23, 2016, to the Narragansett Indian Tribe stating that Transco forwarded these survey results and requested their comments regarding project effects on historic properties. We also sent a copy of our NOI describing how to file comments with FERC. On September 28, 2016, the Narragansett Indian Tribe requested consultation and a site visit with FERC regarding ceremonial stone landscape features that may be affected by the Project. We have not received any comments from the tribe on the cultural resources survey information provided by Transco. We look forward to reviewing the Narragansett Indian Tribe's information regarding traditional and cultural use of resources of religious and cultural importance within the APE of the historic property in Luzerne County and comments they may have on the cultural resources survey information. Consultation is ongoing.

On July 6, 2016, FERC staff discussed tribal consultation and maintenance of government-to-government relationships with the Delaware Tribe of Indians and Oneida Indian Nation. Additionally we discussed the Narragansett Indian Tribe's request to consult for the Project.

4.10.1.4 Other Stakeholders and the Public

Transco identified other parties for the purpose of initiating section 106 consultation. Between June 2014 and February 2015, Transco consulted with several non-governmental organizations, state-recognized tribes, local historical societies, museums, historic preservation and heritage organizations, conservation districts and other potential interested parties to provide them an opportunity to comment on the Project.

No response was received from the:

- Cheroenhaka (Nottoway) Indian Tribe of Southampton County, Virginia;
- Columbia Historic Preservation Society;
- Delaware & Lehigh National Heritage Corridor;
- Endless Mountains Heritage Region;
- Harvey's Lake Beach Association;
- Lancaster Historical Society;
- Lebanon County Historical Society;
- Lehigh Valley Railroad Historical Society;
- Luzerne County Historical Society;
- Mahanoy and Mahantongo Historical & Preservation Society;
- Nottoway Indian Tribe of Virginia;
- Pennsylvania Route 6 Alliance;
- Pennsylvania Railroad Technical and Historical Society;
- Pennsylvania Canal Society, c/o Emrick Technology Center;
- Pine Grove Historical Society;
- Piscataway Indian Nation;
- Preservation Pennsylvania;
- Railroad Museum of Pennsylvania;
- Susquehanna County Historical Society;
- Susquehanna Gateway Heritage Area; and
- Wyoming County Conservation District.

The following parties had no comments or no concerns about the Project:

- Anthracite Heritage Museum and Iron Furnaces;
- Friends of Old Annville;
- Historic Society of Schuylkill County;
- Lake Winola Cottagers Association;
- Lebanon County Historical Society; and
- Preservation Pennsylvania.

The Piscataway Conoy Tribe would like to be kept apprised of the Project.

The Reading Company – Technical and Historical Society requested that railroad structures associated with the Reading Railroad be preserved. Transco confirmed that railroad structures crossed by the Project would be avoided through use of the bore crossing method. Transco did not report the Reading Railroad is an eligible resource within the APE.

In a letter dated June 22, 2016, the Nanticoke Lenni-Lenape Tribal Nation requested to be informed of any sites identified along the Conestoga River and any mitigation measures that would be implemented for these sites. Four resources would be avoided by HDD of the Conestoga River.

In a letter to FERC dated June 27, 2016, the Appalachian Trail Conservancy expressed concerns about the project alignment crossing forested land. The Appalachian Trail Conservancy requested that Transco consider an alternate route, and requested to be a consulting party for the Appalachian Trail and the Captain John Smith Chesapeake National Historic Trail. Transco continues to coordinate with the Appalachian Trail Conservancy.

Between July 18 and August 18, 2014, FERC conducted four public scoping meetings in the project area. During these meetings, verbal and written comments were received that identified issues and concerns with the portions of the Project in Pennsylvania and Virginia. The primary cultural resources issues raised during the scoping period are listed below by state.

Pennsylvania

- Cordelia Furnace;
- Forry's Mill Covered Bridge;
- Native American areas/indigenous cultural landscapes:
  - Conestoga;
  - Martic and Manor Townships in Lancaster County;
  - Conestoga Indian Town; and
  - burial sites within Shenk's Ferry;
- Underground Railroad in lower Susquehanna River Valley;
- Catholic cemetery and church foundations along Safe Harbor's Conestoga historical trail;
- historic farm complex built in circa 1725 in Martic Township;
- Lancaster County cultural resource sites;
- George M. Steinman House and Farmland;
- Captain John Smith Chesapeake National Historic Trail;
- Appalachian Trail;
- historic railroad bed in Pine Grove; and
- public and private cemeteries.

Virginia

- Battle of Second Manassas battlefield

According to Transco's Response to Scoping Issues dated September 3, 2014, Transco addressed these comments through archival research and survey that was summarized in Transco's Resource Report 4. Transco continues to coordinate with the Pennsylvania SHPO, the NPS, FERC, and other stakeholders regarding the Appalachian Trail and the Captain John Smith Chesapeake National Historic Trail. No direct or indirect effects from the Project would occur on the remaining resources.

The Ontario Metis' Aboriginal Association (The Woodland Metis' Tribe)/Autonomous American Indian Movement commented that the Project represents an effect on sacred Native American Indian burials. Based on surveys completed by Transco to date, no Native American burial sites have been identified.

4.10.2 Results of Cultural Resources Surveys

Transco conducted archaeological and architectural resource surveys in Pennsylvania and Virginia. In Pennsylvania, the cultural resources survey is about 94 percent complete for archaeological and architectural resources. No surveys were required in Maryland, North Carolina, and South Carolina because the Project is limited to existing facilities in these states.

Pennsylvania

In Pennsylvania, the APE for the Project consists of the pipeline rights-of-way, pipeline construction workspace, ATWS, contractor yards, aboveground facilities, and access roads. For the direct APE, Transco conducted a cultural resources identification survey consisting of a 300-foot-wide corridor for the pipeline route and adjacent workspace. The direct APE for access roads was based on the width needed to make the roads usable for construction. The direct APE for aboveground facilities and contractor yards included the footprint of those compressor stations, regulator stations, MLVs, and yards. Transco's investigation included a combination of walkover reconnaissance and shovel testing according to the predictive model of low, medium, and high probability for archaeological discovery. Geomorphologic investigations to evaluate the potential for deeply buried archaeological resources were also completed at waterbody crossings within the direct APE. The geomorphological investigations are complete at all waterbody crossings except the west bank of Swatara Creek.

Indirect effects on aboveground historic properties would be primarily visual in nature. For the pipeline, the direct APE and the area adjacent was surveyed for visual effects on aboveground historic resources. To identify any historic properties within the viewshed of each of the new aboveground facilities (compressor stations, regulator stations, MLVs) and yards, a 0.25-mile radius APE was surveyed at each facility.

Table 4.10.2-1 provides information for the archaeological sites in the APE identified during Transco's Phase I archaeological identification surveys conducted in 2014, 2015, and 2016 that are pending review or require treatment. A total of 73 archaeological sites were documented within the APE for the Project; of which, 22 are precontact sites, 27 are historic sites, and 24 are multicomponent sites. The precontact sites include lithic and artifact scatters of an indeterminate age, with a few sites ranging in date between the Early or Middle Archaic to the Middle Woodland periods. The historic sites include domestic and architectural artifact scatters, general refuse disposal areas, field dumps, farmsteads, a tannery, and a mine. The historic sites range in date from the mid-nineteenth to mid-twentieth century, though many of the sites are of an indeterminate age. The Pennsylvania SHPO approved the treatment plans for three sites (36WO0115, 36WO0118, and 36BN0196) and commented that five sites

(36WO0121, 36WO0108, 36LA1541, 36LE0536, and 36LW0540) should be avoided or Phase II site evaluation would be necessary. The Pennsylvania SHPO commented that 134 sites and isolated find spots are not eligible and 2 additional sites identified by Transco as not eligible for the NRHP are currently under review by the Pennsylvania SHPO. Four sites (36LA1531, 36LA1540, 36LA1555, and 36LE0539) were not formally evaluated for their NRHP eligibility. Site 36LA1540 would be avoided by HDD, and the Pennsylvania SHPO commented that the portions of sites 36LE0539 and 36LA1531 within the APE are non-contributing. The portion of site 35LA1555 within the project footprint is previously disturbed; therefore, the four unevaluated sites would not be affected during construction of the Project. One site (36LA0001) is listed on the NRHP but would be avoided by HDD.

TABLE 4.10.2-1

Archaeological Sites with Pending Studies or Treatment in the Area of Potential Effects for the Atlantic Sunrise Project

Facility/Site Number	Site Type	Eligibility Status	NRHP Eligibility
CPL North			
36WO0121	Multi-component subsurface scatter	Complete	Eligible – avoidance by a shift in the proposed pipeline route
36WO0108	Multi-component subsurface scatter	Complete	Eligible – avoidance by a reroute and reduced construction corridor
36WO0115	Precontact subsurface lithic scatter	Complete	Eligible – treatment plan approved
36WO0118	Precontact, open air	Complete	Eligible – treatment plan approved
CPL South			
36LA1541	Precontact artifact scatter and historic plowzone deposit/field dump	Complete	Eligible – avoidance by HDD
36LA0001	Multi-component subsurface scatter	Complete	Listed – avoidance by HDD
36LE0536	Historic farmstead	Complete	Eligible – avoidance by a reroute and reduced construction corridor
36LE0540	Historic homestead	Complete	Eligible – avoidance by reduced construction corridor
36LE0554	Historic Surface Scatter	Pending SHPO review	Recommended not eligible
36NB0196	Historic mining operation	Complete	Eligible – treatment plan approved
36CO0054	Precontact subsurface scatter	Pending SHPO review	Recommended not Eligible

Four hundred and forty architectural resources were documented within the APE for the Project, of which 419 are recommended to be ineligible for the NRHP by the Pennsylvania SHPO. These architectural resources include farms and farmsteads, residential dwellings, commercial buildings, sites, structures, railroads, trails, and rural historic districts, and range in date from the mid-eighteenth to mid-twentieth century.

Twenty-one of these architectural resources are considered to be eligible for the NRHP or are pending review by the Pennsylvania SHPO (see table 4.10.2-2). Four of the 21 resources are linear resources, including the Appalachian Trail (144291), Pennsylvania Railroad Mainline (105675), Pennsylvania Turnpike: Philadelphia Extension (122695), and Pennsylvania Railroad Enola Low Grade Freight Line – Enola to Parkesburg (102143). Five of the 24 resources are historic districts, including Fort Indiantown Gap Historic District (107363), Nesbitt Estate Rural Historic District (862240), the Conestoga Township Rural Historic District (862230), Manor Township Rural Historic District (862231), and South Annville Rural Historic District (862229). The Pennsylvania SHPO requested additional information for the Conestoga Township Rural Historic District (862230), the Manor Township Rural Historic District (862231), and the South Annville Rural Historic District (862229), which are currently under review. The remaining 12 architectural resources are recommended eligible for the NRHP including 9 farms, a mill, a barn, and a railroad tunnel.

TABLE 4.10.2-2

Aboveground Resources with Pending Studies or Treatment in the Area of Potential Effects for the Atlantic Sunrise Project

Facility/Site Number	Resource Description	Date of Construction	SHPO Recommendation of Eligibility and Effect
CPL North			
862171	Lawrence Shaw Farmstead	c. 1870	Pending SHPO review of additional information requested
862240	Nesbitt Estate Rural Historic District	c. 1850 to 1940	Adverse effect, pending treatment plan for historic rock walls, rock piles, and clearing of historic vegetation
097170	Nicholson Tunnel (D&H Railroad)	c. 1914	Eligible; pending SHPO review
862236	Pedrick Farm	c. 1850	Adverse effect, pending treatment plan for historic rock walls
CPL South			
102143	Pennsylvania Railroad Enola Low-Grade Freight Line (Enola to Parkesburg) Rails to Trails	c. 1906	Eligible; pending SHPO review
105675	Pennsylvania Railroad Mainline	c. 1880s	Eligible; pending SHPO review
862203	Jacob Baker Farm	c. 1780	Eligible; pending SHPO review
862230	Conestoga Township Rural Historic District [a]	c. 1712 to 1960	Eligible; pending SHPO review of additional information requested
862231	Manor Township Rural Historic District [b]	c. 1682 to 1960	Eligible; pending SHPO review of additional information requested
862232	Barn	c. 1930	Recommended not eligible – no effect; pending SHPO review
029808	Herr's Mill	c. 1880	Eligible; pending SHPO review
144171	Brandt Farm	c. 1900	Eligible; pending SHPO review
122695	Pennsylvania Turnpike: Philadelphia Extension	c. 1948	Eligible; pending SHPO review
862229	South Annville Rural Historic District [c]	c. 1730 to 1960	Eligible; pending SHPO review of additional information requested
142969	Schenk Farm	c. 1730; c. 1877	Eligible; pending SHPO review
862061	Walker Farm	c. 1770 to 1780	Pending SHPO review of additional information requested
862059	Leroy Adams, Sr. Farm	c. 1780	Pending SHPO review of additional information requested
107363	Fort Indiantown Gap Historic District	c. 1937	Eligible; pending SHPO review
144291	Appalachian Trail	c. 1920s to 1930s	Eligible; pending SHPO review
861994	Brecht Rohrbach Farm	c. 1850	Pending SHPO review of additional information requested
861966	Bruce W. and Mary R. Althouse Farm	c. 1844	Pending SHPO review of additional information requested

[a] Contributing resources include BHP Keys 101543, 862145, and 862141.
[b] Contributing resources include BHP Keys 862125, 862134, 862126, 862120, 862122, 862199, and 862128.
[c] Contributing resources include BHP Keys 026581, 026588, 026589, and 862073.

The Pennsylvania SHPO provided comments of adverse effects for two historic properties, including the Nesbitt Estate Rural Historic District (862240) and the Pedrick Farm (862236). Comments on the remaining 19 sites are pending review by the Pennsylvania SHPO.

The Nesbitt Estate was established by Abram Nesbitt, a prominent financial, industrial, and civil leader in the Wyoming Valley from the 1860s to 1920. The estate was the family's rural retreat that continues to be owned by direct descendants of Abram Nesbitt. The Nesbitt Estate is a well-preserved example of a mid-nineteenth century, Queen Anne style, American Country House Estate of the late Gilded Age of America (1880s to 1907). Well-preserved dry laid stone fence/walls, rock cairns, and stone piles mark the earlier division of fields and boundaries. The property also retains two mid-nineteenth century, Anglo-New England, single family farmsteads with well-preserved main dwellings and agricultural outbuildings. The Nesbitt Estate holds significance within two agricultural contexts, including “Diversified Production for Local Markets (1860–1940)” and “Fossil Fuel Powered Diversified Production (1940–1960).” Transco has rerouted the Project to minimize impacts on the Nesbitt Estate Rural Historic District. Additionally, section 3.3.2 provides an analysis of alternatives we considered to avoid the district.

Pedrick Farm is a well-preserved 116-acre property with dry laid stone fence/walls. The site is significant for its role in the agricultural history of the region between 1850 and 1960. The property retains dry laid stone fence walls.

The Captain John Smith Chesapeake National Historic Trail was established in 2006 as the first national water trail. The trail traces approximately 3,000 miles of John Smith’s voyages on the Chesapeake Bay and nine of its major tributaries (NPS, 2006). Smith’s expeditions reached the mouth and falls of the Susquehanna River but did not extend into what is now Pennsylvania; however, Susquehannock leaders from present-day Pennsylvania traded with Smith. Because of this historic connection, the NPS worked with the state of Pennsylvania to link existing water trails on the Susquehanna River to the Captain John Smith Chesapeake National Historic Trail (NPS, 2011). In 2016, the NPS announced the route for the Captain John Smith Chesapeake National Historic Trail as a line on the waters of the Chesapeake Bay and nine of its tributaries, including the Susquehanna River, which is within the proposed project area (NPS, 2016). However, Transco completed a GIS-based visual analysis of the Captain John Smith Chesapeake National Historic Trail to assess Transco’s 50-foot-wide permanent easement visibility from the trail and to assess potential project impacts on the trail. The Project would cross the Susquehanna River by HDD at CPL North MP 35.0 and CPL South MP 99.7. Additionally, CPL South would be parallel to the trail in southern Lancaster County where the trail is at distance ranging from 1 to 10 miles from the river.

Both sides of the CPL North crossing are located in open areas. About 5.7 acres of the permanent tree removal associated with Transco’s 50-foot-wide permanent right-of-way would be visible from the Captain John Smith Chesapeake National Historic Trail. The visible areas would be between MPs M-0071 2.8 and 3.1 and MPs 34.3 and 34.8 on the west side of the pipeline crossing and between MPs 36.1 and 36.3 on the east side of the crossing.

Most of the pipeline right-of-way near the proposed CPL North pipeline crossing location would be in open areas. Once these areas are revegetated, the portions of the pipeline closest to the trail would not be visible. Using the HDD method, Transco would install the pipeline beneath the Susquehanna River to avoid direct impacts on the trail and would avoid vegetation clearing between the HDD entry and exit sites. No archaeological or architectural resources associated with Captain Smith’s voyages during the early 1600s would be directly or indirectly affected at this crossing location.

The CPL South crossing location is collocated with an existing electric transmission line with a right-of-way of about 200 feet wide. Both sides of the river are bordered by agricultural lands interspersed with small stands of forest. Along CPL South, about 6.6 acres of the permanent tree removal associated with the new 50-foot-wide permanent right-of-way would be visible from the Captain John Smith Chesapeake National Historic Trail. Transco’s permanent right-of-way would be visible between MPs 100.2 and 100.5 on the north side of the river crossing, and between MPs M-0179 0.1 and 0.26 and MPs M-0423 0.4 and 1.1. However, the historic setting of the trail has been diminished due to the visible modern intrusion created by the collocated overhead electric transmission lines. Therefore, the Project would not affect the trail. No archaeological or architectural resources associated with Captain Smith’s voyages during the early 1600s would be directly or indirectly affected at this crossing location.

In Lancaster County, CPL South crosses the River Hills region between MPs M-0184 0.8 and 2.1 east of the Susquehanna River. The dissected uplands characteristic of this region and presence of vegetation limit most views of the Project from the Captain John Smith Chesapeake National Historic Trail. The overall cultural landscape has been altered considerably as a result of twentieth century industrialization of the river. The historic river levels that would have been present during the early 1600s were altered by the construction of three hydroelectric dams on the Susquehanna River between 1910 and 1931, which raised water levels up to 105 feet. CPL South would be visible from the Susquehanna River near MP 22.2 as a result of localized permanent tree removal and would represent a negligible visual impact on the trail with little to no perceived change to the character of the landscape.

Virginia

In Virginia, the direct APE consists of all areas of ground disturbance outside of the current right-of-way or facilities (i.e., areas identified as temporary workspace and access roads) and segments of the right-of-way. For the direct APE, Transco conducted a cultural resources identification survey consisting of a 15-foot-wide corridor for the areas identified as temporary workspace that extend outside of the existing right-of-way. The direct APE for access roads was based on the width needed to make the roads usable for construction. The survey was conducted along a 15-foot-wide corridor for the access road. A Phase I archaeological survey was conducted within the direct APE for the Project. A total of 47.5 acres were surveyed. In addition, five previously identified archaeological resources within or immediately adjacent to the right-of-way were reviewed and reassessed. The Phase I archaeological survey included pedestrian reconnaissance and shovel testing.

Transco conducted architectural reconnaissance within the indirect APE for the Project, including all areas visible at eye-level from within the public right-of-way for the proposed MLVs. The aboveground resources reconnaissance was completed at the proposed MLV sites in order to assess the effects of the undertaking on architectural resources. The archaeological and architectural surveys in Virginia did not identify any new resources. One lithic artifact was recovered from a disturbed context within a previously recorded precontact archaeological site (44PW418). This site is not recommended as eligible.

The Project intersects the Second Battle of Manassas in an area that lacks historical integrity due to previous construction of a modern road and pipeline. Therefore, the Project would not adversely affect the battlefield.

4.10.3 Outstanding Cultural Resource Investigations

Transco would file additional reports with FERC and the Pennsylvania SHPO for the Phase I archaeological resources identification surveys for the remaining project locations. FERC staff is in the process of notifying the ACHP of the potential adverse effect to historic properties.

4.10.4 Unanticipated Discovery Procedures

Transco has prepared procedures to be used in the event any unanticipated historic properties or human remains are encountered during construction. The *Unanticipated Cultural and Human Remains Discovery Plan* provides for the notification of consulting and interested parties, including Indian tribes, in the event of any discovery. To date, Transco has not filed the Pennsylvania, Virginia, Maryland, North Carolina, and South Carolina SHPOs' responses to the revised plan for unanticipated discoveries during construction. However, we find the plan acceptable.

4.10.5 General Impacts and Mitigation

Compliance with section 106 of the NHPA has not been completed for the Project. Cultural resources surveys of portions of the Project and consultation with the Pennsylvania SHPO and other parties has not been completed.

To ensure that FERC's responsibilities under the NHPA and its implementing regulations are met, **we recommend that:**

- **Transco should not begin construction of facilities in Pennsylvania or use of staging, storage, or temporary work areas and new or to-be-improved access roads <u>until</u>:**

  a. Transco completes the remaining cultural resources surveys and files with the Secretary all remaining cultural resources survey and evaluation reports, any necessary avoidance or treatment plans that outline measures to avoid, reduce, and/or mitigate, effects on historic properties, and the Pennsylvania SHPO's comments on the reports and plans;

  b. Transco completes the remaining geomorphological investigation of the west bank of Swatara Creek and files the report with the Secretary;

  c. the ACHP is provided an opportunity to comment on the undertaking if historic properties would be adversely affected; and

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

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

4.11 AIR QUALITY AND NOISE

4.11.1 Air Quality

Air quality would be affected by construction and operation of the Project. Most of the construction emissions associated with this Project would be from pipeline construction. The primary operational emissions associated with the Project would be from the compressor stations. This section of the EIS addresses the construction and operational emissions from the Project, as well as projected impacts on air quality and applicable regulatory requirements.

The Project would generate emissions during construction as a result of the use of gasoline and diesel-fired combustion equipment, and earth-moving activities. The following project components would generate emissions during construction:

- 57.3 miles of new 30-inch-diameter and 125.2 miles of 42-inch-diameter greenfield pipeline in Pennsylvania;
- 2.9 miles of new 36-inch-diameter and 8.6 miles of 42-inch-diameter pipeline loops in Pennsylvania; and

- 2.5 miles of 30-inch-diameter pipeline replacements in Virginia.

The following project components would be sources of air emissions during construction and operation:

- 2 new compressor stations (Compressor Stations 605 and 610) in Pennsylvania;
- additional ancillary facilities, such as MLVs and internal inspection device (i.e., pig) launchers and receivers in Pennsylvania;
- 2 new meter stations and 3 new regulator stations with interconnecting piping in Pennsylvania;
- additional compression and related modifications to Compressor Stations 517 and 520 in Pennsylvania and Compressor Station 190 in Maryland;
- modifications to existing Compressor Stations 190, 185, 170, 160, 150, and 145 that enable compression for bidirectional flow in Maryland, Virginia, and North Carolina;
- installation of deodorization/odor masking equipment at existing Compressor Stations 160, 155, 150, and 145 in North Carolina;
- modification to an existing meter station for use of shared facilities with a new meter station in Pennsylvania;
- supplemental odorization, odor detection, and/or odor masking/deodorization equipment at 42 meter/regulator stations in North Carolina and South Carolina; and
- odor masking/deodorization equipment at 14 MLV locations in North Carolina and South Carolina.

4.11.1.1 Regional Climate

Pennsylvania

The project area receives an annual average of 40 to 45 inches of rain. The annual average temperature across the region is 50 °F. The region’s coldest temperatures occur during the winter months and on average range between 20 and 40 °F. The warmest temperatures occur during the summer months and on average range between 60 and 85 °F. Pennsylvania’s warmest temperatures are found in the southeast part of the state. During the summer, southeastern Pennsylvania can experience about 75 percent more days with high temperatures above 90 °F, compared to the state average.

Maryland

The average annual temperature is about 55 °F. The region’s coldest temperatures occur during the winter months with an average temperature of about 35 °F. The summer months offer the region’s warmest temperatures with an average of 75 °F. This portion of Maryland averages about 42 inches of precipitation per year with the distribution roughly spread throughout the year. The project area’s proximity to the Chesapeake Bay and the Atlantic Ocean results in a higher likelihood of marine-influenced weather including high humidity, fog, and in some cases, flooding.

North Carolina

The project area in North Carolina receives an annual average of 48 inches of rain. December is typically the driest month of the year with a monthly mean of 4 inches of rain, whereas March tends to be the wettest month with a monthly mean of 5 inches. Temperatures range from an average of 89 °F in August to an average of 50 °F in January (State Climate Office of North Carolina, 2015).

South Carolina

The project area in South Carolina receives an annual average of 46.01 inches of rain. April is typically the driest month of the year with a monthly mean of 3 inches of rain, whereas August tends to be the wettest month with a monthly mean of 5 inches. Temperatures range from an average of 85.6 °F in June to an average of 51.5 °F in January (National Climatic Data Center, 2010).

Virginia

The project area in Virginia receives an annual average of between 39 to 43 inches of rain. February is typically the driest month of the year with a monthly mean of 2 inches of rain, whereas May tends to be the wettest month with a monthly mean of 5 inches. Temperatures range from an average of 83 °F in July to an average of 23 °F in January (University of Washington, 2015).

Existing Air Quality

The CAA, 42 USC 7401 et seq., amended in 1977 and 1990, is the primary federal statute governing air pollution. The EPA, as required by the CAA, has established National Ambient Air Quality Standards (NAAQS) to protect public health (primary standards) and public welfare (secondary standards). Standards have been set for six principal pollutants that are called "criteria pollutants." These criteria pollutants are ground-level ozone, carbon monoxide (CO), oxides of nitrogen (NO_X), sulfur dioxide (SO_2), respirable and fine particulate matter (inhalable particulate matter with an aerodynamic diameter less than or equal 10 microns [PM_{10}] and less than or equal to 2.5 microns [$PM_{2.5}$]), and airborne lead. Ozone is not directly emitted into the atmosphere from an emissions source. Ozone develops as a result of a chemical reaction between NO_X and volatile organic compounds (VOC) in the presence of sunlight. Therefore, NO_X and VOCs are often referred to as ozone precursors. The current NAAQS are available on the EPA's website.[32]

States have the authority to adopt ambient air quality standards if they are more stringent than the NAAQS. Pennsylvania has adopted standards for non-criteria pollutants (beryllium, fluorides, hydrogen sulfide, and settled particulate); however, all of the other states where the Project would be located have not adopted state ambient air quality standards for any criteria pollutant.

Air quality monitoring data from the EPA AirData website for calendar year 2013 was reviewed to characterize background air quality for regulated criteria pollutants. Air quality monitoring stations in closest proximity to the project area were considered for obtaining monitored values. Table 4.11.1-1 shows background air quality data (EPA, 2013a) for Pennsylvania and Maryland, the two states where the majority of the project emissions would occur. Because the project facilities located in Virginia, North Carolina, and South Carolina are not considered significant, background air quality data was not provided for those states.

[32] The current NAAQS can be accessed online at https://www.epa.gov/criteria-air-pollutants/naaqs-table.

TABLE 4.11.1-1

Background Ambient Air Quality and Ambient Air Quality Standards for Pennsylvania and Maryland

Air Pollutant	Averaging Period	Monitor Values [a]	Monitoring Site (County)	NAAQS [b]
Pennsylvania				
Sulfur dioxide (SO_2)	1-hour [c]	20 ppb	Centre	75 ppb
CO	1-hour	1.2 ppm	Lackawanna	35 ppm
	8-hour	0.9 ppm	Lackawanna	9 ppm
Nitrogen dioxide (NO_2)	1-hour [d]	36 ppb	Centre	100 ppb
Ozone	8-hour [e]	0.071 ppm	Lycoming	0.075 ppm (2008 Standard)
PM_{10}	24-hour [f]	32 µg/m^3	Lycoming	150 µg/m^3
$PM_{2.5}$	24-hour [f]	27.7 µg/m^3	Centre	35 µg/m^3
	Annual [f]	9.68 µg/m^3	Centre	12 µg/m^3
Maryland				
SO_2	1-hour [c]	12 ppb	Prince George’s	75 ppb
CO	1-hour	1.26 ppm	Prince George’s	35 ppm
	8-hour	1.1 ppm	Prince George’s	9 ppm
NO_2	1-hour [d]	47 ppb	Baltimore	100 ppb
Ozone	8-hour [e]	0.085 ppm	Baltimore	0.075 ppm (2008 Standard)
PM_{10}	24-hour [f]	35.3 µg/m^3	Prince George’s	150 µg/m^3
$PM_{2.5}$	24-hour [f]	21.8 µg/m^3	Prince George’s	35 µg/m^3
	Annual [f]	8.82 µg/m^3	Prince George’s	12 µg/m^3

[a] Monitored values of pollutants are the high value between 2011 and 2013, obtained from the EPA AirData website (EPA, 2013a). CO is reported as the second maximum.

[b] EPA, 2014c.

[c] Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.075 ppm. The 1971 annual and 24-hour SO_2 standards were revoked June 2, 2010; the 3-hour secondary standard (0.5 ppm) was retained. Averaged over the following years: 2011, 2012, and 2013.

[d] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (0.1ppm), effective January 22, 2010. Averaged over the following years: 2011, 2012, and 2013.

[e] Fourth highest daily maximum, averaged over 3 years. In this case, 2011, 2012, and 2013.

[f] The $PM_{2.5}$ and PM_{10} standards specify an average over 3 years. In this case, 2011, 2012, and 2013 were averaged.

Notes: µg/m^3 = micrograms per cubic meter
ppb = parts per billion
ppm = parts per million

An air quality control region (AQCR) is defined under 42 USC 7407(c) as “...any interstate area or major intrastate area which [the Administrator of the EPA] deems necessary or appropriate for the attainment and maintenance of ambient air quality standards.” Each AQCR, or portion(s) of an AQCR, is classified as either “attainment,” “nonattainment,” “unclassifiable,” or “maintenance” with respect to the NAAQS.

Areas where ambient air concentrations of the criteria pollutants are below the levels listed in the NAAQS are considered in attainment. If ambient air concentrations of criteria pollutants are above the NAAQS levels then the area is considered to be nonattainment. Areas that have been designated nonattainment but have since demonstrated compliance with the NAAQS are designated as in maintenance for that pollutant. Maintenance areas are treated similarly to attainment areas for the permitting of stationary sources; however, specific provisions may be incorporated through the state’s approved maintenance plan to ensure that air quality would remain in compliance with the NAAQS for that pollutant. Areas where air quality data are not available are considered to be unclassifiable and are treated as attainment areas. Counties in the project area currently listed as nonattainment for one or more criteria pollutants are listed in table 4.11.1-2. All other counties affected by the Project are in attainment for all criteria pollutants.

TABLE 4.11.1-2

Attainment Status for the Counties Crossed by the Atlantic Sunrise Project Facilities

State	County	Attainment Status (Pollutant and Standard)
PA	Lancaster	Nonattainment: Ozone, $PM_{2.5}$
MD	Howard	Nonattainment: Ozone
VA	Prince William	Nonattainment: Ozone
NC	Iredell	Nonattainment: Ozone
NC	Gaston	Nonattainment: Ozone
NC	Lincoln	Nonattainment: Ozone
NC	Rowan	Nonattainment: Ozone

Source: EPA, 2015c

Section 184 of the CAA established the Northeast Ozone Transport Commission to assist in developing recommendations for the control of interstate air pollution in these 13 northeast states, referred to as the Northeast Ozone Transport Region (OTR). All major sources in these states are treated as being in at least a moderate ozone nonattainment area for permitting purposes. Compressor Stations 517 and 520 in Pennsylvania and Compressor Station 190 in Maryland would be affected by these OTR requirements and are described further in this document. Compressor Stations 605 and 610 would have minimal operational emissions because the proposed compressors would be electric-driven and would not trigger air permitting or OTR requirements.

Greenhouse Gases

Greenhouse gases occur in the atmosphere both naturally and as a result of human activities, such as the burning of fossil fuels. GHGs are gases that absorb infrared radiation in the atmosphere, and an increase in emissions of these gasses has been determined by the EPA to endanger public health and welfare by contributing to human-induced global climate change. The most common GHGs emitted during fossil fuel combustion and natural gas transportation are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). 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 over a specific timeframe, or its global warming potential (GWP). The 100-year GWP of CO_2 is 1, CH_4 is 25, and N_20 is 298. During construction and operation of the Project, these GHGs would be emitted from non-electrical construction and operational equipment, as well as from fugitive CH_4 leaks from the pipeline and aboveground facilities.

As with any fossil fuel-fired project or activity, the Project would contribute to climate change-inducing GHG emissions. The principle GHGs that would be produced by the Project are CO_2, CH_4, and N_2O. Emissions of GHGs are quantified and regulated in units of CO_2e. The CO_2e unit of measure takes into account the GWP of each GHG over a specified timeframe. The GWP is a ratio relative to CO_2 that is based on the particular GHG's ability to absorb solar radiation as well its residence time within the atmosphere. Thus, CO_2 has a GWP of 1, CH_4 has a GWP of 25, and N_2O has a GWP of 298 on a 100-

year timescale. To obtain the CO_2e quantity, the mass of the particular compound is multiplied by the corresponding GWP, the product of which is the CO_2e for that compound. The CO_2e value for each of the GHG compounds is summed to obtain the total CO_2e GHG emissions. GHG emissions are typically used as a proxy to evaluate impacts on climate change.

The EPA has expanded its regulations to include the emission of GHGs from major stationary sources under the Prevention of Significant Deterioration (PSD) program. The EPA's current rules require that a stationary source that is major for a non-GHG-regulated New Source Review (NSR) pollutant must also obtain a GHG PSD permit prior to beginning construction of a new or modified major source with mass-based GHG emissions equal to or greater than 100,000 tons per year (tpy) and significant net emission increases in units of CO_2e equal to or greater than 75,000 tpy. There are no NAAQS or other significance thresholds for GHGs.

4.11.1.2 Air Quality Regulatory Requirements

The Project would be potentially subject to a variety of federal and state regulations pertaining to the construction and operation of air emission sources.

Federal Air Quality Requirements

The CAA, 42 USC 7401 et seq., as amended in 1977 and 1990, and 40 CFR Parts 50 through 99 are the basic federal statutes and regulations governing air pollution in the United States. The following federal requirements have been reviewed for applicability to the Project:

- NSR/PSD;
- Title V Operating Permits;
- New Source Performance Standards (NSPS);
- National Emission Standards for Hazardous Air Pollutants (NESHAP);
- GHG Reporting; and
- General Conformity.

<u>New Source Review and Prevention of Significant Deterioration</u>

Congress established the NSR preconstruction permitting program as part of the 1977 CAA Amendments. Federal preconstruction review under NSR is conducted under separate procedures for sources in attainment areas and sources in nonattainment areas. Nonattainment New Source Review (NNSR) applies to sources in nonattainment areas. The EPA usually delegates the NSR/NNSR permitting program to state and/or local air quality agencies that have established permitting thresholds and requirements such as Best Available Control Technology (BACT), emission offsets, and air quality impact analyses (modeling). PSD applies to new major sources or major modifications at existing sources in attainment areas or in areas that are unclassifiable. PSD is intended to keep new air emission sources from causing the existing air quality to deteriorate beyond acceptable levels.

Under PSD, any new major source or major modification of an existing source of air pollutants is required to obtain an air quality permit before beginning construction. The definition of a PSD major source of air pollutants as applicable to the Project is any stationary source that emits, or has the potential to emit, 250 tpy of a regulated NSR pollutant (40 CFR 51.166(b)(1)(i)(b)) or is listed as belonging to one of 28 specifically listed industrial source categories under 40 CFR 52.21(b)(1) that have a 100-tpy applicability threshold. The sources proposed as part of the Project are not included on the categorical list; therefore, the potential to emit 250 tpy of an NSR-regulated pollutant is the applicable threshold for determining major source status. If a source emits even one criteria pollutant in major amounts, the source will be considered major. All pollutants, even those emitted in non-major amounts, are then reviewed for PSD applicability by using their respective Significant Emissions Rate (SER). Emissions equal to or higher than the SER make the pollutant subject to PSD review.

PSD also applies to an existing major source when physical modifications are made that result in increased emissions above the "major modification." The applicability thresholds under PSD are listed in table 4.11.1-3.

TABLE 4.11.1-3

Major Stationary Source/Major Modification Emission Thresholds

Pollutant	Major Stationary Source Threshold Level (tpy)	Major Modification Significant Net Increase and Major Source SER (tpy)
Ozone	250	40
VOC	250	40
NO_X	250	40
CO	250	100
SO_2	250	40
PM	250	25
PM_{10}	250	15
$PM_{2.5}$	250	10
Lead	250	0.6
GHGs	100,000	75,000

Under PSD, any new major source or major modification of an existing source of air pollutants is required to obtain an air quality permit before beginning construction. NSR/NNSR permitting requirements vary by state, but new sources or modifications to existing sources are required to obtain an air quality permit prior to construction.

An analysis of potential emissions for Compressor Stations 517, 520, 190, 605, and 610 was performed to evaluate air permit requirements and applicable air regulations. Compressor Stations 605 and 610, which would use electric motor-driven compression, would be considered new minor emission sources because the only source of emissions would be from natural gas-fired emergency generators, gas heaters, and fugitive emissions. Therefore, Compressor Station 605 and 610 emissions would not be subject to PSD review.

Compressor Stations 517, 520, and 190 are existing major sources under the PSD program with potential emissions of NO_X and CO above 250 tpy. Emissions increases from the proposed modifications were compared to the PSD SER thresholds identified in table 4.11.1-3 to assess the PSD major modification applicability. Based on this analysis, the emissions associated with Compressor Stations 517 and 520 would be below all respective PSD SER thresholds. Therefore, the emission increases at Compressor Stations 517 and 520 are not subject to PSD permitting requirements, but are subject to NNSR requirements.

The potential to emit (PTE) of air pollutants from the proposed modifications at Compressor Station 190 were compared to the PSD SER thresholds in table 4.11.1-3. It was determined that the proposed NO_X emission increases are greater than the SER threshold. A NO_X netting analysis was completed, which demonstrated that other emission reductions and a pollution control project completed by Transco at Compressor Station 190, when combined with the proposed emission increases, result in net NO_X emissions lower than the SER. Therefore, the modifications to Compressor Station 190 would not be subject to NNSR or PSD. A detailed description of this analysis was included in the air permit application for the modifications to Compressor Station 190. This analysis was reviewed by the MDE and included in the Permit to Construct issued in January 2015.

On May 13, 2010, the EPA issued a PSD GHG Tailoring Rule. The rule tailored specific applicability thresholds for GHG stationary sources. However, on June 23, 2014, the Supreme Court ruled that the EPA cannot require PSD permitting based solely on GHG emissions, striking down a portion of the rule.

The GHG Tailoring Rule specified that as of July 1, 2011, new sources would become subject to PSD with regard to GHGs if the source emits or has the potential to emit greater than 100,000 tpy of CO_2e. An existing Title V facility was subject to a 75,000 tpy CO_2e significance threshold for any modifications. However, based on the U.S. Supreme Court ruling, in order for PSD permitting requirements to apply, the new or modified source must be subject to PSD for a criteria pollutant in order to be considered a major PSD source for GHGs and, for such sources, only BACT requirements would apply. As discussed above, no criteria pollutant emissions would trigger PSD review at any of the compressor stations associated with the Project. Because GHG emissions from Compressor Station 190 exceed the 75,000-tpy threshold and the facility is an existing PSD major source, GHG BACT would apply to the proposed modifications at this facility.

Federal Class I Areas

The CAA Amendments of 1977 designated certain areas of the United States as Mandatory Federal Class I areas, based on their air quality being considered a special feature of the area (e.g., national parks, wilderness areas). Class I areas are protected against several types of pollution, including elevated levels of criteria pollutant concentrations, visibility degradation, and acid deposition. If the new major source or major modification is within 62 miles (100 kilometers [km]) of a Class I area, the facility is required to notify the appropriate federal official and assess potential impacts of that project on the nearby Class I area. For major sources that are within 6.2 miles (10 km) from a Class I area, ambient air pollutant impacts must be assessed for any project emission increase. Under the protection of the CAA, there are currently 156 protected areas nationwide designated as “Class I” areas. When evaluating the potential impacts of sources of new air emissions on designated Class I areas, special analyses are required by federal law.

Two factors determine potential impacts on Federal Class I areas: (1) magnitude of emissions; and (2) distance to the Class I area. No Federal Class I areas were found in Pennsylvania or Maryland, The only new stationary sources that could impose an air quality impact on Class I areas are those proposed to be added at Compressor Stations 517 and 520 in Pennsylvania and Compressor Station 190 in Maryland. The approximate distance and direction to Federal Class I areas from the nearest compressor station are noted in table 4.11.1-4.

TABLE 4.11.1-4

Distance to Class I Areas from Nearest Compressor Station Associated with the Atlantic Sunrise Project

Compressor Station	Shenandoah National Park, VA	Dolly Sods, WV	Otter Creek, WV	Lye Brook, VT	Brigantine National Wildlife Refuge, NJ
517	189.5 miles SW	214.3 miles SW	226.7 miles SW	211.2 miles NE	158.4 miles SE
520	170.8 miles S	186.4 miles SW	197.5 miles SW	245.4 miles NE	189.5 miles SE
190	116.2 miles SW	130.5 miles WSW	146.6 miles WSW	334.2 miles NNE	137.3 miles E

Transco completed a screening analysis based on proposed emissions (Q in tons per year) and the distance from the emission source to the Class I area (D in kilometers). If the ratio (Q/D) is less than 10, no additional analysis of impacts on the Class I area from project emissions is needed. Based on this screening analysis, no additional Class I impact assessment was needed. We have reviewed this analysis and agree no additional Class I impact assessment is needed for the Project.

Title V Operating Permit Program

The Part 70 Operating Permit program, as described in 40 CFR 70, requires major stationary sources of air emissions to submit an operating permit application prior to initial facility startup. Part 70 operating permits are more commonly referred to as "Title V" permits. A Title V operating permit is issued for a period of 5 years and governs operation of emission sources at a facility. The Title V permit includes all applicable regulations, emission limits, and reporting and recordkeeping requirements for a facility.

Compressor Stations 517 and 520 currently operate under Title V permits issued by PADEP as follows:

- Station 517 Title V operating permit No. 19-00007, effective April 2, 2010, and expires April 1, 2015 – A Title V renewal application was submitted on September 16, 2014 for this compressor station.

- Station 520 Title V operating permit No. 41-00001, effective April 14, 2010, and expires April 13, 2015 – A Title V renewal was submitted on August 12, 2014, for this compressor station.

Compressor Station 190 currently operates under Title V Permit No. 24-027-00223, issued by MDE, effective September 1, 2014, and expires November 30, 2018.

After construction is complete at the compressor stations and operation has begun, minor modifications would be submitted to PADEP and MDE to incorporate the facility modifications into the respective Title V operating permits.

No other facilities associated with the Project are subject to the Title V Operating Permit Program because they are either not considered major sources of emissions or emission profiles of existing facilities would not change.

New Source Performance Standards

Section 111 of the CAA authorized the EPA to develop technology-based standards that apply to specific categories of stationary sources. These standards, referred to as New Source Performance Standards (NSPS), are found in 40 CFR 60. The NSPS applies to new, modified, and reconstructed affected facilities in specific source categories. NSPS regulations are issued for categories of sources causing or contributing significantly to air pollution that may reasonably be anticipated to endanger public health or welfare. The standards apply to new stationary sources of emissions (i.e., sources whose construction, reconstruction, or modification began after a standard for those sources was proposed). The NSPS typically applicable to natural gas compressor station engines are:

Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

Subpart JJJJ provides requirements for stationary spark ignition internal combustion engines (ICE) that are constructed, modified, or reconstructed after June 12, 2006. These standards implement section 111(b) of the CAA. Subpart JJJJ is applicable to the natural gas-fired emergency generator engines proposed for Compressor Stations 517, 520, 190, 605, and 610 because the engines would be spark-ignited ICEs, above the horsepower size threshold, commencing construction after June 12, 2006, and manufactured after the applicability date in the NSPS (July 1, 2008). Operating hours for maintenance/readiness/non-emergency operation are limited to 100 hours in any 12-month period. The PADEP permits the PTE for emergency use engines based on 500 hours per year operation. This 500-hour limit includes a limit of 100 hours of maintenance/readiness/non-emergency operation with the remaining hours for emergency use. Transco indicates that the emergency generators would not be operated more than 500 hours per year.

Subpart KKKK – Standards of Performance for Stationary Combustion Turbines

Subpart KKKK regulates emissions of NO_X and SO_2 from combustion turbines. The applicability thresholds are a heat input rating (based on the higher heating value of the fuel) at peak load equal to or greater than 10 million British thermal units per hour, and manufactured after February 18, 2005. The new gas turbines proposed for installation at Compressor Stations 517 and 520 in Pennsylvania and Compressor Station 190 in Maryland would be subject to NSPS Subpart KKKK. Transco would comply with the requirements of the Plan Approvals issued by the PADEP and the Air Quality Permit to Construct issued by the MDE. Proposed Compressor Stations 605 and 610 in Pennsylvania would be electric motor-driven and, therefore, the turbines at these compressor stations would not be subject to this regulation.

Subpart OOOOa – Standards of Performance for Oil and Natural Gas Sector

Subpart OOOOa is a recently revised NSPS that regulates emissions of GHGs and VOCs from certain new and modified sources in the oil and natural gas section. Subpart OOOOa would likely apply to the proposed new Compressor Stations 605 and 610, and to the modified Compressor Stations 190, 517, and 520. Subpart OOOOa requires implementation of leak detection and repair programs at applicable natural gas compressor stations, requirements to limit GHG and VOC emissions from compressors and pneumatic controllers used at compressor stations, and includes requirements for recordkeeping and annual reporting. Transco would be required to comply with the applicable portions of Subpart OOOOa by installing compliant equipment at the new or modified compressor stations and by implementing leak detection and repair programs.

National Emission Standards for Hazardous Air Pollutants

The National Emission Standards for Hazardous Air Pollutants (NESHAP), codified in 40 CFR 61 and 63, regulate the emissions of hazardous air pollutants (HAP) from new and existing sources. The 1990 CAA Amendments established a list of 189 HAPs, resulting in the promulgation of Part 63, also known as the Maximum Achievable Control Technology (MACT) standards. Part 63 regulates HAPs from major sources of HAPs and specific source categories emitting HAPs. Some NESHAPs may apply to non-major sources (area sources) of HAPs. Major source thresholds for NESHAPs are 10 tpy of any single HAP or 25 tpy of total HAPs. The Project does not include any of the specific sources for which NESHAP have been established in Part 61. Therefore, Part 61 NESHAP requirements would not apply to the Project.

The EPA has also established NESHAP requirements in 40 CFR 63 for various source categories. Part 63 NESHAP applies to certain emission units at facilities that are major sources of HAPs. Some NESHAPs apply, or may apply in the future, to non-major sources (area sources) of HAPs. Compressor Stations 190 and 520 would be considered major sources for HAPs emissions because emissions of HAPS would be lower than the major stationary source thresholds (see section 4.11.1.3). Any modifications to these stations would be subject to applicable NESHAP requirements and have been appropriately represented in the air permit applications.

The NESHAP for reciprocating internal combustion engines (RICE) amendments was promulgated under 40 CFR 63, Subpart ZZZZ by the EPA. The original major source NESHAP for RICE was amended to include those with a site rating of 500 hp or less located at major sources of HAPs, and new and reconstructed stationary located at area sources. New spark ignition ICEs (emergency generator engines) subject to 40 CFR 63, Subpart ZZZZ applicability would be installed at Compressor Stations 517, 520, 190, 605, and 610 (one per station). The NESHAP refers to the NSPS for applicable requirements (Subpart JJJJ), thus compliance with NSPS constitutes compliance with NESHAP Subpart ZZZZ. Transco would comply with these requirements as required by Pennsylvania and Maryland regulations.

The NESHAP for stationary combustion turbines was promulgated under 40 CFR 63, Subpart YYYY. Under Subpart YYYY, there are no requirements applicable to existing turbines greater than or equal to 1 MW (about 1,340 hp). Furthermore, on August 18, 2004, the Washington D.C. Circuit Court issued a Stay of Implementation on 40 CFR 63, Subpart YYYY. Currently, natural gas-fired turbines are only subject to the general permitting and notification requirements of 40 CFR 63, Subpart A. Thus, there are no pollutants regulated under the current Subpart YYYY. The new gas turbines proposed for installation at Compressor Stations 517 and 520 in Pennsylvania and Compressor Station 190 in Maryland would be subject to the general permitting and notification requirements under 40 CFR 63, Subpart A. Transco would comply with these requirements.

Greenhouse Gas Reporting Rule

On November 8, 2010, the EPA signed a rule that finalizes reporting requirements for the petroleum and natural gas industry under 40 CFR 98. Subpart W of 40 CFR 98 requires petroleum and natural gas facilities that emit 25,000 metric tons or more of CO_2e per year to report annual emissions of specified GHGs from various processes within the facility. Emissions of GHGs associated with the construction and operation of the Project, including all direct and indirect emission sources were calculated. In addition, GHG emissions were converted to total CO_2e emissions based on the GWP of each pollutant. The reporting rule does not apply to construction emissions. However, we have included the construction emissions for accounting and disclosure purposes. GHG emissions from Compressor Stations 517, 520, and 190 may be subject to GHG reporting. If actual GHG emissions from the compressor stations are not equal to or greater than the reporting threshold, Transco would be required to comply with all applicable requirements of 40 CFR Part 98.

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 State Implementation Plan. 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 counties designated attainment or unclassifiable/attainment that are within the Northeast OTR.

The General Conformity Rule excludes emissions regulated by any permit issued under minor and major NSR from counting toward a General Conformity applicability.

A General Conformity Determination must be completed when the total direct and indirect emissions of a project would equal or exceed specified pollutant thresholds on a calendar year basis for each nonattainment or maintenance area. With regard to the Project, the relevant general conformity pollutant thresholds are shown in table 4.11.1-5. These thresholds are based on the current air quality designations (e.g., serious nonattainment, moderate nonattainment, maintenance, etc.).

Estimated emissions for the Project subject to review under the General Conformity thresholds (construction emissions and operational emissions not subject to major or minor NSR permitting), along with a comparison to the applicable General Conformity applicability threshold are presented in table 4.11.1-5.

Based on Transco's original construction emission estimates included in the draft EIS, the Project did not trigger a General Conformity Determination. On September 19, 2016, Transco filed revised construction emission calculations that compressed the construction schedule to one calendar year (2017). As shown in table 4.11.1-5, the revised estimated 2017 NO_X construction emissions for Lancaster County would exceed the General Conformity applicability threshold. All other emissions generated during all years of construction would not exceed General Conformity applicability thresholds.

A draft General Conformity Determination was developed for the Project and placed on public notice on November 3, 2016. Transco has committed to using emission reduction credits (ERC) to demonstrate conformity and is currently working with the PADEP and the EPA to verify the amount of ERCs required and the location from which the ERCs must be taken to offset the estimated 2017 NO_X construction emissions for Lancaster County. Correspondence with the PADEP has indicated that the use of ERCs is an acceptable method for demonstrating compliance with the Pennsylvania State Implementation Plan and that sufficient NO_X ERCs are available.

Based on comments received on December 5, 2016 by PADEP and the Clean Air Council during the public comment period on the draft General Conformity Determination, Transco provided additional calculation methodology and provided additional estimates for fugitive dust emissions. These revisions are being incorporated into the final General Conformity Determination. Table 4.11.1-5 has been updated to include these revisions.

TABLE 4.11.1-5

Summary of Construction Emissions Subject to General Conformity Review Associated with the Atlantic Sunrise Project for 2017

Designated Pollutant	Designated Non-attainment Area	Threshold (tpy)	Pollutant or Precursor	2017 Total Construction Emissions (tons)
Ozone	Lancaster County, PA	50	VOC	19.3
		100	NO_X	133.5
	Howard County, MD	50	VOC	2.1
		100	NO_X	15.2
	Prince William County, VA	50	VOC	4.1
		100	NO_X	33.2
	Gaston County, NC	50	VOC	0.1
		100	NO_X	0.2
	Lincoln County, NC	50	VOC	0.1
		100	NO_X	0.2
	Mecklenburg County, NC	50	VOC	0.1
		100	NO_X	0.2
	Iredell County, NC	50	VOC	0.1
		100	NO_X	0.2
	Rowan County, NC	50	VOC	0.1
		100	NO_X	0.2
	Carabus County, NC	50	VOC	0.1
		100	NO_X	0.2
	York County, SC	50	VOC	0.1
		100	NO_X	0.2
$PM_{2.5}$	Lancaster County, PA	100	NO_X	128.6
		100	$PM_{2.5}$	42.2
		100	SO_2	0.2
	Lebanon County, PA	100	NO_X	99.4
		100	$PM_{2.5}$	33.8
		100	SO_2	0.1

Based on Transco's commitment to use ERCs and the information provided by the PADEP, we conclude that the portions of the Project to which General Conformity would apply would conform to the Pennsylvania State Implementation Plan. However, to allow us to prepare a final General Conformity Determination, we requested that Transco provide additional documentation during the 30-day public comment period of the draft General Conformity Determination. On December 12, 2016 Transco filed additional information regarding the General Conformity analysis, including additional calculation details and justification regarding the use of NO_X ERCs in Lancaster County, Pennsylvania. We need written documentation from the PADEP that they approve of the use of the NO_X ERCs proposed by Transco and confirmation of the transfer of the ERCs through PADEP's ERC File system. Because we have not yet received this information, **we recommend that:**

- **Transco should file with the Secretary, for review and written approval by the Director of OEP, proof of purchase or transfer of NO_X ERCs to offset the estimated 2017 NO_X construction emissions for Lancaster County, Pennsylvania that exceed General Conformity thresholds, and confirmation from the PADEP that the ERCs conform with the Pennsylvania State Implementation Plan. Transco should file the requested information in order for staff to complete the final General Conformity Determination.**

The estimated NO_X construction emissions for Lebanon County do not exceed the General Conformity applicability threshold. However, if significant changes occur to construction activities, the potential for exceeding the General Conformity applicability threshold for NO_X emissions in Lebanon County may exist. To ensure that construction activities in Lebanon County do not exceed General Conformity applicability thresholds, **we recommend that:**

- **<u>Prior to construction</u>, Transco should file with the Secretary, for review and written approval by the Director of OEP, a Construction Emission Plan identifying how Transco would track its construction schedule for each component of the Project within the Lebanon County $PM_{2.5}$ Nonattainment Area and ensure that construction emissions of NO_X would remain below the General Conformity applicability threshold. If a change in the construction schedule or Project results in emissions of NO_X greater than the General Conformity applicability threshold of 100 tpy, Transco should provide and document all mitigation measures it would implement to comply with the General Conformity regulations at 40 CFR 93.158.**

State and Local Regulations

State air quality rules govern the issuance of air permits for construction and operation of a stationary emission source. For larger facilities subject to major NSR or NNSR permitting, review and approval at the federal level may be required. No permitting is required for changes that do not affect emission-producing equipment. For existing facilities, modifications themselves can be classified as minor or major depending on the amount of the emissions increase and the level of existing permitted emissions. For new facilities, classification as a minor or major source depends on the quantity of potential emissions and the existing air quality designation of the Project's location.

<u>Pennsylvania</u>

The construction and operation of emission sources at new or existing facilities, such as compressor stations, are regulated in Pennsylvania by the air quality permit programs of the PADEP. Air permits allowing for construction of emission sources in Pennsylvania are based on Plan Approval applications and are required prior to: (1) initiating modifications or adding to the emission sources at existing facilities; or (2) prior to constructing a new facility. Pennsylvania has full delegation from the EPA for air permitting programs. Transco has prepared Plan Approval applications for the modifications at Compressor Stations 517 and 520. No Plan Approval applications would be required for the proposed two new metering and three new regulator stations in Pennsylvania because emissions from those sources would be below levels requiring permitting. The applications request each modification be permitted to operate for 8,760 hours per year; however, hour restrictions have been requested for each emergency generator in compliance with NSPS Subpart JJJJ (500 hours per year) and are used in calculating the PTE for the proposed emergency generators. The following PADEP regulations are applicable to Compressor Stations 517 and 520:

- 25 Pa. Code §127.203a, NSR Requirements;
- 25 Pa. Code § 127, Plan Approval Requirements;
- 25 Pa. Code §123.31, Odor Emissions;
- 25 Pa. Code §123.41, Visible Emissions; and
- 25 Pa. Code §124, NESHAP Regulations.

The project emission sources in Pennsylvania are subject to the requirements of NNSR regulations in Pennsylvania codified at 25 Pa. Code §127.203a pertaining to a proposed project's emissions increase. In accordance with these regulations, if the proposed emissions increase and the net emissions increase at the facility (i.e., project emissions plus all emissions increases and decreases at the source in the 10 years preceding the permit application) exceed the SER for NO_X and/or VOC, the project would be subject to NNSR requirements including the requirements to install Best Available Technology (BAT) and to purchase emission offsets corresponding to the net emissions increase from the project. If the project, by itself, has an emissions increase that is less than the SER for applicable pollutants, but the net emissions increase exceeds the SER, the project would be subject to the emission offsets provision in the regulation only. The emission offsets need to be purchased prior to commencement of operation of the project sources. The emission offsets could be purchased from other creditable emission sources that have registered ERCs with the PADEP. The creditable ERCs would need to be obtained from a source located in a county with a designation at least as stringent as the proposed project's county. The ERCs that would be used to offset proposed emission increases at Compressor Stations 517 and 520 would be generated internally by Transco. On February 10, 2015, Transco submitted an ERC registry application to the PADEP to register the ERCs from the shutdown of Transco's emission sources 033, 034, and 035 at Compressor Station 195 in Peach Bottom Township, York County, Pennsylvania.

Compressor Station 517

Compressor Station 517 is in Columbia County, Pennsylvania. Pennsylvania is entirely within the Northeast OTR. Therefore, the proposed emission increases at Compressor Station 517 are subject to NNSR requirements, which include BAT and the procurement of emission offsets because the increase in NO_X of 60.6 tpy exceeds the SER for NO_X (40 tpy). Equipment-specific BAT requirements for Compressor Station 517 are summarized in table 4.11.1-6.

TABLE 4.11.1-6

Best Available Technology Summary for Solar Mars Turbines at Compressor Stations 517 and 520

Pollutant	Best Available Technology
NO_X	SoLoNO$_X$ Dry Low NO_X Combustors
CO	Oxidation catalyst and good combustion practices
VOC/HAPs	Oxidation catalyst and good combustion practices
$PM/PM_{10}/PM_{2.5}$	Good combustion practices and pipeline-quality natural gas as fuel
SO_2/SAM	Natural gas sulfur content limit of 0.4gr/100 scf
GHG	Good combustion practices and natural gas fuel
Fugitives	Comprehensive audio, visual, and olfactory program

Compressor Station 520

Compressor Station 520 is in Lycoming County, Pennsylvania. Pennsylvania is located entirely within the Northeast OTR. Therefore, the proposed emission increases at Compressor Station 520 are subject to NNSR requirements, which include BAT and the procurement of emission offsets because the increase in NO_X of 73.9 tpy exceeds the SER for NO_X (40 tpy). Equipment specific BAT requirements for Compressor Station 520 are summarized in table 4.11.1-6 above.

<u>Maryland</u>

The construction and operation of compressor stations are regulated in Maryland by air quality permit programs of the MDE. Air permits allowing for construction of emission sources in Maryland require that construction permit applications be submitted to the state prior to modification of air emission sources at existing facilities or prior to constructing a new facility. Maryland has full delegation from the EPA for air permitting programs. Transco has prepared a Permit to Construct application for the modifications at Compressor Station 190. The application requests the new turbine be permitted to operate 8,760 hours per year; however, hour restrictions have been requested for the emergency generator in compliance with NSPS Subpart JJJJ (100 hours per year) and are used in calculating the PTE for the proposed emergency generator. Transco reviewed all state air regulations applicable to the proposed modifications of the compressor station as part of the construction permit application process, including any requirements for fugitive emissions.

The following Maryland Air Regulations (COMAR) are applicable to Compressor Station 190:

- COMAR §26.11.17, NSR Requirements;
- COMAR §26.11.02, Construction Permit Requirements;
- COMAR §26.11.06.09, Odor Emissions; and
- COMAR §26.11.06.02, Visible Emissions.

Compressor Station 190

Compressor Station 190 is in Howard County, Maryland. The entire State of Maryland is in the Northeast OTR, and Howard County is part of the Baltimore ozone non-attainment area that is currently designated as moderate nonattainment for ozone. Therefore, the applicability of NNSR requirements for NO_X and VOC must be addressed for any emissions increase at Compressor Station 190.

As noted above, NO_X and VOC emissions are not subject to the MDE NNSR requirements; therefore, Lowest Achievable Emission Rate[33] and emission offsets are not applicable to the emission increase at this facility.

Virginia, North Carolina, and South Carolina

No permit modifications would be required for work at existing compressor stations in Virginia (Compressor Stations 170 and 185) or North Carolina (Compressor Stations 145, 150, 155, and 160). At each of these compressor stations, none of the emission-producing equipment would be modified. Installation of odorization, odor detection, and/or masking/deodorization equipment at meter and regulator stations and MLVs would not trigger permitting in Virginia, North Carolina, and South Carolina.

4.11.1.3 Air Emissions Impacts and Mitigation

Construction Emissions and Mitigation

Air emissions would be generated during construction of the new pipeline segments, two new compressor stations, new meter and regulator stations, and modifications to existing compressor stations and meter stations.

Construction activities for the proposed facilities and pipeline replacement activities would result in temporary increases in emissions of some pollutants due to the use of equipment powered by diesel or gasoline engines. Construction activities would also result in the temporary generation of fugitive dust due to land clearing, ground excavation, and cut and fill operations. Indirect emissions during construction of the Project would be generated by delivery vehicles and construction workers commuting to and from work areas.

A summary of construction emissions associated with the various project facilities is listed in table 4.11.1-7. Construction emissions were calculated using EPA calculation tools (EPA Motor Vehicle Emission Simulator 2014 for on-road and non-road equipment) and are an aggregate of emissions for the estimated 12-month duration of project construction. Transco provided fugitive dust emissions for construction activities associated with project segments located wholly or partially within particulate

[33] The rate of emissions that reflects the most stringent emission limitation in the implementation plan of any state for such source unless the owner or operator demonstrates such limitations are not achievable; or the most stringent emissions limitation achieved in practice, whichever is more stringent.

matter nonattainment or maintenance areas. To provide an estimate of overall fugitive dust emissions associated with project construction, FERC staff calculated fugitive dust emissions for project segments located in particulate matter attainment areas.[34]

Emissions from diesel- and gasoline-fired construction equipment would be minimized by maintaining the equipment in accordance with the manufacturer's recommendations and, to the extent practicable, by minimizing the idling time of engines. We received a comment from the EPA regarding additional diesel emission control measures for new construction equipment outlined by the Northeast Diesel Collaborative. To ensure that diesel emissions are minimized to the extent practicable, **we recommend that:**

- **Transco should review the Northeast Diesel Collaborative's recommendations for reducing diesel emissions from new on- and off-road construction equipment and indicate <u>in the Project's Implementation Plan</u> what measures it would implement.**

Transco provided an FDCP, which outlines measures to be implemented during construction activities to control fugitive dust. As outlined in the FDCP, watering would be the primary means of dust abatement. Additional measures outlined in the FDCP include the following:

- use of approved dust suppressants;
- reduced speed limits on unpaved surfaces;
- covering open-body trucks;
- maintaining construction entrances at paved road access points;
- sweeping public roadways;
- providing wash stations as necessary;
- temporary mulching and stabilization;
- tillage/surface roughening; and
- use of windbreaks.

Transco would be required to ensure that all contractors comply with the methods outlined in the FDCP during construction, restoration, and operation of the Project. Although local residents near the construction work areas may notice elevated fugitive dust levels, we reviewed the FDCP and find it acceptable.

These construction emissions would occur over the duration of construction activity and would be emitted at different times and locations along the length of the Project. As presented in table 4.11.1-5, construction emissions and non-exempt operating emissions from the Project that would occur in nonattainment and/or maintenance areas would be less than the General Conformity applicability thresholds, with the exception of Lancaster County, Pennsylvania, which would exceed the NO_X General Conformity applicability threshold for the 2017 construction period. Transco has indicated that it would offset the NO_X emissions generated in 2017 by purchasing or transferring ERCs as further described in section 4.11.1.2 and appendix P.

[34] The Fugitive Dust Construction Emission Calculations are included as attachment B of FERC's December 13, 2016 informational memorandum, which is available at: http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20161213-4005.

TABLE 4.11.1-7

Construction Emissions for the Atlantic Sunrise Project

	Total Construction Emissions (PTE, tpy)						
Facility	VOC	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	CO_2 [a]
Pipeline segment un-collocated CPL North (2017), 35.6 miles, 30-inch-diameter	9.7	89.6	90.9	77.7	14.8	0.1	18,978.9
Pipeline segment collocated (2017), no spread, 21.7 miles, 30-inch-diameter	9.8	94.6	87.4	73.4	14.4	0.1	19,644.9
Pipeline segment CPL South Spread 6/7 (2017), MPs 0 to 49.4, 49.4 miles of 42-inch-diameter	25.8	185.7	167.3	146.9	54.4	0.2	32,853.8
Pipeline segment CPL South Spread 5/6 (2017), MPs 49.4 to 95.0, 45.6 miles, 42-inch-diameter	26.1	187.0	169.9	162.7	59.7	0.2	33,906.6
Pipeline segment CPL South Spread 4 (2017), MPs 95.0 to 125.2, 30.2 miles, 42-inch-diameter	11.7	107.2	110.1	176.2	27.0	0.1	22,841.1
Pipeline segment Chapman Loop (2017), 3 miles of 36-inch-diameter	1.8	19.3	16.3	6.6	1.7	0.0	3,460.2
Pipeline segment Unity Loop (2017), 8.6 miles of 42-inch-diameter	5.3	51.7	47.7	22.7	5.6	0.1	10,733.3
Pipeline segment Mainline A and B Replacements (2017), 2.52 miles of 36-inch-diameter	2.1	22.1	18.6	3.1	1.5	0.0	3,950.3
Compressor Stations 610 and 605 (2017)	3.3	29.9	25.1	8.3	2.8	0.0	5,739.1
Zick Meter Station (2017)	0.6	8.2	3.2	0.5	0.3	0.0	906.3
Springfield Meter Station (2017) – Wyoming County	0.6	8.2	3.2	0.4	0.3	0.0	906.3
North Diamond Regulator Stations (2017) – Luzerne County	0.6	8.2	3.2	0.4	0.3	0.0	906.3
West Diamond Regulator Station (2017) – Columbia County	0.6	8.2	3.2	0.4	0.3	0.0	906.3
River Road Regulator Station (2017) – Lancaster County	0.6	8.2	3.2	4.2	1.4	0.0	906.3
Modified Compressor Stations 517, 520, 190 (2017)	2.1	20.4	15.2	7.3	2.0	0.0	3,563.6
Modified Compressor Station 155 (2017) – North Carolina	0.2	2.2	2.0	0.5	0.2	0.0	514.2
Modified Compressor Stations 185, 170, 160, 150, 145 (2017)	2.0	22.1	14.6	3.5	1.5	0.0	3,349.7
Meter stations (42) (2017) North Carolina (33)/South Carolina (9)	0.0	0.5	0.1	0.1	0.0	0.0	32.8
Total Project Construction Emissions	**103.4**	**880.6**	**781.2**	**694.9**	**188.2**	**0.8**	**168,519.2**

[a] Emissions account only for CO_2, not CO_2e. CH_4 and N_2O are expected to be emitted in insignificant quantities by construction equipment.

Emissions from construction are not expected to result in a violation of any applicable ambient air quality standard; construction equipment would be operated on an as-needed basis generally during daytime hours. Gasoline and diesel engines used during construction would be operated and maintained in a manner consistent with the manufacturers' specifications and EPA standards, thus minimizing emissions. Current EPA sulfur-in-fuel standards for gasoline, on-road diesel, and off-road diesel would also contribute to minimizing emissions from construction equipment.

With the mitigation measures proposed by Transco and our recommendation, air quality impacts from construction activities, such as elevated dust levels near construction areas, would be temporary or short term, and should not result in a significant impact on local and regional air quality.

Operational Emissions and Mitigation

Operation of the Project would result in air emissions from stationary equipment (e.g., Compressor Stations 517, 520, and 190; emergency generators; meter stations). The operational phase emissions from a variety of sources/equipment would be permanent. These various sources and associated criteria pollutants, GHGs, and HAP emission rates are addressed in the following sections. Operational emissions are anticipated from Compressor Stations 605 and 610 because each compressor station will have a natural-gas fired emergency generator installed.

<u>Compressor Stations 605 and 610</u>

Compressor Stations 605 and 610 would be equipped with electric motor-driven compressors (two 15,000 hp and two 20,000 hp, respectively), natural gas-fired emergency generators (one at each compressor station), and building heating and ventilation equipment. Transco submitted a request for determination to the PADEP to document that no air permitting would be necessary at Compressor Stations 605 and 610. Transco received concurrence from the PADEP that Compressor Stations 605 and 610 would not be subject to plan approval or require an operating permit on July 17 and October 1, 2015, respectively. Both Compressor Stations 605 and 610 would generate a small amount of fugitive CH_4 emissions during operation. Table 4.11.1-8 provides an estimate of annual air emissions that would be generated during operation of Compressor Stations 605 and 610.

TABLE 4.11.1-8

Summary of Pollutant Potential Emissions from Compressor Stations 605 and 610

	Emissions (PTE, tpy)						
Facility	NO_X	CO	VOC	$PM_{10}/PM_{2.5}$	SO_2	HAPs	CO_2e (metric tons)
Compressor Station 605 [a]	1.7	1.2	7.0	0.1	<0.1	0.1	5,545
Compressor Station 610 [b]	1.7	1.2	7.0	0.1	<0.1	0.1	5,545

[a] Primary emission sources at Compressor Station 605 include an emergency generator; building heaters; fugitive leaks, including blowdown emissions; a drip pot; and an odorant system.

[b] Primary emission sources at Compressor Station 610 include an emergency generator; building heaters; fugitive leaks, including blowdown emissions; and a drip pot.

The generation of the electricity needed to operate the compressors for Compressor Stations 605 and 610 would result in some air quality emissions; however, the load required to operate these electric motors would not require the construction of additional power generation facilities. Therefore, the Project should not result in the generation of additional air emissions to operate Compressor Stations 605 and 610.

Compressor Stations 517 and 520

Compressor Stations 517 and 520 are existing major sources under the PSD program with potential emissions of NO_X and CO above 250 tpy. The existing air pollutant emissions, the emission levels from modifications, and total emissions (existing emissions combined with emissions from the modifications) for Compressor Stations 517 and 520 are shown in table 4.11.1-9. Emission estimates are based on the Plan Approval air permit applications submitted to PADEP. Compressor turbines are assumed to operate 8,760 hours per year, while emergency electric generators are limited to 500 hours per year operation.

Transco has indicated that gas turbine-driven compressors were chosen for these two compressor stations in lieu of electric motor-driven compressor units due to concerns over electric reliably and readily available infrastructure to support the addition of electric motor-driven compressor units. In addition, Transco stated that these new compressors would be installed at existing facilities, which were not originally sited with consideration for electric motor-driven compression loads.

Compressor Station 190

The modifications at Compressor Station 190 in Maryland consist of installing one new natural gas-fired Solar Titan 250S combustion turbine, as well as modifications to valves and yard piping for multi- and/or bi-directional flow. The turbine would be equipped with a low NO_X combustor to control the emissions of NO_X to a manufacturer guarantee of 15 parts per million by volume, dry at 15 percent oxygen (O_2).

TABLE 4.11.1-9

Summary of Pollutant Potential Emissions from Modifications to Compressor Stations 517 and 520

	Emissions (PTE, tpy) [a]						
Facility	NO_X	CO	VOC	PM_{10}/ $PM_{2.5}$	SO_2	HAPs	CO_2e (metric tons)
Compressor Station 517 [b]							
Existing emissions at Compressor Station 517	255.2	85.3	26.0	13.2	3.7	5.5	225,533
Emissions from project modifications for Compressor Station 517	34.0	24.5	3.5	4.0	0.7	0.6	71,308
Total emissions for Compressor Station 517	289.2	109.8	29.5	17.2	4.4	6.1	296,841
Compressor Station 520 [c]							
Existing emissions at Compressor Station 520	568.4	278.8	67.7	10.0	2.0	33.0	153,469
Emissions from project modifications for Compressor Station 520	34.7	24.5	3.5	4.0	0.7	0.6	71,323
Total emissions for Compressor Station 520	603.1	303.3	71.2	14.0	2.7	33.6	224,792

[a] Emissions shown are based on an operating condition of 0 °F.
[b] Primary emission sources at Compressor Station 517 include compressor turbines, emergency generators, a glycol heater, and fugitive leaks.
[c] Primary emission sources at Compressor Station 520 include compressor turbines, emergency generators, a boiler, and fugitive leaks.

At Compressor Station 190, an electric motor-driven compressor was initially considered by Transco because electric power infrastructure in this area could have been made available by the local electric utility. However, Transco indicated that after discussions with the local electric utility, the reliability of that power would not have met the requisite firm requirements of the Project without major system upgrades. As such, Transco did not elect to use an electric motor-driven compressor at Compressor Station 190.

The PTE from existing equipment at Compressor Station 190 is shown in table 4.11.1-10. The PTE shown reflects any enforceable restrictions, such as limits on hours of operation, contained in the station's operating permit. ERCs would be in place prior to start-up of the project emission sources. The criteria pollutant emissions for modifications at Compressor Station 190 are also shown in table 4.11.1-10. Emission estimates are based on the Permit to Construct application submitted to the MDE. Compressor turbines are assumed to operate 8,760 hours per year, while emergency electric generators are limited to 500 hours per year.

TABLE 4.11.1-10

Summary of Emissions from Equipment at Compressor Station 190 [a]

	Emissions (PTE, tpy)							
Facility	NO_X	VOC	CO	SO_2	PM_{10}/ $PM_{2.5}$	Individual HAP (HCHO)	Total HAP	CO_2e (metric tons)
Existing Emissions at Compressor Station 190	294.5	182.6	705.7	0.4	33.2	56.9	79.6	88,080
Emissions from Project Modifications for Compressor Station 190	57.3	8.0	60.6	1.2	6.8	3.0	3.4	114,711
Total Emissions for Compressor Station 190	351.8	190.6	766.3	1.6	40.0	59.9	83.0	202,791

[a] Primary emission sources consist of 12 reciprocating engines, rated from 2,050 to 5,500 brake horsepower. Smaller emission sources included in the PTE are one 1,478 brake horsepower auxiliary engine, two gas-fired boilers, and fugitive leaks. Note: Emission sources include sources and emission reductions from a separate facility maintenance project and Permit No. 027-0223-5-0054M. The purpose of the Compressor Station 190 Facility Maintenance Project is to install high-pressure fuel injection and pre-combustion chamber systems on Units 1 through 10. The Project would generate about 901 tpy of NO_X ERCs.

The Project would transport up to 1.7 million dekatherms per day of natural gas. Assuming that all of the natural gas being transported is used for combustion, downstream end-use would result in about 32.9 million metric tons of CO_2 per year. Combustion uses include electrical generation, home heating, home cooking, commercial heating/boiling use, and use as a vehicle fuel. Non-combustion uses include fertilizer and other chemical manufacturing products. Because the precise end-uses of the gas that would be transported by the Project are unknown, the GHG emission value provided here represents a conservative estimate.

Operational Air Quality Impact Analysis

The new and modified compressor stations would have long-term impacts on local air quality. Because Compressor Stations 605 and 610 would have electric-driven compressors, the operational emissions would primarily be minor fugitive CH_4 emissions and would not have a significant impact on local air quality.

Modifications at the Compressor Stations 517, 520, and 190 have the potential to be significant; therefore, we requested that Transco complete an air quality impact analyses at these three stations to document that the proposed emission modifications, along with existing emissions and background air quality, would not have a significant impact on local air quality and would not result in violation of the NAAQS.

Transco provided an air quality modeling analysis using AERSCREEN presenting the potential impacts of the proposed new equipment at Compressor Stations 517, 520, and 190, including background air quality data obtained from air quality monitors in the region, and compared the results to the NAAQS. We requested that Transco update the AERSCREEN analysis to include the existing sources at the three compressor stations. Transco indicated its preference to conduct air quality monitoring near the existing compressor stations due to its contention that air quality modeling analysis using AERSCREEN or AERMOD may overestimate impacts associated with certain pollutants. We offered Transco the option to monitor air quality for 1 year in the vicinity of the compressor stations to establish the local existing environment ambient air quality baseline. In addition, Transco has indicated that it would continue to monitor air quality for criteria pollutants following project construction to gather a total of 3 years of air quality monitoring data. To date, Transco provided air quality modeling for the new project components and about 12 months of air quality monitoring at Compressor Stations 517, 520, and 190. Because the air quality monitoring data collected by Transco was collected while the existing sources at these stations were either not operating or were not operating at full load, FERC staff completed a supplemental modeling analysis that included existing sources at Compressor Stations 517, 520, and 190, proposed new sources, and background.

The results of the air quality monitoring analysis, the initial AERSCREEN analysis, and supplemental air modeling analysis are detailed below.

Air Quality Monitoring Analysis

Transco started an air quality monitoring program to collect ambient air data from existing Compressor Stations 517, 520, and 190 in September 2015.

Hourly ambient air quality measurements were reported for CO, NO_2, PM_{10}, $PM_{2.5}$, and SO_2. Because of construction activities at Compressor Station 517 associated with the Leidy Southeast Expansion Project, monitoring for $PM_{2.5}$ and PM_{10} was deferred until July 2016 when construction activities at that station concluded. The following sections summarize the air quality monitoring data collected at Compressor Stations 517, 520, and 190 that we have received to date. [35]

Compressor Station 517

The air quality monitoring station for Compressor Station 517 is located in the northwest section of the existing facility, approximately 250 feet from the nearest structure. The dominant wind direction of the site is to the northwest. We reviewed the information provided by Transco and agree that this is an appropriate location for air monitoring for this station.

Transco filed air quality monitoring results from September 1, 2015, to August 31, 2016. Results of the monitoring data are presented in table 4.11.1-11. As previously noted, $PM_{2.5}$ and PM_{10} monitoring at Compressor Station 517 was deferred due to construction activities. This is consistent with EPA guidelines in the *Quality Assurance Handbook for Air Pollution Measurement Systems* (EPA, 2013b). Transco commenced $PM_{10/2.5}$ monitoring at Compressor Station 517 in July 2016 following completion of construction of the Leidy Southeast Expansion Project. During the monitoring period presented in table 4.11.1-11, Compressor Station 517 operated at an average load of 15 percent and a peak load of 67 percent.

[35] Air quality monitoring reports can be accessed at FERC's eLibrary (https://www.ferc.gov/docs-filing/elibrary.asp) using the following accession numbers: 20160205-5231, 20160706-5104, 20161007-5189, 20150923-5188, and 20151119-5049.

TABLE 4.11.1-11

Compressor Station 517 Air Quality and Meteorological Monitoring Results (from September 1, 2015, to August 31, 2016)

Criteria		CO 1-Hour Average (ppm)	CO 8-Hour Average (ppm)	NO_2 Max Daily 1-Hour (ppb)	NO_2 Annual (ppb)	SO_2 Max Daily 1-Hour (ppb)	SO_2 3-Hour Average (ppb)	PM_{10} 24-Hour (µg/m^3)	$PM_{2.5}$ 24-hour (µg/m^3)	$PM_{2.5}$ Annual (µg/m^3)
Overall Monitored Hours	Minimum	<0.1	<0.1				<0.1	7.1 [b]		
	Average	0.5	0.3	31.4 [a]	3.5 [a]	13.1 [a]	0.3	13.3 [b]	10.3 [a,b]	6.9 [a, b]
	Maximum	7.9	1.3				14.4	81.0 [b]		
Background value assumed for screening analysis		1.8	1.3	33.0	Not available	19.0	Not available	27	24	9.2
NAAQS		35	9	100	53	75	500	150	35	12

[a] Due to calculation methodologies, only one value is available for comparison to the NAAQS.
[b] PM_{10} and $PM_{2.5}$ monitoring results are based on data collected from July 11, 2016, to August 31, 2016.
Notes: ppm = parts per million
ppb = parts per billion
µg/m^3 = microgram per cubic meter

Compressor Station 520

The air quality monitoring station for Compressor Station 520 is located in the north-northeast section of the existing facility, approximately 700 feet from the nearest structure. The air quality monitoring site is located approximately 164 feet away from the identified tree-line and is otherwise free from potential obstructions. The dominant wind direction at the site is to the north. We reviewed the information provided by Transco and agree that this is an appropriate location for air monitoring for this station.

Transco filed air quality monitoring results for Compressor Station 520 from September 2, 2015, to August 31, 2016. Results of the monitoring are presented table 4.11.1-12. During the monitoring period, Compressor Station 520 operated at an average load of 6 percent and a peak load of 41 percent.

TABLE 4.11.1-12

Compressor Station 520 Air Quality and Meteorological Monitoring Results (from September 2, 2015, to August 31, 2016)

Criteria		CO 1-Hour Average (ppm)	CO 8-Hour Average (ppm)	NO_2 Max Daily 1-Hour (ppb)	NO_2 Annual (ppb)	SO_2 Max Daily 1-Hour [a] (ppb)	SO_2 3-Hour Average [a] (ppb)	$PM_{2.5}$ 24-Hour Average (µg/m^3)	PM_{10} 24-Hour Average (µg/m^3)
Overall Monitored Hours	Minimum	<0.1	<0.1	16.7 [b]	3.0 [b]	4.8 [b]	<0.1	17.2 [b]	7.2 [b]
	Average	0.4	0.4				0.2		
	Maxi-mum	1.0	0.9				6.5		
Background value assumed for screening analysis		1.8	1.3	33.0	Not available	19.0	Not available	24.0	27.0
NAAQS		35	9	100	53	75	500	35	150

[a] A portion of the SO_2 data was not collected due to a system failure. The system failure was corrected and subsequent values are recorded in this table.
[b] Due to calculation methodologies, only one value is available for comparison to the NAAQS.
Notes: ppm = parts per million
ppb = parts per billion
µg/m^3 = micrograms per cubic meter

Compressor Station 190

The air quality monitoring station for Compressor Station 190 is located in the northeast corner of the existing facility, approximately 300 feet from the nearest structure. This location was determined by analyzing local wind patterns and topography. The location of the monitoring site is more than 65 feet away from each identified tree-line. The dominant wind direction at the site is to the northeast. We reviewed the information provided by Transco and agree that this is an appropriate location for air monitoring for this station.

Transco filed air quality monitoring results for Compressor Station 190 from September 17, 2015, to August 31, 2016. Results of the monitoring are presented in table 4.11.1-13. During the monitoring period, Compressor Station 190 operated at an average load of 2 percent and a peak load of 21 percent.

TABLE 4.11.1-13

Compressor Station 190 Air Quality and Meteorological Monitoring Results (from September 17, 2015, to August 31, 2016)

Criteria		CO 1-Hour Average (ppm)	CO 8-Hour Average (ppm)	NO_2 Max Daily 1-Hour (ppb)	NO_2 Annual (ppb)	SO_2 Max Daily 1-Hour (ppb)	SO_2 3-Hour Average (ppb)	$PM_{2.5}$ 24-Hour Average (μg/m^3)	PM_{10} 24-Hour Average (μg/m^3)
Overall Monitored Hours	Minimum	<0.1	<0.1				<0.1		
	Average	0.3	0.3	26.1 [a]	4.1 [a]	34.4 [a]	0.1	15.7 [a]	6.1 [a]
	Maximum	1.3	1.3				7.0		
Background value assumed for screening analysis		0.9	0.9	44.1	Not available	10.0	Not available	21.0	27.0
NAAQS		35	9	100	53	75	500	35	150

[a] Due to calculation methodologies, only one value is available for comparison to the NAAQS.

Notes: ppm = parts per million
ppb = parts per billion
μg/m^3 = micrograms per cubic meter

All three monitoring programs have been in continuous operation since September 2015 and represent about 1 year of air monitoring data collection. Because the compressor stations were not operating at full load or not operating during portions of the monitoring period, we asked Transco to evaluate the data and, if possible, scale the data to represent the range of potential impacts from the compressor stations operating at full load. Transco provided a scaling analysis; however, due to the small amount of data points and lack of an approved methodology for completing the analysis, we believe that the results from the scaled data are inconclusive..

Air Quality Modeling Analysis

Transco performed an assessment of potential ambient air quality impacts from the proposed modifications (new components) associated with the Project at Compressor Stations 517, 520, and 190 using the most recent version of the EPA regulatory air dispersion model AERSCREEN. The analysis includes modeled concentrations of emissions associated with the Project, as well as background ambient air quality concentrations taken from EPA regional air quality monitoring stations, and a comparison to the NAAQS. The results of the AERSCREEN analyses presented in table 4.11.1-14 demonstrate that proposed modifications to Compressor Stations 517, 520, and 190, when combined with background air quality concentrations, would be below the NAAQS.

TABLE 4.11.1-14

Air Quality Modeling Analysis for Compressor Stations 517, 520, and 190 – New Sources and Combined Facility

Pollutant	Averaging Period	AERSCREEN Model Results (New Sources) (µg/m^3)	Modeled Concentration (Existing and New Sources) (µg/m^3)	Incremental Increase from New Sources (µg/m^3)	Regional Ambient Background (µg/m^3) [a]	Total Concentration (Existing and New Sources Plus Background) (µg/m^3)	NAAQS (µg/m^3)
Compressor Station 517							
NO_2	1-hour	49.1	141.2	0.0	84.0	225.2	188
	Annual	4.9	23.9	0.9	18.6	42.5	100
SO_2	1-hour	1.3	3.4	0.2	22.7	26.1	196
	3-hour	1.3	3.2	0.0	24.5	27.7	1,310
CO	1-hour	44.3	310.2	0.0	1,336.6	1,646.8	40,000
	8-hour	39.9	154.6	0.0	1,833.1	1,987.7	10,000
PM_{10}	24-hour	5.2	3.7	0.9	37.0	40.7	150
$PM_{2.5}$	24-hour	5.2	2.3	0.7	24.0	26.3	35
	Annual	0.5	0.5	0.0	10.2	10.7	12
Compressor Station 520							
NO_2	1-hour	32.1	204.1	0.0	84.0	288.1	188
	Annual	3.2	55.4	0.3	18.6	74.0	100
SO_2	1-hour	0.8	4.9	0.6	22.7	27.6	196
	3-hour	0.8	4.0	0.7	24.5	28.5	1,310
CO	1-hour	29.0	854.2	0.7	1,336.6	2,190.8	40,000
	8-hour	26.1	401.1	0.0	1,833.1	2,234.2	10,000
PM_{10}	24-hour	2.1	6.3	0.0	37.0	43.3	150
$PM_{2.5}$	24-hour	2.1	3.8	0.0	24.0	27.8	35
	Annual	0.4	0.7	0.0	10.2	10.9	12
Compressor Station 190							
NO_2	1-hour	32.2	113.0	0.0	74.0	187.0	188
	Annual	3.2	11.4	2.6	15.1	26.5	100
SO_2	1-hour	0.9	0.8	0.0	26.2	27.0	196
	3-hour	0.9	1.2	0.6	36.0	37.2	1,310
CO	1-hour	43.0	393.2	0.4	992.9	1,386.1	40,000
	8-hour	38.7	296.4	3.2	1,107.5	1,403.9	10,000
PM_{10}	24-hour	3.5	8.1	0.1	25.0	33.1	150
$PM_{2.5}$	24-hour	3.5	4.0	0.0	23.0	27.0	35
	Annual	0.4	0.8	0.0	9.3	10.1	12

Note: µg/m^3 = micrograms per cubic meter

[a] Regional ambient background data from 2013 to 2015 collected from the EPA's Outdoor Air Quality Data Monitor Values Reports: https://www.epa.gov/outdoor-air-quality-data/monitor-values-report. Monitor IDs 42-069-2006 and 42-079-1101 for Compressor Stations 517 and 520. Monitor IDs 24-003-1003 and 24-03-0030 for Compressor Station 190.

Transco's AERSCREEN analysis did not include the existing emission sources at Compressor Stations 517, 520, and 190, and the air quality monitoring data summarized above were collected while the stations were not operating at full load or not operating during portions of the monitoring period. Therefore, FERC staff conducted a supplemental modeling analysis to present the potential impacts associated with the operation of the existing emission sources at Compressor Stations 517, 520, and 190, along with the proposed new sources, including monitored background. The results of the modeling analysis for existing sources are presented in table 4.11.1-15, and the results of the modeling analysis for existing and new sources are presented in table 4.11.1-14. For a more complete description of the modeling analysis and methodology, see appendix P.

We note that the existing sources at Compressor Stations 517, 520, and 190 were operating during portions of the period during which the regional background data were collected; however, because the monitoring stations are located at distances ranging from 10 to 80 miles from the compressor stations, the emissions from these compressor stations likely had only a very minor influence on the background air quality monitoring data.

As shown in table 4.11.1-15, the existing sources at Compressor Stations 517, 520, and 190 are shown to be in compliance with the NAAQS for all pollutants, with the exception of the one-hour NO_2 standard at Compressor Stations 517 and 520. Based on the modeling analysis ,modeled concentrations for one-hour NO_2 for existing sources at Compressor Stations 517 and 520 have the potential to exceed the NAAQS during some operating scenarios and meteorological conditions. However, as presented in table 4.11.1-14, the new emission sources associated with the Project would not incrementally contribute to the potential exceedance of the one-hour NO_2 standard. The potential exceedances in the model are based on existing equipment and would not be caused or significantly contributed to by the Project. We note that although the current monitoring program was deemed inadequate, at no time did the current monitoring show any exceedances.

Therefore, we conclude that operation of the Project would not cause or contribute to a violation of the NAAQS. However, we acknowledge that, based on the modeling analysis completed by FERC,, the potential exists for the one-hour NO_2 NAAQS to be exceeded during some operating scenarios and meteorological conditions at Compressor Stations 517 and 520 due to existing sources. To ensure that the operation of Compressor Stations 517, 520, and 190 do not result in a violation of the NAAQS, **we recommend that:**

- **Transco should continue to operate the existing air quality monitors at Compressor Stations 517, 520, and 190 for CO, NO_2, PM_{10}, $PM_{2.5}$, and SO_2 for <u>a period of 3 years after the newly modified facilities begin operation</u>. Transco should file <u>quarterly</u> air quality monitoring reports with the Secretary. In the event that the air quality monitoring shows a violation of the NAAQS, Transco should immediately contact the state air quality agency to report the violation and establish a plan of action to correct the violation in accordance with the terms of the facility air permit and applicable state law.**

TABLE 4.11.1-15

Air Quality Modeling Analysis for Compressor Stations 517, 520, and 190 – Existing Sources

Pollutant	Averaging Period	Modeled Concentration (Existing Sources) (µg/m^3)	Regional Ambient Background (µg/m^3) [a]	Total Concentration (Existing Sources Plus Background) (µg/m^3)	NAAQS (µg/m^3)
Compressor Station 517					
NO_2	1-hour	141.2	84.0	225.2	188
	Annual	23.0	18.6	41.6	100
SO_2	1-hour	3.2	22.7	25.9	196
	3-hour	3.2	24.5	27.7	1,310
CO	1-hour	310.2	1,336.6	1,646.8	40,000
	8-hour	154.6	1,833.1	1,987.7	10,000
PM_{10}	24-hour	2.8	37.0	39.8	150
$PM_{2.5}$	24-hour	1.6	24.0	25.6	35
	Annual	0.5	10.2	10.7	12
Compressor Station 520					
NO_2	1-hour	204.1	84.0	288.1	188
	Annual	55.1	18.6	73.7	100
SO_2	1-hour	4.3	22.7	27.0	196
	3-hour	3.3	24.5	27.8	1,310
CO	1-hour	853.5	1,336.6	2,190.1	40,000
	8-hour	401.1	1,833.1	2,234.2	10,000
PM_{10}	24-hour	6.3	37.0	43.3	150
$PM_{2.5}$	24-hour	3.8	24.0	27.8	35
	Annual	0.7	10.2	10.9	12
Compressor Station 190					
NO_2	1-hour	113.0	74.0	187.0	188
	Annual	8.8	15.1	23.9	100
SO_2	1-hour	0.8	26.2	27.0	196
	3-hour	0.6	36.0	36.6	1,310
CO	1-hour	392.8	992.9	1,385.7	40,000
	8-hour	293.2	1,107.5	1,400.7	10,000
PM_{10}	24-hour	8.0	25.0	33.0	150
$PM_{2.5}$	24-hour	4.0	23.0	27.0	35
	Annual	0.8	9.3	10.1	12

Note: µg/m^3 = micrograms per cubic meter

[a] Regional ambient background data from 2013 to 2015 collected from the EPA's Outdoor Air Quality Data Monitor Values Reports: https://www.epa.gov/outdoor-air-quality-data/monitor-values-report. Monitor IDs 42-069-2006 and 42-079-1101 for Compressor Stations 517 and 520. Monitor IDs 24-003-1003 and 24-03-0030 for Compressor Station 190.

Clean Air Council

We received multiple comments from the Clean Air Council regarding the proposed Project. The Clean Air Council expressed concerns about:

- the adequacy of air quality monitoring data to accurately assess potential air quality impacts from the Project;
- the load level of the compressor stations during air quality monitoring;
- recent proposed modifications to the EPA's AERMOD air quality modeling program that suggested that these changes would correct potential tendencies for AERMOD to overestimate pollutant impacts;
- an air quality violation at Compressor Station 517; and
- particulate matter impacts from compressor station operation and potential health effects.

As identified above, we too had concerns regarding the low load level of the compressor stations during air quality monitoring activities. Therefore, we used the monitored maximum levels, as well as the regional background when identifying the air quality impacts. After reviewing information provided by Transco in response to conditions included in the draft EIS, we completed an air modeling analysis including existing sources at these three compressor stations.

Regarding the accuracy of EPA's AERMOD, as previously noted, we believe that air quality modeling is one tool in assessing potential air quality impacts. We believe that the data provided by Transco, along with our supplemental modeling analysis, allowed us to assess impacts associated with the Project and that sufficient information is available to conclude that the operation of the three modified compressor stations would not result in NAAQS violations; however, we made further recommendations above to ensure that the impact associated with the operation of Compressor Stations 517, 520, and 190 are monitored and do not result in a violation of the NAAQS.

Regarding the air quality violation at Compressor Station 517, Transco admitted that it ran a turbine at Compressor Station 517 without operating certain emission controls for CO as specified in the plan approved by the PADEP and at a higher NO_X level than specified in the plan. As soon as Transco discovered the problem, they consulted with the manufacturer to install controls to reduce CO emissions. As a result, Compressor Station 517 is fully in compliance with PADEP.

Regarding particulate matter and health impacts of compressor station operation, the Clean Air Council provided a copy of the Brooklyn Township $PM_{2.5}$ Report. The facility referenced in this is not the subject of this Certificate proceeding. This report was prepared in reference to a particular compressor station located in Brooklyn Township, Pennsylvania, and the report states that conclusions drawn in the report "should not be generalized to all natural gas compressor stations." Based upon the air quality impact analysis completed for Compressor Stations 517, 520, and 190, the operation of the modified facilities would not result in a violation of the NAAQS. In addition, we included a recommendation that would require Transco to continue background air monitoring at Compressor Stations 517, 520, and 190 for 3 years after the newly modified facilities begin operation to ensure that the compressor stations do not result in NAAQS violations for particulate matter or any other criteria pollutant.

New Aboveground Facilities

Other aboveground facility modifications include the following:

- upgrades to valves and yard piping;
- installation of odorization, odor detection, and deodorization/odor masking equipment;
- proposed meter and regulator stations; and
- pig launcher/receivers.

The emissions from the new aboveground facilities and modifications to existing facilities, including the proposed meter and regulator stations, would be considered minor and would not have a significant impact on air quality.

Activated carbon filtration would be installed for deodorization at Compressor Station 155. An activated-carbon filter cartridge, housed in carbon-steel filter housing, would be designed to remove mercaptan from the odorized natural gas.

The proposed meter and regulator stations are not expected to result in significant air emissions. The Zick Meter Station would not have an odorant system or flaring on site, only fugitive emissions, which would not require air permitting. The Springville Meter Station would have an odorant flaring system on site as well as fugitive emissions and would not require permitting. Emissions associated with the Springville and Zick Meter Stations are summarized in table 4.11.1-16. On July 17, 2015, Transco received concurrence from the PADEP that the Springville and Zick Meter Stations would not be subject to plan approval or require an operating permit.

TABLE 4.11.1-16

Summary of Emissions from Springville and Zick Meter Stations

	Emissions (PTE, tpy)						
Facility	NO_X	VOC	CO	SO_2	$PM_{10}/PM_{2.5}$	HAPs	CO_2e (metric tons)
Springville Meter Station	1.2	1.0	0.8	<0.1	<0.1	0.1	257
Zick Meter Station	1.2	1.0	0.8	<0.1	<0.1	0.1	257

Pipeline Facilities

Operation of the pipeline would result in additional fugitive emissions from the new pipeline segments. Blowdown emissions are included in fugitive emission estimates associated with the compressor stations. A summary of fugitive emissions associated with operation of the pipeline facilities is presented in table 4.11.1-17.

TABLE 4.11.1-17

Summary of Fugitive Emissions from Pipeline Facilities for the Atlantic Sunrise Project

		Potential to Emit	
Pipeline Facilities	Length (miles)	VOC (tons/year)	HAP (tons/year)
CPL North (PA)	57.4	1.00E-03	5.55E-07
CPL South (PA)	126.3	2.25E-03	1.22E-06
Chapman Loop (PA)	2.9	5.00E-05	2.8E-08
Unity Loop (PA)	8.6	1.50E-04	8.3E-08
Mainline A and B Replacements (VA)	2.5	5.00E-05	2.42E-08
Pipeline Fugitives Total		**7.0**	**3.82E-03**

4.11.1.4 Radon Exposure

We received comments about the potential exposure to released radon gas. The downstream use of natural gas in the market areas, including the effects of burning natural gas and exposure to radon in homes, is beyond the scope of this EIS. Although the effects of transportation of natural gas to downstream users are outside the scope of the EIS and beyond our jurisdiction, we have provided general background and a review of the literature on radon. Radon is a naturally occurring radioactive gas that is odorless and tasteless. While radon is inert, long-term (chronic) exposure to its decay products (progeny) can be carcinogenic (lung cancer), with increased risk to smokers.

While FERC has no regulatory authority to set, monitor, or respond to indoor radon levels, many local, state, and federal entities (e.g., the EPA) establish and enforce radon exposure standards for indoor air. Radon can be entrained in fossil fuels including natural gas reserves. Because radon is unaffected by combustion, the use of natural gas can increase the level of radon within a home. Several factors, however, limit the exposure of the homeowner to radon from natural gas. Radon's half-life, defined as the time it takes for the compound to decay to half its initial concentration is relatively short (3.8 days). The time needed to gather, process, store and deliver natural gas allows a portion of the entrained radon to decay, thereby decreasing the amount of radon in the gas before being used in a residence. The required venting of appliance exhausts from water heaters, furnaces, and other appliances also limits potential exposure pathways to radon emissions. In addition, natural gas processing helps reduce radon concentrations in pipeline natural gas. The upstream processing that removes liquefied petroleum gas from the natural gas stream also removes radon. This is because radon and the two major components of liquefied petroleum gas, namely propane and ethane, have similar boiling points. Processing can remove an estimated 30 to 75 percent of the radon from natural gas (Johnson et al, 1973).

Other research suggests that the cumulative decay of radon from wellhead to burner tip is on the order of 60 percent (Gogolak, 1980). Indoor radon concentrations from natural gas and liquefied petroleum gas combustion based on average indoor combustion were calculated in Gogolak (1980). Gogolak concluded that the radon concentrations resulting from the use of natural gas in the home are unlikely to pose a radiological hazard to domestic users (Gogolak, 1980). A similar conclusion was reached by Johnson et al. (1973). Johnson et al. concluded that "the use of natural gas containing radon for average exposure conditions does not contribute significantly to lung cancer deaths in the United States." While the number of deaths due to increased indoor radon concentrations could potentially be higher now than in 1973 due to the growth in the U.S. population over the last 30+ years, there is no reason to believe that the conclusions by Johnson et al. (1973) and Gogolak (1980) regarding the risks of radon in natural gas would be any different. In fact, radon exposure associated with the combustion of natural gas may be lower now due to the improved ventilation and increased fuel efficiency of modern boilers, furnaces, and hot water heaters, as well as new building codes requiring venting of gas-fired stoves and ovens.

Comments have been brought up regarding the decay of radon to other longer-lived daughters, specifically isotope Lead-210, which has a half-life of 22 years, and coating the interior of the pipeline with this material. The majority of pipelines have greater than a 50-year operational lifetime, so the majority of pipeline material would decay to a stable lead. When a pipeline ends its operational lifetime, the vast majority is abandoned in place. If a replacement or removal should take place, the pipeline company must comply with the Resource Conservation and Recovery Act to ensure that high levels of contaminants (including lead) are not disposed of improperly. In addition, pipeline companies regularly clean, or "pig," the pipeline to remove solid and liquid materials, which also must be disposed of properly in compliance with the Resource Conservation and Recovery Act and state laws.

Radon levels in outdoor air, indoor air, soil air, and groundwater can be very different. Outdoor air radon levels range from less than 0.1 to about 30 picocuries per liter (pCi/L). The EPA identifies the average outdoor radon levels at about 0.4 pCi/L. Radon in soil air (the air that occupies the pores in soil) can range from 20 or 30 to more than 100,000 pCi/L. Most soils in the United States contain between 200 and 2,000 pCi of radon per liter of soil air. The amount of radon dissolved in groundwater can range from about 100 to nearly 3 million pCi/L (USGS, 1995). Radon in indoor air can range from less than 1 to about 3,000 pCi/L. The EPA identifies the average indoor radon level as 1.3 pCi/L. The U.S. Congress passed the Indoor Radon Abatement Act in 1988, which established the long-term goal that indoor air radon levels be equal to or better than outdoor air radon levels.

The EPA recommends that indoor radon range from 2 to 4 pCi/L and has set the indoor action level for radon at 4 pCi/L. If concentrations of radon exceed this action level, the EPA recommends remedial actions, such as improved ventilation, be implemented to reduce levels below this threshold. The radiation given off by the decay of radon is not strong enough to penetrate the skin. However, when radon is inhaled, its radiation can affect the sensitive tissues in the lungs, leading to an increased risk of lung cancer. At the range of 4 pCi/L the EPA estimates that prolonged exposures would result in approximately 4 cases of lung cancer per 1,000 people exposed for those who have never smoked. The cancer risk is greater for those who are smokers or formerly smoked (EPA, 2012b).

Because pipeline construction moves through an area relatively quickly, air emissions are typically intermittent and short term. Once construction activities in an area are completed, fugitive dust and construction equipment emissions would subside and the impact on air quality would diminish. In addition, with the implementation of the mitigation measures discussed above and FERC’s recommendations, operational emissions from the compressor and meter stations would be reduced. Transco has committed to continuously monitored ambient air quality for 3 years at Compressor Stations 190, 517 and 520 for any exceedances of the NAAQS. Therefore, we believe that construction and operation of the proposed Project would not have a significant impact on air quality.

4.11.2 Noise

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

Two measurements used by some federal agencies to relate the time-varying quality of environmental noise to its known effects on people are the equivalent sound level (L_{eq}) and the day-night sound level (L_{dn}). The L_{eq} is a sound level over a specific time period corresponding to the same sound energy as measured for an instantaneous sound level assuming it is a constant noise source. Sound levels, measured in decibels (dB), are perceived differently, depending on length of exposure and time of day. The L_{dn} takes into account the duration and time the noise is encountered. Specifically, in the calculation of the L_{dn}, late night and early morning (10:00 p.m. to 7:00 a.m.) noise exposures are increased by 10 dB to account for people’s greater sensitivity to sound during nighttime hours. To account for the human ear’s sensitivity to low-level noises, decibel levels are corrected using the A-weighted scale (dBA). The A-weighted scale is used because human hearing is less sensitive to low and high frequencies than mid-range frequencies. A 3-dB change of sound level is considered to be barely perceivable by the human ear, a 5- or 6-dB change of sound level is considered noticeable, and a 10-dB increase is perceived as if the sound intensity has doubled.

4.11.2.1 Regulatory Noise Requirements

Federal Regulations

In 1974, the EPA published *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (EPA, 1974). This document provides information for state and local governments to use in developing their own ambient noise standards. The EPA has determined that to protect the public from activity interference and annoyance outdoors in residential areas, noise levels should not exceed an L_{dn} of 55 dBA. We have adopted this criterion and use it to evaluate the potential noise impacts of projects at NSAs, such as residences, schools, or hospitals. Because late night and early morning noise exposures are increased by 10 dB in the L_{dn} calculation to account for people's greater sensitivity to sound during nighttime hours, a facility that meets the 55-dBA L_{dn} limit must be designed such that actual constant noise levels on a 24-hour basis do not exceed 48.6 dBA L_{eq} at any NSA.

State and Local Regulations

<u>Pennsylvania</u>

With the exception of Columbia County, there are no state- or local-level noise regulations in Pennsylvania that are applicable to the Project. Columbia County has a noise control ordinance that includes specific noise level requirements (50 dBA nighttime [L_n] and 60 dBA daytime [L_d] at or within the boundary of a noise-sensitive property) (Columbia County, 1991).

<u>Maryland</u>

The State of Maryland regulates noise under the Code of Maryland Regulations section 26.02.03.02, Environmental Noise Standards. Section B(1) of the standard states that daytime noise cannot exceed 75, 67, and 65 dBA at industrial, commercial, and residential receptors, respectively, and nighttime noise cannot exceed 75, 62, and 55 dBA at industrial, commercial, and residential receptors, respectively.

Section B(2) prohibits noise levels emanating from construction or demolition site activities that exceed 90 dBA during daytime hours; or 75, 62, and 55 dBA at industrial, commercial, and residential receptors, respectively, during nighttime hours.

Intermittent noise is also limited under section B(3), which states that a person may not cause or permit the emission of prominent discrete tones and periodic noises that exceed a level which is 5 dBA lower than 75, 67, and 65 dBA at industrial, commercial, and residential receptors, respectively, during daylight hours, and 75, 62, and 55 dBA at industrial, commercial, and residential receptors, respectively, during nighttime hours.

The Maryland noise regulation also prohibits vibration under section C as follows: "A person may not cause or permit, beyond the property line of a source, vibration of sufficient intensity to cause another person to be aware of the vibration by such direct means as sensation of touch or visual observation of moving objects. The observer shall be located at or within the property line of the receiving property when vibration determinations are made."

Howard County has adopted a noise ordinance (Howard County Code section 8.900); however, the noise regulations in the Howard County noise ordinance reference the State of Maryland regulations.

4.11.2.2 Existing Ambient Noise Levels

Ambient noise levels for NSAs near Compressor Stations 517, 520, and 190 were estimated based on calculations that assumed the compressor stations were operating at full load. Ambient noise levels for Compressor Stations 605 and 610, regulator stations, and entry/exit locations of HDD operations were determined by completing ambient noise surveys.

Compressor Station 517

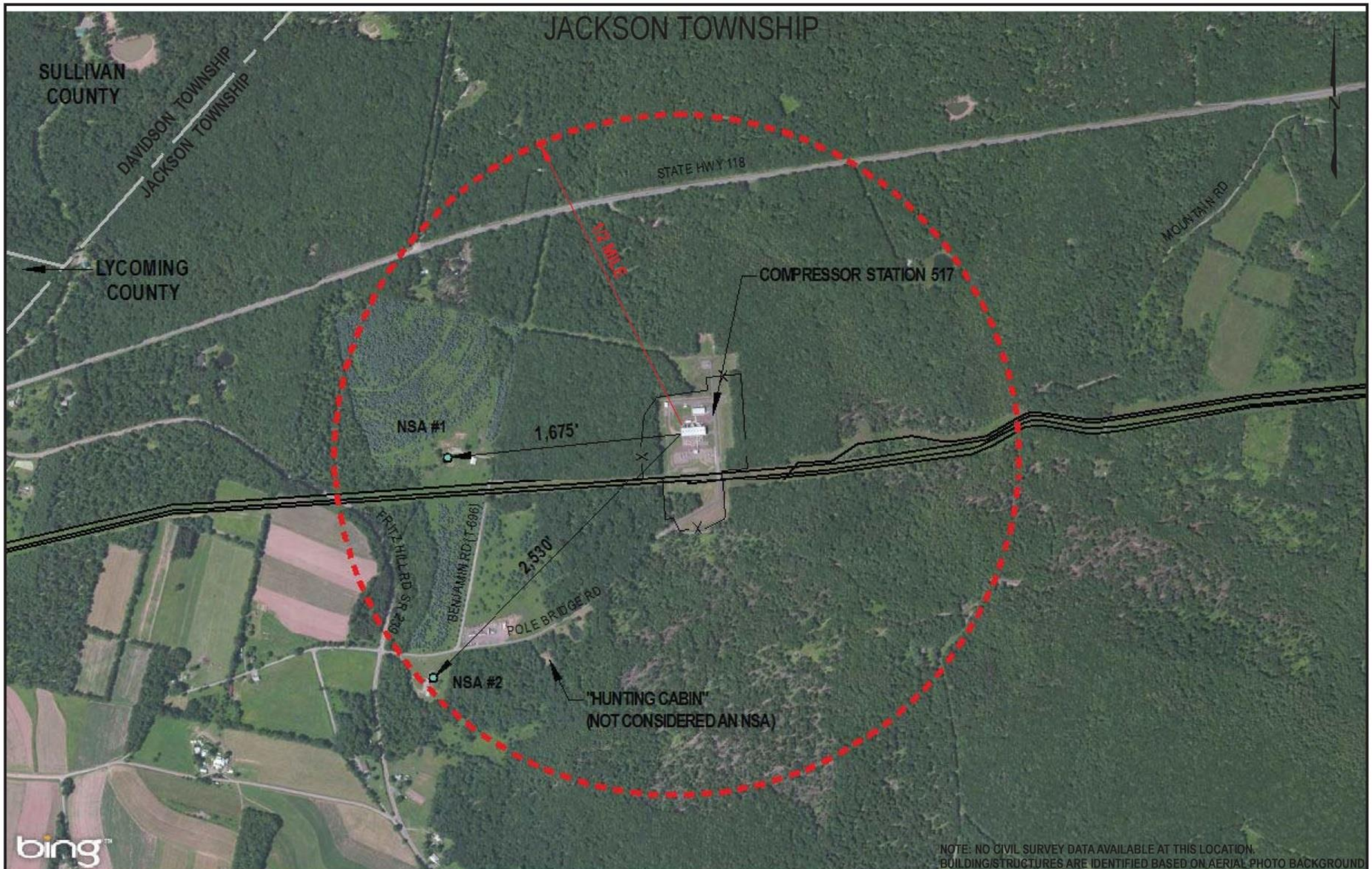
Compressor Station 517 is an existing facility in Columbia County (Jackson Township), Pennsylvania. The area surrounding the compressor station is primarily forestland and some farmland. The compressor station equipment/buildings are in the middle of the 122-acre Transco property. Transco conducted an acoustical analysis associated with the planned modifications at Compressor Station 517. The purpose of the acoustical analysis was to estimate the station's sound level contribution at the nearest NSAs. There are two NSAs within a 0.5-mile radius of Compressor Station 517. NSA 1 is a residence about 1,700 feet west of the site center and about 1,990 feet from the proposed location of new compressor unit no. 5. NSA 2 is a residence about 2,600 feet from the site center and about 2,800 feet from the proposed location of new compressor unit no. 5. The distance and direction of these NSAs are depicted on figure 4.11.2-1.

The current sound level contribution of Compressor Station 517 at the closest NSA (NSA 1) is estimated to be 46.6 dBA. This sound level contribution is based on surveys conducted at the site for a previous project. Transco did not provide an estimate of the sound level contribution of the existing compressor station at the second NSA, but assumed the station noise at this second NSA would be lower due to its increased distance from the compressor station.

Compressor Station 520

Compressor Station 520 is an existing facility in Lycoming County (Mifflin Township), Pennsylvania. The land surrounding the site is primarily rural with areas of forest and a few scattered residences. Transco conducted an acoustical analysis associated with the planned modifications at Compressor Station 520. The purpose of this acoustical analysis was to estimate the station's sound level contribution at the nearest NSAs. There are 37 NSAs within a 0.5-mile radius of Compressor Station 520 (36 residences and 1 school [Salladasburg Elementary School]). The distance and direction of the five closest NSAs to Compressor Station 520 are depicted on figure 4.11.2-2.

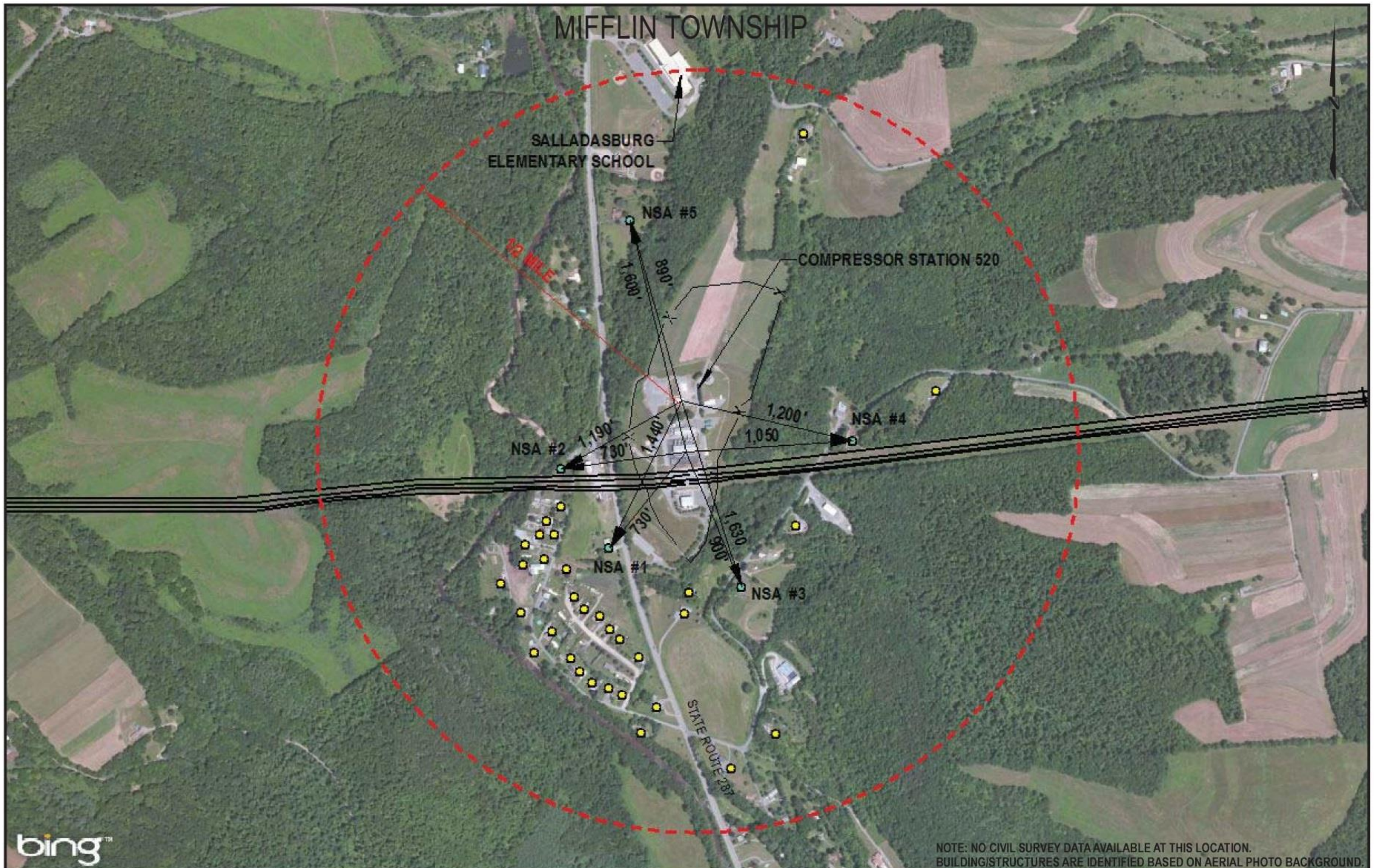
The existing sound level contribution of Compressor Station 520 at these five NSAs ranges from 59.7 to 65.0 dBA. These sound level contributions are based on surveys conducted at the site for a previous project.



LEGEND

EXISTING PIPELINE
FENCE LINE
TOWNSHIP/COUNTY BOUNDARY
1/2 MILE BUFFER
NSA (NOISE SENSITIVE AREA) USED FOR ANALYSIS

Figure 4.11.2-1
Atlantic Sunrise Project
Noise-Sensitive Areas Associated with Compressor Station 517



LEGEND

- EXISTING PIPELINE
- FENCE LINE
- 1/2 MILE BUFFER
- RESIDENCE
- NSA (NOISE SENSITIVE AREA) USED FOR ANALYSIS

Figure 4.11.2-2
Atlantic Sunrise Project
Noise-Sensitive Areas Associated with Compressor Station 520

Compressor Station 190

Compressor Station 190 is an existing facility in Howard County (Ellicott City, West Friendship District), Maryland. The area surrounding the compressor station is a mix of farmland, residential properties, and scattered regions of undeveloped woodland. Transco conducted an acoustical analysis associated with the planned modifications at Compressor Station 190. The purpose of this acoustical analysis was to estimate the station's sound level contribution at the nearest NSAs. There are 32 residential NSAs within a 0.5-mile radius of Compressor Station 190. The distance and direction of the five closest NSAs to Compressor Station 190 are depicted on figure 4.11.2-3.

The current sound level contribution of the compressor station at the five NSAs ranges from 49.3 to 53.7 dBA. These sound level contributions are based on surveys conducted at the site for a previous project in December 2002.

A preconstruction noise study for Compressor Station 190 could not be performed prior to submittal of Transco's application with FERC due to hydraulic constraints on the Transco System. The Transco Pipeline could not be configured in a manner that would allow Transco to run Compressor Station 190 at full load. In addition, as previously mentioned in RR9, Units 1 through 10 are currently unavailable due to the ongoing emissions reduction project. This prevents Transco from running Compressor Station 190 at the loading required to obtain accurate and representative noise data.

Compressor Station 605

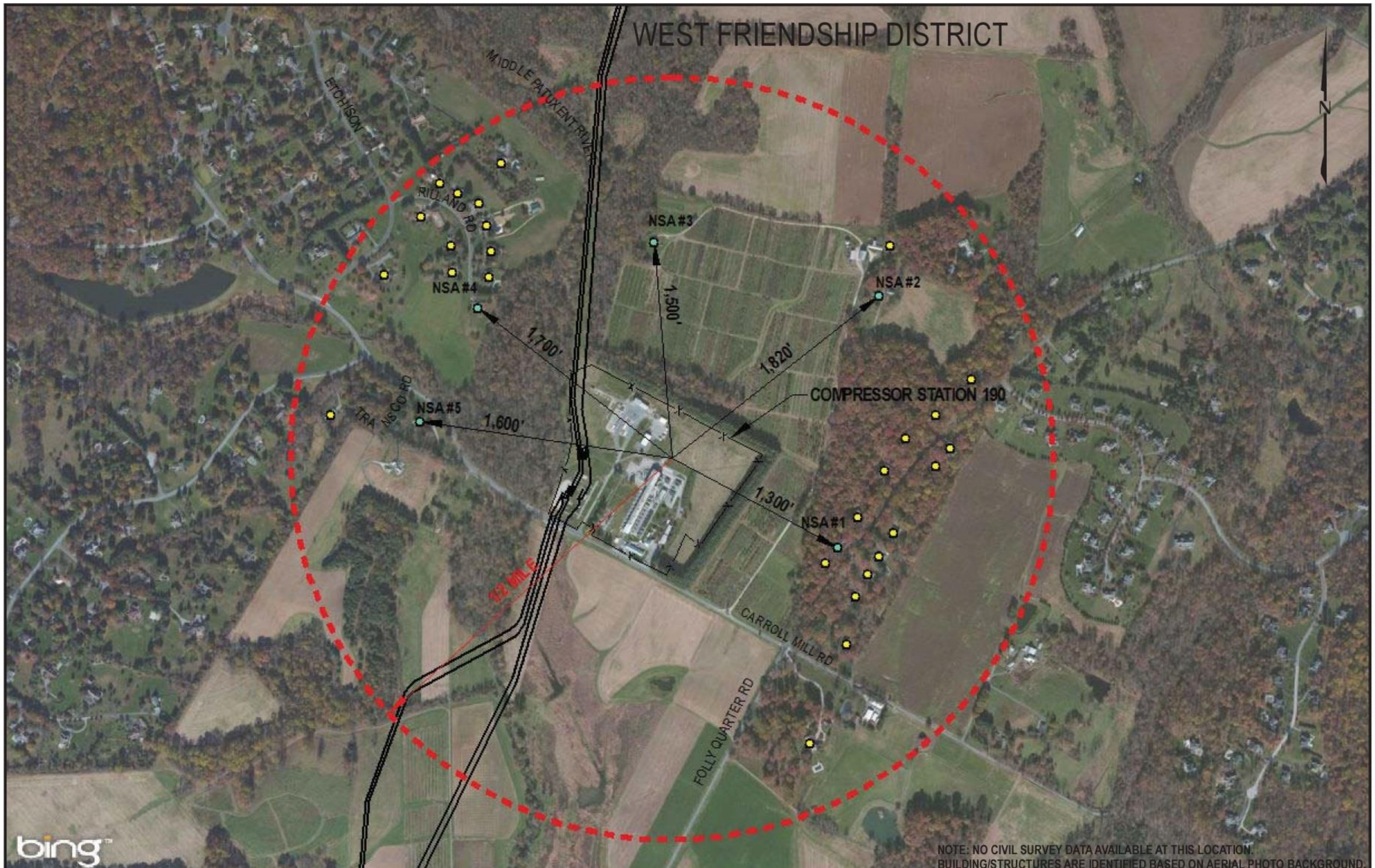
Compressor Station 605 would be a new facility in Wyoming County (Clinton Township), Pennsylvania. There is no existing equipment at the proposed site. The area surrounding the site is a mix of undeveloped wooded land, farmland, and residential properties. Transco conducted an acoustical analysis associated with new Compressor Station 605. The noise survey calculated the ambient sound level at the closest NSAs, the estimated station sound level at the closest NSAs if operated at full load, and the total sound contribution of the station. There are 26 residential NSAs within a 0.5-mile radius of the proposed site. Noise analyses were conducted at the three nearest NSAs. The results of noise analyses are presented in table 4.11.2-1. The distance and direction of these NSAs to the Compressor Station 605 site are depicted on figure 4.11.2-4.

TABLE 4.11.2-1

Compressor Station 605 – Noise-Sensitive Areas

Closest NSA	Description of the Identified Closest NSA and Related Sound Measurement Location	Ambient L_{dn} [a] (dBA)
NSA 1	Residence 1,500 feet northeast of the station site	47.5
NSA 2	Residence 1,865 feet west of the station site	58.1
NSA 3	Residence 2,150 feet southeast of the station site	44.1

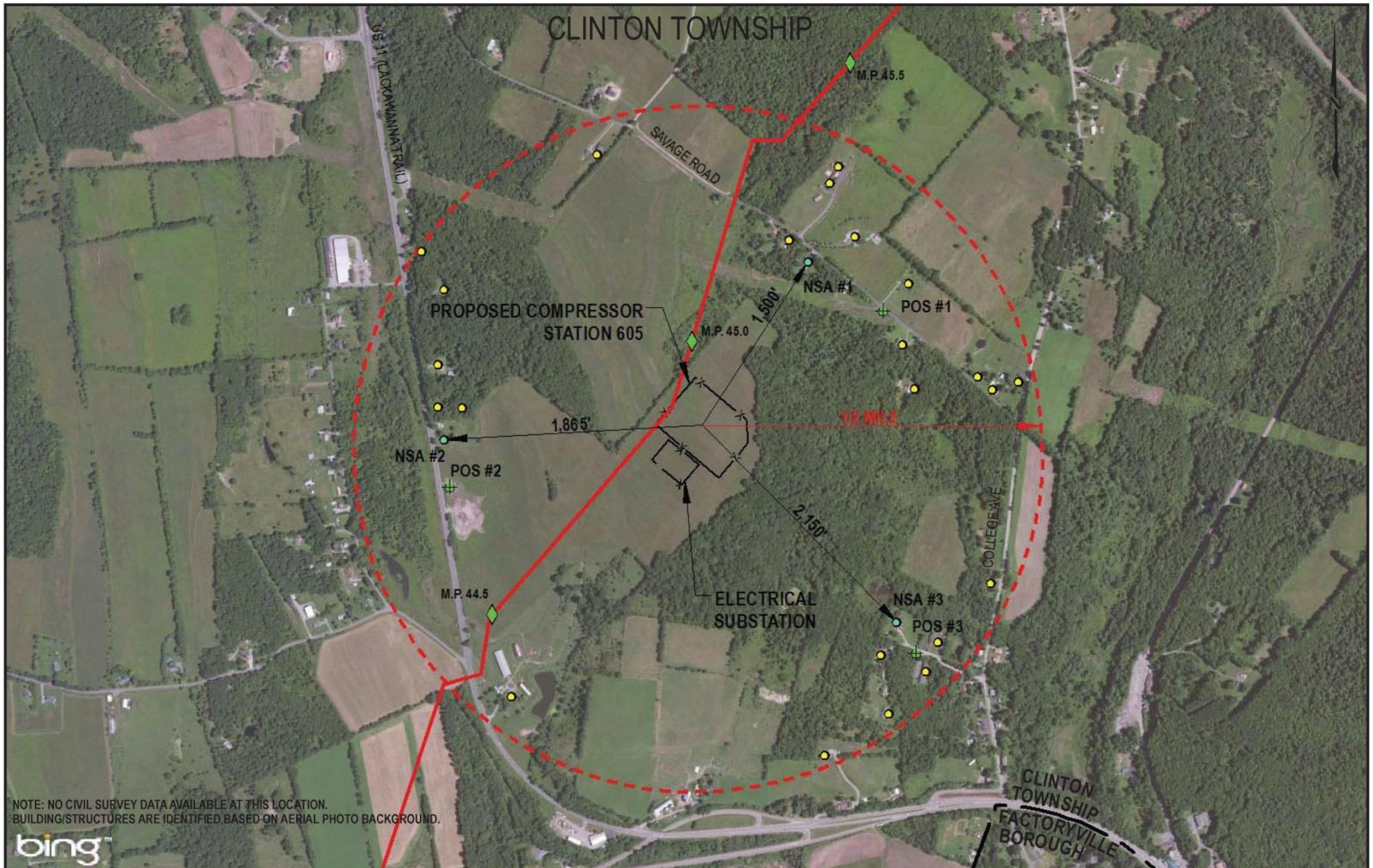
[a] Ambient noise measurements during nighttime hours were estimated because sound surveys were conducted only during daytime hours



LEGEND

- EXISTING PIPELINE
- FENCE LINE
- 1/2 MILE BUFFER
- RESIDENCE
- NSA (NOISE SENSITIVE AREA) USED FOR ANALYSIS

Figure4.11.2-3
Atlantic Sunrise Project
Noise-Sensitive Areas Associated with Compressor Station 190



LEGEND

- PROPOSED 42" CENTRAL PENN LINE SOUTH
- FENCE LINE
- TOWNSHIP/COUNTY BOUNDARY
- 1/2 MILE BUFFER
- RESIDENCE
- NSA (NOISE SENSITIVE AREA) USED FOR ANALYSIS
- MEASUREMENT POSITION

Figure 4.11.2-4
Atlantic Sunrise Project
Noise-Sensitive Areas Associated with Compressor Station 605

Compressor Station 610

Compressor Station 610 would be a new facility in Columbia County (Orange Township), Pennsylvania. There is no existing equipment at the proposed site. The area surrounding the proposed site is a mix of farm land and residential properties. Transco conducted an acoustical analysis associated with the new Compressor Station 610. The noise survey calculated the ambient sound level at the closest NSAs, the estimated station sound level at the closest NSAs if operated at full load, and the total sound contribution of the station. There are 17 residential NSAs within a 0.5-mile radius of the proposed site. Noise analyses were conducted at the three nearest NSAs. The results of the noise measurements are presented in table 4.11.2-2. The distance and direction of these NSAs to the Compressor Station 610 site are depicted on figure 4.11.2-5.

TABLE 4.11.2-2

Compressor Station 610 – Noise-Sensitive Areas

Nearest NSA	Description of the Identified Closest NSA and Related Sound Measurement Location	Ambient L_{dn}[a] (dBA)
NSA 1	Residence 1,020 feet south of the station site	41.8
NSA 2	Residence 1,890 feet east of the station site	39.0
NSA 3	Residence 1,220 feet northwest of the station site	38.7

[a] Ambient noise measurements during nighttime hours were estimated because sounds surveys were conducted only during daytime hours

Meter and Regulator Stations

Transco proposes to construct two new meter stations and three new regulator stations. The new Zick and Springville Meter Stations would include ultrasonic meters. Because the operation of these meter stations and ultrasonic meters would have a negligible noise impact, they are not analyzed further in this EIS.

The three new regulator stations would be the:

- North Diamond Regulator Station;
- West Diamond Regulator Station; and
- River Road Regulator Station.

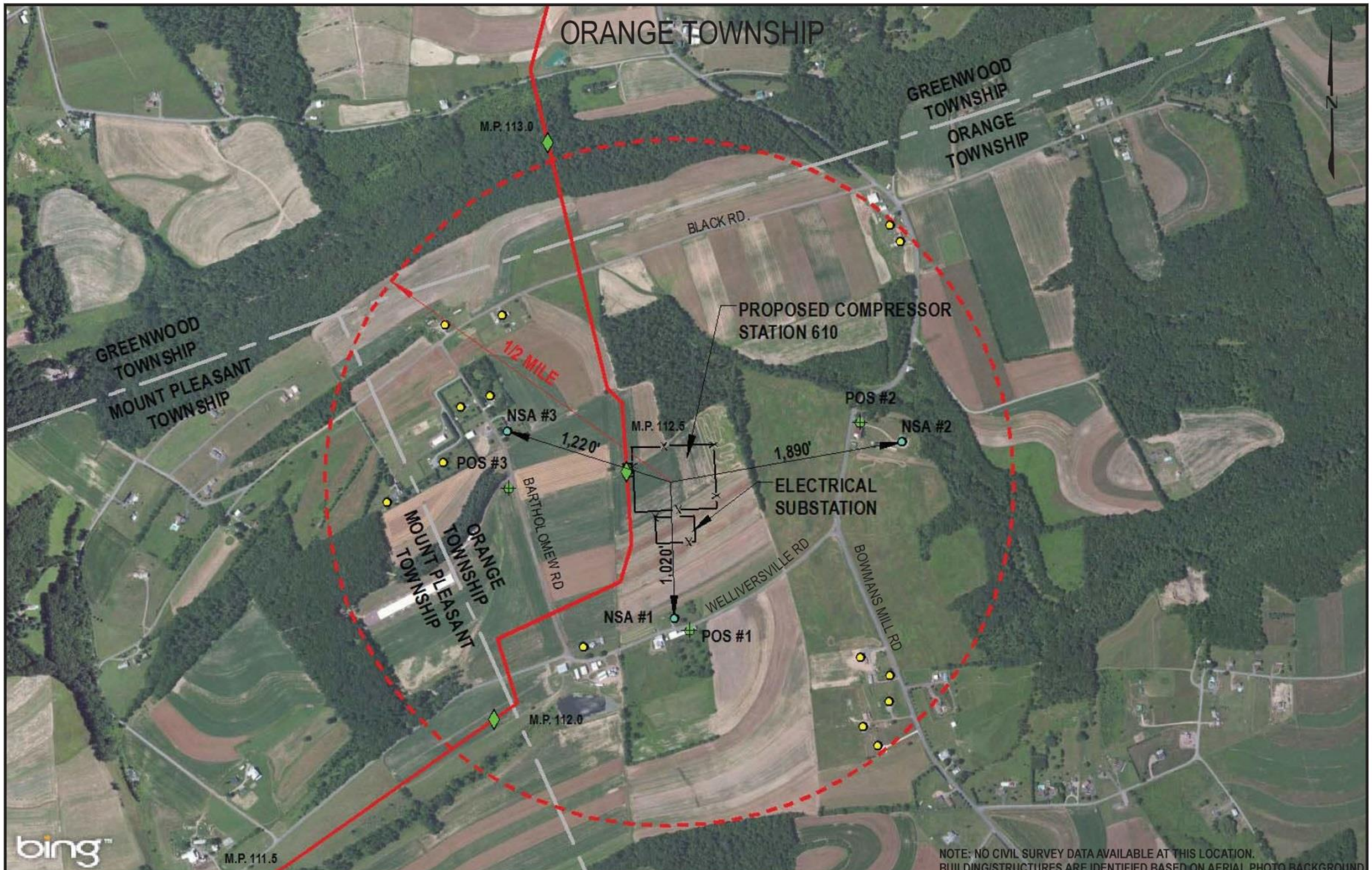
Transco performed ambient sound measurements at the three regulator stations in January 2015. Ambient sound levels were measured at the closest NSA within 0.5 mile of each regulator station site. Table 4.11.2-3 summarizes the results of the noise measurements.

TABLE 4.11.2-3

Regulator Stations – Noise-Sensitive Areas

Facility (milepost [a])	Closest NSA and Direction	Ambient L_{dn}[b] (dBA)
North Diamond Regulator Station (L 92.7)	950 feet (NW)	52.8
West Diamond Regulator Station (L 114.0)	1,075 feet (SE)	42.7
River Road Regulator Station (Transco Mainline MP 1,683.3)	1,550 feet (NW)	41.9

[a] L = Leidy Line System Milepost
[b] Ambient noise measurements during nighttime hours were estimated because sounds surveys were conducted only during daytime hours.



LEGEND

PROPOSED 42" CENTRAL PENN LINE SOUTH
FENCE LINE
TOWNSHIP/COUNTY BOUNDARY
1/2 MILE BUFFER
RESIDENCE
NSA (NOISE SENSITIVE AREA) USED FOR ANALYSIS
MEASUREMENT POSITION

Figure 4.11.2-5
Atlantic Sunrise Project
Noise-Sensitive Areas Associated with Compressor Station 610

Horizontal Directional Drill Locations

Transco proposes to use the HDD method at four locations:

- CPL North Susquehanna River HDD (MP 35.0);
- CPL South Conestoga River HDD (MP 12.3);
- CPL South Susquehanna River HDD (MP 99.7); and
- CPL South I-80/Little Fishing Creek (MP M-0423 3.3).

All four of these HDD sites have NSAs within 0.5 mile of either the entry or exit point. Transco performed ambient sound measurements at the CPL North and South Susquehanna River and CPL South Conestoga River HDD sites in January 2015. Table 4.11.2-4 summarizes the results of these measurements at the two closest NSAs to each HDD site. The distance and direction of these NSAs to the HDD locations are depicted in figures 4.11.2-6, 4.11.2-7, and 4.11.2-8. HDD activities at the three sites are estimated to be completed over a 3- to 6-month period, depending on actual drilling conditions encountered.

TABLE 4.11.2-4

Ambient Noise Levels at Noise-Sensitive Areas Closest to the Proposed Horizontal Directional Drill Entry and Exit Locations

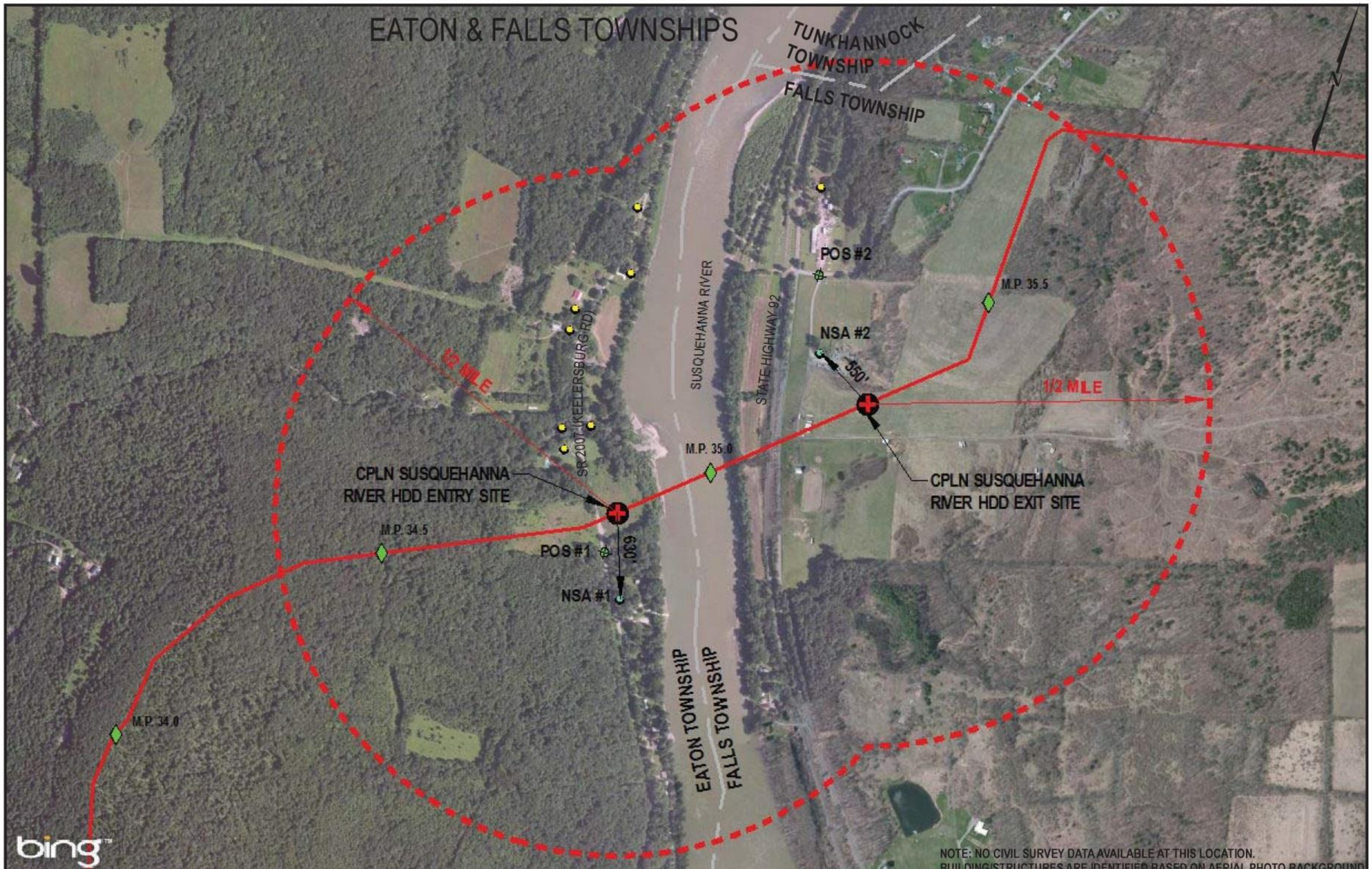
Facility/HDD Crossing	Milepost	Entry or Exit Point	NSA	Distance and Direction of Closest NSA	Ambient L_{dn} (dBA)
CPL North					
Susquehanna River HDD	35.0	Entry	Residence	630 feet (S)	44.0
		Exit	Residence	550 feet (NW)	44.3
CPL South					
Conestoga River HDD	12.3	Entry	Residence	580 feet (NW)	41.4
		Exit	Residence	360 feet (SE)	42.6
Susquehanna River HDD	99.5	Entry	Residence	1,550 feet (SE)	43.0
		Exit	Residence	475 feet (WNW)	36.8

Transco proposed the I-80/Little Fishing Creek HDD crossing in its August 18, 2016 supplemental filing (FERC accession number 20160818-5320). Because ambient sound measurements for the I-80/Little Fishing Creek HDD sites and subsequent noise assessments are still pending, **we recommend that:**

- **<u>Prior to construction at the CPL South I-80/Little Fishing Creek HDD at MP M-0423 3.3</u>, Transco should file with the Secretary, for review and written approval by the Director of OEP, the results of the noise impact assessment for the nearest NSAs within a 0.5-mile radius of the HDD entry and exit points. If the results of the noise impact assessment indicate that the estimated noise attributable to HDD equipment operations would exceed FERC's noise level criterion of 55 dBA L_{dn} at any of the NSAs, Transco should provide additional information on the mitigation measures, such as sound barriers, that would be implemented to reduce noise levels below 55 dBA.**

Pipeline Construction and Blasting

The pipeline would be constructed through suburban and rural locations. Estimated noise L_{dn} levels associated with these areas can range from 40 to 50 dBA L_{dn} (EPA, 1974) with remote rural areas being as quiet as 35 dBA L_{dn}. Proximity of this work to busy roads and commercial or industrial noise sources can increase the background noise significantly.



LEGEND

- PROPOSED 30" CENTRAL PENN LINE NORTH
- TOWNSHIP/COUNTY BOUNDARY
- 1/2 MILE BUFFER
- RESIDENCE
- NSA (NOISE SENSITIVE AREA) USED FOR ANALYSIS
- MEASUREMENT POSITION

Figure 4.11.2-6
Atlantic Sunrise Project
Noise-Sensitive Areas Associated with the
CPL North Susquehanna River Horizontal Directional Drill

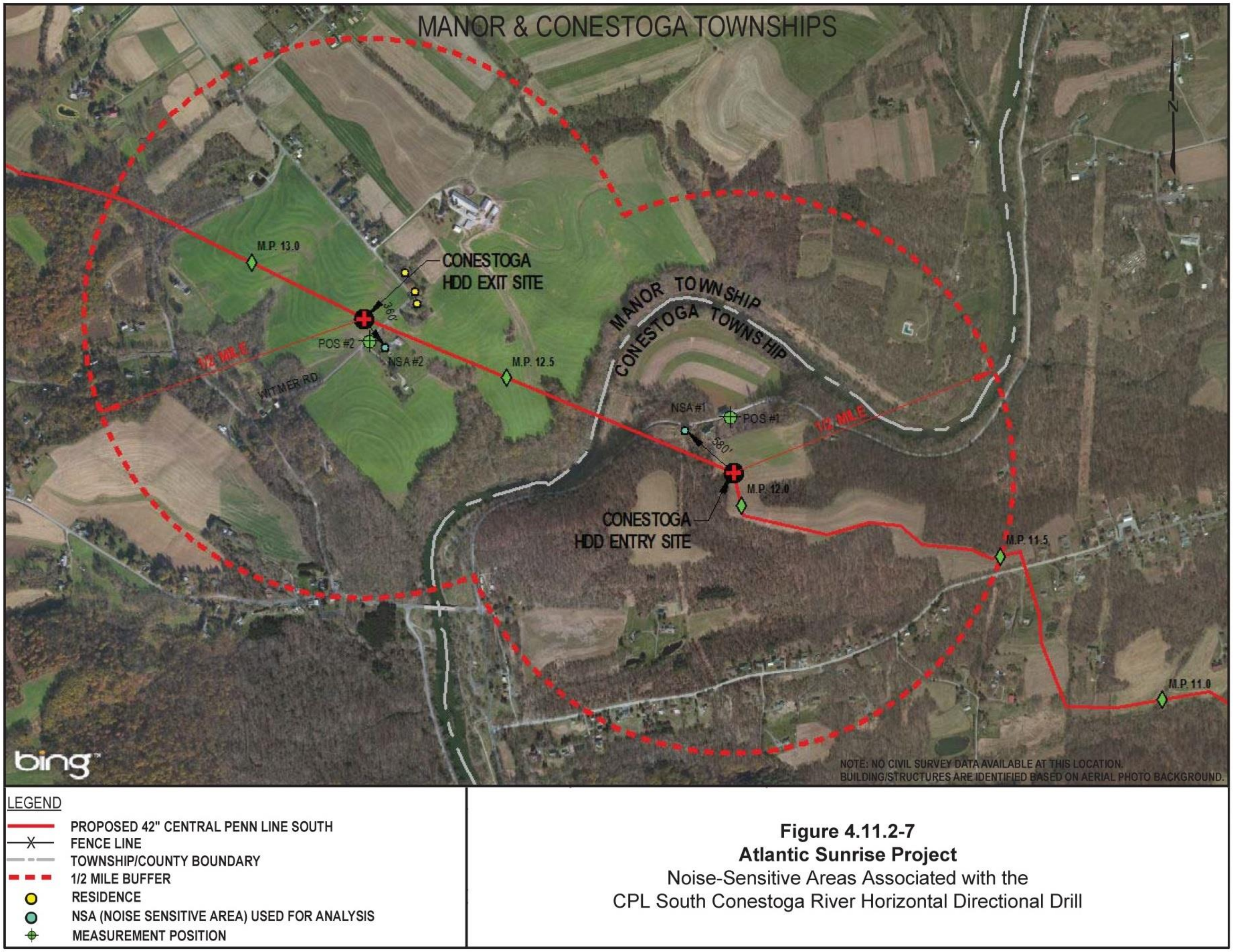


Figure 4.11.2-7
Atlantic Sunrise Project
Noise-Sensitive Areas Associated with the
CPL South Conestoga River Horizontal Directional Drill

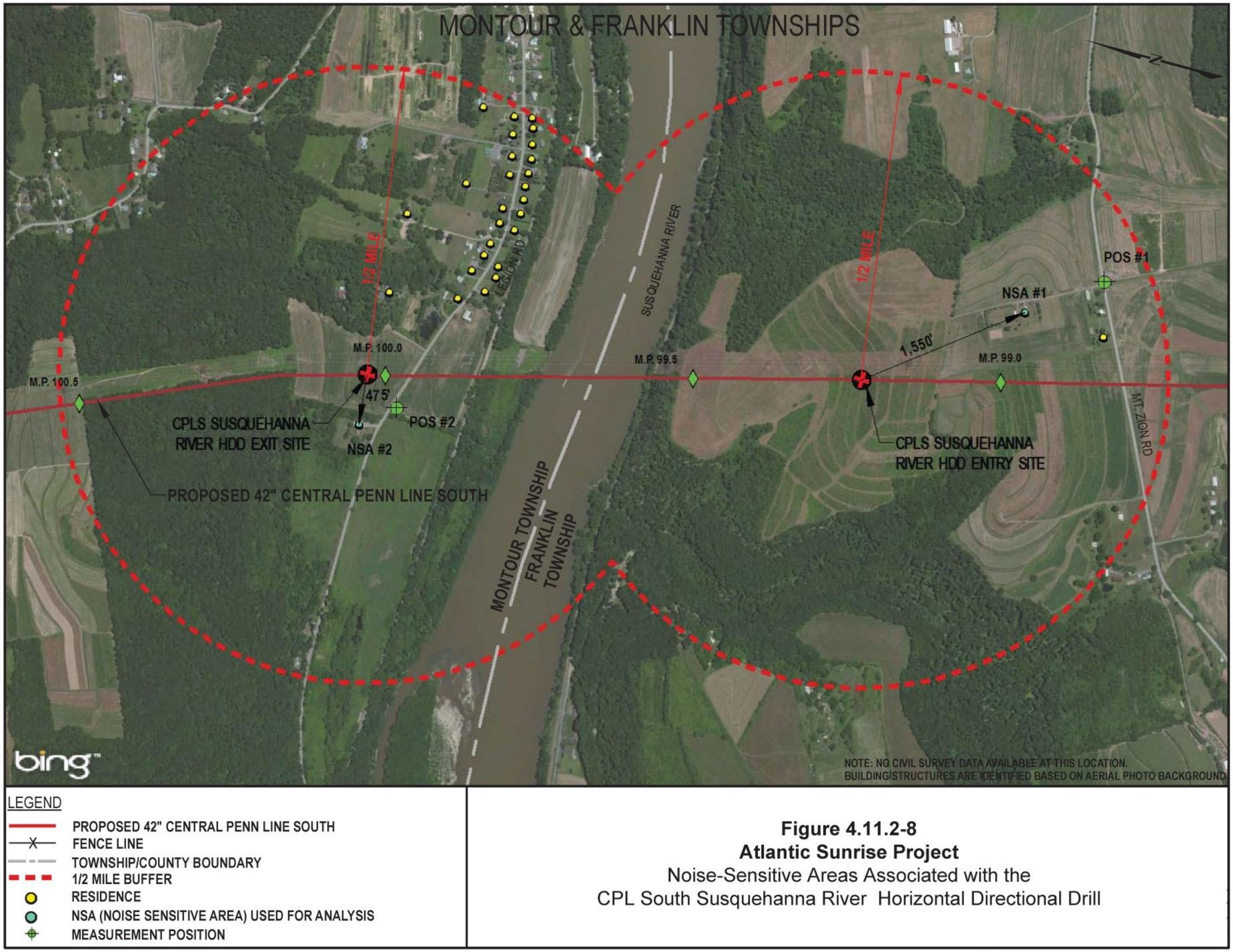


Figure 4.11.2-8
Atlantic Sunrise Project
Noise-Sensitive Areas Associated with the
CPL South Susquehanna River Horizontal Directional Drill

4.11.2.3 Noise Impacts and Mitigation

Construction Noise

Construction noise associated with the pipeline would be spread over the length of the pipeline route and would not be concentrated at any one location for an extended period of time, except at the HDD sites. Construction noise associated with the installation of the compressor, metering, and regulator stations, would be concentrated in the vicinity of each site and would extend for several months, but would vary depending on the specific activities that are taking place at any given time. Table 4.11.2-5 lists the estimated noise levels associated with construction equipment used for the Project.

TABLE 4.11.2-5

Noise Levels of Major Equipment Associated with Pipeline Construction [a]

Equipment Type	Sound Levels at 50 feet (dBA)
Trucks	85
Crane	80
Roller	80
Bulldozer	85
Pickup Trucks	55
Backhoes	80

[a] DOT, Federal Highway Administration (FHWA). 2006. FHWA Highway Construction Noise Handbook. Available online at http://www.fhwa.dot.gov/environment/noise/handbook/09.htm.

Existing Compressor Stations 517, 520, and 190

The noise contribution of construction activities at Compressor Stations 517, 520, and 190 related to the installation of the new compressor units is not expected to exceed the existing noise levels generated by the compressor station (i.e., due to the distance between the new equipment and closest NSAs). Consequently, site construction noise associated with the installation of the new compressor unit would have a negligible effect on the nearby NSAs, noting that the construction would be primarily limited to daytime hours.

New Compressor Stations 605 and 610 and the Meter and Regulator Stations

The construction noise at Compressor Stations 605, 610, and the M&R stations would include site grading, clearing, and grubbing, which is considered short term and intermittent. Transco's assessments indicate that the expected noise produced by construction equipment working at the new compressor stations would not exceed 55 dBA L_{dn} at any NSA.

Horizontal Directional Drill Locations

Transco proposes to conduct four HDD crossings as summarized in table 4.11.2-6. Noise-generating equipment typically used at HDD entry sites would include the following:

- drilling rig and engine-driven hydraulic power unit (most prominent noise source);
- engine-driven mud pump(s) and engine-driven generator set(s);
- mud mixing/cleaning equipment and associated fluid systems shale shakers;
- crane, backhoe, frontloader, forklift, and/or truck(s);
- temporary material storage tanks (water and drilling mud storage); and
- engine-driven light plants (nighttime operation).

TABLE 4.11.2-6

Noise Assessments for Each Horizontal Directional Drill Entry and Exit Site Associated with the Atlantic Sunrise Project, Assuming No Additional Noise Mitigation Measures

Facility/HDD Crossing	Milepost	Entry or Exit Point	NSA No.	Distance and Direction of Closest NSA	Ambient L_{dn} (dBA)	Calculated L_{dn} due to HDD (dBA)	L_{dn} of HDD + Ambient (dBA)	Increase Above Ambient (dB)	Exceed 55dBA L_{dn} Noise Criterion?
CPL North									
Susquehanna River HDD		Entry	1	630 feet (S)	44.0	63.7	63.7	19.7	Yes
	35.0	Exit	2	550 feet (NW)	44.3	53.3	53.6	9.5	No
CPL South									
Conestoga River HDD		Entry	1	580 feet (NW)	41.4	64.5	64.5	23.1	Yes
	12.3	Exit	2	360 feet (SE)	42.6	58.8	58.9	16.3	Yes
Susquehanna River HDD	99.5	Entry	1	1,550 feet (SE)	43.0	52.6	53.0	10.0	No
		Exit	2	475 feet (WNW)	36.8	54.3	54.4	17.6	No

Noise-generating equipment typically used at HDD exit sites would include the following:

- backhoe, sideboom, backhoe, and/or trucks;
- possibly one engine-driven generator set and one smaller engine-driven pump; and
- engine-driven light plants (used for nighttime operation).

Transco conducted a noise impact assessment for the nearest NSAs within a 0.5-mile radius of the entry points and exit points of the CPL North and South Susquehanna River and CPL South Conestoga River HDD sites, assuming HDD activities are continuous and extend through the night. The results of this assessment, assuming no noise mitigation is implemented, are presented in table 4.11.2-6.

The results of the noise assessments indicate that the estimated noise attributable to HDD equipment operations would increase above FERC's noise level criterion of 55 dBA L_{dn} at three NSAs if no additional mitigation is employed and would be noticeable at all of the NSAs. Moreover, the noise of the HDDs would exceed 55 dBA L_{dn} (FERC threshold) at NSAs at the following HDD entry and/or exit locations:

- CPL North Susquehanna River HDD entry site;
- CPL South Conestoga River HDD entry site; and
- CPL South Conestoga River HDD exit site.

Transco's consultant recalculated the noise at these three locations assuming additional mitigation measures, such as sound barriers, would be employed to bring the noise below 55 dBA. Table 4.11.2-7 summarizes the projected sound level contribution (L_{dn}) of HDD operations at the three NSAs assuming the additional noise mitigation measures are implemented.

TABLE 4.11.2-7

Summary of Estimated Sound Contribution (L_{dn}) of Horizontal Directional Drill Operations at the Closest Noise-Sensitive Area Assuming that Additional Noise Mitigation Measures are Employed to Meet the Sound Criterion

HDD Crossing	Entry or Exit Point	Distance and Direction of Closest NSA	Ambient L_{dn} (dBA)	Calculated L_{dn} due to HDD (dBA)	L_{dn} of HDD + Ambient (dBA)	Increase Above Ambient (dB)	Additional Noise Mitigation Measures Employed
CPL North							
Susquehanna River HDD	Entry	630 feet (S)	44.0	51.8	52.5	8.5	Barrier around the Hydraulic Unit, Barriers for other Engine-Driven Pumps/Equipment and Low-Noise Generators
CPL South							
Conestoga River HDD	Entry	580 feet (NW)	41.4	52.6	52.9	11.5	Barrier around the hydraulic unit, barriers for other engine-driven pumps/equipment and low-noise generators
Conestoga River HDD	Exit	360 feet (SE)	42.6	50.2	50.9	8.3	Barrier around South and East Side of Workspace

We received several comments related to noise from drilling operations at the CPL North Susquehanna River HDD and the CPL South Conestoga River HDD. To ensure that the noise mitigation measures adequately reduce the noise levels to below 55 dBA at the nearest NSAs during drilling activities at the CPL North Susquehanna River and CPL South Conestoga River HDDs, **we recommend that**:

- **Transco should file <u>in its weekly construction status reports</u> the following information for the CPL North Susquehanna River HDD entry site and the CPL South Conestoga River HDD entry and exit sites:**

  a. the noise measurements from the nearest NSA for the CPL North Susquehanna River HDD entry site and the CPL South Conestoga River HDD entry and exit sites, obtained at the start of drilling operations;

  b. any noise mitigation that Transco implemented at the start of drilling operations; and

  c. any additional mitigation measures that Transco would implement if the initial noise measurements exceed an L_{dn} of 55 dBA at the nearest NSA.

Transco indicated in its application that the owners of the properties at the nearby NSAs would be notified in advance of planned nighttime construction activities, advising them that noise-generating equipment may be operated during nighttime hours. Since mitigated noise levels attributable to HDDs are anticipated to be below the FERC sound criterion at any NSAs, overnight construction, if necessary, is not expected to create significant impacts on surrounding NSAs. However, if the noise levels cannot be reduced to target levels, Transco has committed to providing temporary housing or equivalent monetary compensation to the occupants of affected NSAs in the project area until the construction activities are completed.

We received several comments from individuals concerned that an Amish family renting a residence on the Justin and Susan Cappiello property near the CPL South Conestoga River HDD entry site would be adversely affected by the noise levels generated during drilling operations. As shown in table 4.11.2-4, the Amish family had been identified as an NSA 1, at 580 feet. The commentors were concerned that noise levels would exceed the 55-dBA L_{dn} threshold at the residence (which is the closest NSA to the HDD entry site on figure 4.11.2-7) or would negatively affect the farm animals that are kept on the property and that the family would not be able to temporarily relocate due to the number of family members and farm animals present. Based on the comments received, the Amish family did not accept temporary relocation as a mitigation measure proposed by Transco. Due to the noise mitigation measures that Transco would implement and our recommendation above, we do not believe the noise levels at the residence would exceed the 55-dBA L_{dn} threshold or cause adverse effects on the farm animals kept on the property.

<u>Pipeline Construction and Blasting</u>

Noise associated with pipeline construction activities other than HDDs would vary depending on the phase of construction and progress at a given time. The most noticeable construction noise would likely occur during site grading, clearing, grubbing, and trenching operations. However, the noise impact at any given location would be short in duration and would have no long-term effect on nearby NSAs. Vibration from construction within 25 feet of a residence would be monitored prior to, during, and after construction. Pipeline construction would be conducted as quickly as possible through residential areas, and most work would be conducted Monday through Saturday during daytime hours. Blasting would be required during construction in some areas with shallow depth to bedrock (i.e., less than 8 feet). Areas of potential blasting are described in section 4.1.3. Transco would verify in the field potential blasting locations prior to construction. If bedrock is encountered during construction that cannot be removed using mechanical methods such as ripping or conventional excavation, Transco would implement the measures described in its Blasting Plan (see attachment 10 of Transco's ECP). These measures include notifying counties, townships, and nearby landowners prior to conducting blasting activities.

Operational Noise

<u>Compressor Station 517</u>

Modifications associated with Compressor Station 517 would consist of the installation of the new turbine-driven compressor unit no. 6 and an extension of the existing gas aftercooler that serves the existing compressor units. The new unit would include one new natural gas-fired Solar Mars 100S combustion turbine rated at 16,000 International Standards Organization (ISO) hp. The following describes the predominant noise-producing equipment associated with the project modifications (i.e., new unit and gas aftercooler):

- outdoor lube oil cooler that serves the turbine and compressor;
- turbine exhaust system;
- turbine air intake filter system;
- aboveground gas piping associated with the new compressor unit; and
- blowdown vent for the new unit; and gas aftercooler (i.e., addition of bays [one or two bays] to the existing gas aftercooler that serves the first four units).

Table 4.11.2-8 summarizes the current sound level contribution of Compressor Station 517, the estimated sound level of project modifications, and the estimated total sound contribution of the compressor station (i.e., the sound level after installation of project modifications).

TABLE 4.11.2-8						
Noise Assessment for Compressor Station 517						
Closest NSAs	Distance and Direction of NSA to Compressor Building	Distance and Direction of NSA to the New Compressor Unit No. 6	Current L_{dn} of Station if Operated at Full Load [a] (dBA)	Estimated L_{dn} of Project Modifications (dBA)	Estimated Total L_{dn} of Station After Installation of Modifications (dBA)	Potential Noise Increase [b] (dB)
NSA 1	1,675 feet (W)	1,650 feet (W)	46.6	43.6	48.4	1.8

[a] Current station sound level includes the estimated station sound level after installation of the station modifications associated with the Leidy Southeast Expansion Project.

[b] Assumes operational noise control measures detailed below have been implemented.

As shown in table 4.11.2-8, predicted noise levels are expected to be below our 55 dBA L_{dn} requirement. The increase in noise at the nearest NSA would be less than 3 dBA and thus below the level generally deemed to be perceptible to the human ear. However, to ensure that the actual noise produced as a result of Transco's modifications to the compressor station meets our criteria, **we recommend that**:

- **Transco should file a noise survey with the Secretary <u>no later than 60 days</u> after placing the authorized units at Compressor Station 517 in service. If a full load condition noise survey is not possible, Transco should provide an interim survey at the maximum possible horsepower load and provide the full load survey <u>within 6 months</u>. If the noise attributable to the operation of all of the equipment at Compressor Station 517 under interim or full horsepower load conditions exceeds an L_{dn} of 55 dBA at any nearby NSAs, Transco should file a report on what changes are needed and should install the additional noise controls to meet the level <u>within 1 year</u> of the in-service date. Transco should confirm compliance with the above requirement by filing a second noise survey with the Secretary <u>no later than 60 days</u> after it installs the additional noise controls.**

The noise of new unit blowdown[36] venting via a blowdown silencer would meet a "peak" A-weighted level of 60 dBA at a distance of 300 feet. The peak sound level of a blowdown event associated with the new unit would be about 43 dBA (L_{dn} of about 49 to 50 dBA) at the closest NSA about 1,700 feet from the blowdown silencer, which would be less than the 55-dBA L_{dn} threshold. Consequently, although the noise of a unit blowdown event could be audible at the closest NSA, it would not have a substantial noise impact. Moreover, any unit blowdown events would be infrequent and would last for only a short period of time (1- to 5-minute period).

<u>Compressor Station 520</u>

Modifications associated with Compressor Station 520 would consist of the installation of a new turbine-driven compressor unit (compressor unit no. 9). The new unit would be designed with one new natural gas-fired Solar Mars 100S combustion turbine rated at 16,000 ISO hp. The following describes the predominant noise-producing equipment associated with the new unit:

- outdoor lube oil cooler that serves the turbine and compressor;

[36] A blowdown event is a planned or unplanned venting of gas. It can be initiated automatically in the control system of the equipment, or manually on site. Planned blowdown events can happen during commissioning/decommissioning or maintenance of a facility. Unplanned blowdown events are necessary in the event of an emergency and could occur at any time. The frequency and length of the blowdown events depend upon the extent of the maintenance activity or type of emergency release. Pipeline blowdown events are typically infrequent and short in duration.

- turbine exhaust system;
- turbine air intake filter system;
- aboveground gas piping and piping components, including new filter/separators; and
- blowdown vent for the new unit.

Table 4.11.2-9 summarizes the current sound level contribution of Compressor Station 520, the estimated sound level of project modifications, and the estimated total sound contribution of the compressor station (i.e., sound level after installation of project modifications).

TABLE 4.11.2-9

Noise Assessment for Compressor Station 520

Closest NSAs	Distance and Direction of NSA to Compressor Building	Distance and Direction of NSA to the New Compressor Unit No. 9	Current L_{dn} of Compressor Station if Operated at Full Load [a] (dBA)	Estimated L_{dn} of the Modifications (dBA)	Estimated Total L_{dn} of Compressor Station After Installation of Modifications (dBA)	Potential Noise Increase [b] (dB)
NSA 1	730 feet (SW)	1,440 feet (SSW)	65.0	43.6	65.0	0.0
NSA 2	730 feet (W)	1,190 feet (SW)	61.0	45.7	61.0	0.1
NSA 3	900 feet (S)	1,630 feet (S)	60.3	42.3	60.4	0.1
NSA 4	1,050 feet (E)	1,200 feet (SE)	63.5	45.6	63.6	0.1
NSA 5	1,600 feet (N)	890 feet (NNW)	59.7	48.6	60.0	0.3

[a] Current compressor station sound level includes the estimated sound level after installation of the modifications associated with the Leidy Southeast Expansion Project.

[b] Assume operational noise control measures detailed below have been implemented.

As shown in table 4.11.2-9, the existing noise levels at Compressor Station 520 (prior to construction of the Project) exceed the 55 dBA requirement. The predicted increase in noise at NSAs associated with the proposed modifications would be 0.3 dBA or lower, and would not be perceptible to the human ear. To ensure that the actual noise produced as a result of the modifications to the compressor station does not exceed previously existing noise levels, **we recommend that:**

- **Transco should conduct a noise survey at Compressor Station 520 to verify that the noise from all the equipment operated at full capacity does not exceed the previously existing noise levels that are at or above an Ldn of 55 dBA at the nearby NSAs. The results of this noise survey should be filed with the Secretary <u>no later than 60 days</u> after placing the modified units in service. If any of these noise levels are exceeded, Transco should, <u>within 1 year</u> of the in-service date, implement additional noise control measures to reduce the operating noise level at the NSAs to at or below the previously existing noise level. Transco should confirm compliance with this requirement by filing a second noise survey with the Secretary <u>no later than 60 days</u> after it installs the additional noise controls.**

The noise of the new unit blowdown venting via a blowdown silencer would meet a "peak" A-weighted level of 55 dBA at a distance of 300 feet. The peak sound level of a blowdown event associated with the new unit would be about 43 dBA (L_{dn} of about 49 to 50 dBA) at the closest NSA about 890 feet from the blowdown silencer, which would be lower than the 55-dBA L_{dn} threshold. Consequently, although the noise of a unit blowdown event could be audible at the nearby NSAs, it would not have a substantial noise impact. Moreover, any unit blowdown events would be infrequent and would last for only a short period of time (1- to 5-minute period).

Compressor Station 190

Modifications associated with Compressor Station 190 would consist of the installation of a new turbine-driven compressor unit (i.e., compressor unit no. 13). The new unit would include one new natural gas-fired Solar Titan 250S combustion turbine rated at 30,000 ISO hp. The following describes the predominant noise-producing equipment associated with the project modification (new unit):

- outdoor lube oil cooler that serves the turbine and compressor;
- turbine exhaust system;
- turbine air intake filter system;
- aboveground gas piping and piping components, including new filter/separators; and
- blowdown vent for the new unit.

Table 4.11.2-10 summarizes the current sound level contribution of Compressor Station 190, the estimated sound level of project modifications, and the estimated total sound contribution of the compressor station (i.e., sound level after installation of project modification).

TABLE 4.11.2-10

Noise Assessment for Compressor Station 190

Closest NSAs and Type of NSA	Distance and Direction of NSA to New Compressor Unit No. 13	Current Sound Level (L_{dn}) of Station if Operated at Full Load (dBA)	Estimated Sound Level (L_{dn}) of the Modifications (dBA)	Estimated Total L_{dn} of Station After Installation of Modifications (dBA)	Potential Noise Increase [a] (dB)
NSA 1 (Residence)	1,300 feet (ESE)	53.7	47.2	54.6	0.9
NSA 2 (Residence)	1,820 feet (NE)	49.3	43.8	50.4	1.1
NSA 3 (Residence)	1,500 feet (N)	51.1	45.7	52.2	1.1
NSA 4 (Residence)	1,700 feet (NW)	49.8	44.5	50.9	1.1
NSA 5 (Residence)	1,600 feet (WNW)	49.9	45.1	51.1	1.2

[a] Assumes operational noise control measures detailed below have been implemented.

As shown in table 4.11.2-10, predicted noise levels are expected to be below our 55 dBA L_{dn} requirement. The increase in noise at the nearest NSAs would be less than 3 dBA and thus below the level generally deemed to be perceptible to the human ear. To ensure that the actual noise produced as a result of Transco's modifications to the compressor station meets our criteria, **we recommend that**:

- **Transco should file a noise survey with the Secretary <u>no later than 60 days</u> after placing the authorized units at Compressor Station 190 in service. If a full load condition noise survey is not possible, Transco should provide an interim survey at the maximum possible horsepower load and provide the full load survey <u>within 6 months</u>. If the noise attributable to the operation of all of the equipment at Compressor Station 190 under interim or full horsepower load conditions exceeds an L_{dn} of 55 dBA at any nearby NSAs, Transco should file a report on what changes are needed and should install the additional noise controls to meet the level <u>within 1 year</u> of the in-service date. Transco should confirm compliance with the above requirement by filing a second noise survey with the Secretary <u>no later than 60 days</u> after it installs the additional noise controls.**

The noise of the new unit blowdown venting via a blowdown silencer would meet a "peak" A-weighted level of 55 dBA at a distance of 300 feet. The peak sound level of a blowdown event associated with the new unit would be about 44 dBA (L_{dn} of about 50 to 51 dBA) at the closest NSA, located about 1,300 feet from the blowdown silencer, which would be lower than 55 dBA L_{dn}. Consequently, although the noise of a unit blowdown event could be audible at the nearby NSAs, it would not be a substantial noise impact. Moreover, any unit blowdown events would be infrequent and would last for only a short period of time (1- to 5-minute period).

Compressor Station 605

Compressor Station 605 would include two electric motor-driven compressor units, each consisting of a 15,000-hp electric motor driving a centrifugal gas compressor, via a Voith Vorecon gearbox. The motors and compressors would be installed inside a single acoustically insulated compressor building. The following describes the predominant noise-producing equipment and other components associated with the compressor units:

- outdoor lube oil cooler that serves compressor, gearbox, and motor;
- power control room, switchgear building, and station substation;
- Pony electric motor used to start up the primary electric motor;
- air supply blower that provides ventilation air for cooling the electric motor;
- exhaust ducting/opening for exhausting motor ventilation air outside the building;
- gas piping and associated components (e.g., valves and inlet filter/separators);
- gas aftercooler that serves each compressor unit; and
- gas blowdown vent that services each compressor unit.

Table 4.11.2-11 summarizes the ambient sound level at the closest NSAs, estimated sound contribution of the compressor station at the closest NSAs if operated at full load, and the total sound contribution of the compressor station (i.e., compressor station sound level plus the ambient sound level).

TABLE 4.11.2-11

Noise Assessment for New Compressor Station 605

Closest NSAs	Distance and Direction of NSA to Compressor Station Site Center	Ambient L_{dn} (via Measured L_d and Estimated L_n) (dBA)	Estimated L_{dn} of the Compressor Station at Full Load (dBA)	Estimated Total L_{dn} (Compressor Station Noise + Ambient Noise) (dBA)	Potential Noise Increase [a] (dB)
NSA 1	1,500 feet (NE)	47.5	47.0	50.3	2.8
NSA 2	1,865 feet (W)	58.1	44.4	58.3	0.2
NSA 3	2,150 feet (SE)	44.1	42.7	46.5	2.4

[a] Assumes operational noise control measures detailed below have been implemented.

As shown in table 4.11.2-11, predicted noise levels are expected to be below our 55 dBA L_{dn} requirement. The increase in noise at the nearest NSAs would be less than 3 dBA and thus below the level generally deemed to be perceptible to the human ear. To ensure that the actual noise produced as a result of the modifications to the compressor station meets our criteria, **we recommend that**:

- **Transco should file a noise survey with the Secretary <u>no later than 60 days</u> after placing Compressor Station 605 in service. If a full load condition noise survey is not possible, Transco should provide an interim survey at the maximum possible**

horsepower load and provide the full load survey <u>within 6 months</u>. If the noise attributable to the operation of all of the equipment at Compressor Station 605 under interim or full horsepower load conditions exceeds an L_{dn} of 55 dBA at any nearby NSAs, Transco should file a report on what changes are needed and should install the additional noise controls to meet the level <u>within 1 year</u> of the in-service date. Transco should confirm compliance with the above requirement by filing a second noise survey with the Secretary <u>no later than 60 days</u> after it installs the additional noise controls.

The noise of gas blowdown venting via a blowdown silencer would meet an A-weighted sound level of 60 dBA at a distance of 300 feet. The sound level of a unit blowdown would be about 40 dBA (L_{dn} of 46 to 47 dBA) at the closest NSA, which would be equal to or lower than 55 dBA L_{dn}. Consequently, although the noise of a blowdown event may be audible at nearby NSAs, it would not be a substantial noise impact. Moreover, any unit blowdown events would be infrequent and would last for only a short period of time (1- to 5-minute period).

<u>Compressor Station 610</u>

Compressor Station 610 would include two electric motor-driven compressor units, each consisting of a 20,000-hp electric motor driving a centrifugal gas compressor, via a Voith Vorecon gearbox. The motors and compressors of the compressor units would be installed inside a single acoustically insulated compressor building. The following describes the predominant noise-producing equipment and other components associated with the compressor station compressor units:

- outdoor lube oil cooler that serves compressor, gearbox, and motor;
- power control room, switchgear building, and station substation;
- Pont electric motor used to start up the primary electric motor;
- air supply blower that provides ventilation air for cooling the electric motor;
- exhaust ducting/opening for exhausting motor ventilation air outside the building;
- gas piping and associated components (e.g., valves and inlet filter/separators);
- gas aftercooler that serves each compressor unit; and
- unit gas blowdown silencer that services each compressor unit.

Table 4.11.2-12 summarizes the ambient sound level at the closest NSAs, estimated sound contribution of the compressor station at the closest NSAs if operated at full load, and the total sound contribution of the compressor station (compressor station sound level plus the ambient sound level).

TABLE 4.11.2-12

Noise Assessment for New Compressor Station 610

Closest NSAs and Type of NSA	Distance and Direction of NSA to Station Site Center	Ambient L_{dn} (via Measured L_d and Estimated L_n) (dBA)	Estimated L_{dn} of the Compressor Station at Full Load (dBA)	Estimated Total L_{dn} (Compressor Station Noise + Ambient Noise) (dBA)	Potential Noise Increase [a] (dB)
NSA 1 (Residence)	1,075 feet (S)	41.8	46.7	47.9	6.1
NSA 2 (Residence)	1,890 feet (E)	39.0	40.6	42.9	3.9
NSA 3 (Residence)	1,950 feet (WNW)	38.7	45.5	46.3	7.6

[a] Assumes operational noise control measures detailed below have been implemented.

As shown in table 4.11.2-12, predicted noise levels are expected to be below our 55 dBA L_{dn} requirement. The increase in noise at the nearest NSAs would be between 3.9 and 7.6 dBA and thus would be perceptible. To ensure that the actual noise produced as a result of the modifications to the compressor station meets our criteria, **we recommend that**:

- **Transco should file a noise survey with the Secretary <u>no later than 60 days</u> after placing Compressor Station 610 in service. If a full load condition noise survey is not possible, Transco should provide an interim survey at the maximum possible horsepower load and provide the full load survey <u>within 6 months</u>. If the noise attributable to the operation of all of the equipment at Compressor Station 610 under interim or full horsepower load conditions exceeds an L_{dn} of 55 dBA at any nearby NSAs, Transco should file a report on what changes are needed and should install the additional noise controls to meet the level <u>within 1 year</u> of the in-service date. Transco should confirm compliance with the above requirement by filing a second noise survey with the Secretary <u>no later than 60 days</u> after it installs the additional noise controls.**

The noise of gas blowdown venting via a blowdown silencer would meet an A-weighted sound level of 60 dBA at a distance of 300 feet. The sound level of a unit blowdown would be about 43 dBA (L_{dn} of 49 to 50 dBA) at the closest NSA, which would be equal to or lower than the 55-dBA L_{dn} threshold. Consequently, although the noise of a blowdown event may be audible at nearby NSAs, it would not be a substantial noise impact. Moreover, any unit blowdown events would be infrequent and would last for only a short period of time (1- to 5-minute period).

<u>Operational Noise Control Measures for New or Modified Compressor Stations</u>

All of the new or modified compressor stations would include the following sound attenuation measures.

- At a minimum, the walls and roof of the building extension would be constructed with an exterior skin of 22-gauge metal, and building interior surfaces would be covered with 6-inch-thick “high-density” mineral wool covered with a perforated liner.
- No windows or louvers would be installed in the building walls.
- At a minimum, acoustical pipe insulation would be employed for any aboveground outdoor discharge and suction piping located near the compressor building.
- Unit blowdown silencers would be incorporated at all new or modified compressor stations associated with the Project.

Compressor Stations 517, 520, and 190 would be designed with the following additional sound attenuation measures.

- The turbine exhaust system at Compressor Stations 517, 520, and 190 would include a silencer.
- The turbine air intake system at Compressor Stations 517, 520, and 190 would be designed with two in-duct silencers, with one of the silencers installed in the ductwork located inside the compressor buildings.

The modifications to existing Compressor Stations 605 and 610 would include the following additional sound attenuation measures.

- The A-weighted sound level of equipment (i.e., noise sources) associated with the power control room, switchgear buildings at Compressor Stations 605 and 610 would not exceed 60 dBA at a distance of 50 feet.
- The sound level generated by the new lube oil coolers for each compressor unit at Compressor Stations 605 and 610 would not exceed 60 dBA at 50 feet at the full rated operating conditions.
- The sound level generated by each multi-fan gas aftercooler at Compressor Stations 605 and 610 would not exceed 62 dBA at 50 feet at the full rated operating conditions.

Meter and Regulator Stations

As stated in section 4.11.2.1, noise associated with meter stations is expected to be negligible and is, therefore, not analyzed further in this EIS.

In general, the noise generated by a regulator station is typically related to the valve-generated noise that is radiated from the aboveground gas piping, and the level of piping noise is directly related to the pressure drop and gas flow across the control valves for the regulator runs. In addition, there could be some noise generated by other site equipment.

The predicted sound contribution of each regulator station was performed only for the closest NSA because the sound contribution at other more distant NSAs would be less than the sound contribution at the closest NSAs.

Table 4.11.2-13 summarizes the estimated sound level contribution (i.e., L_{dn}, as calculated from the estimated A-weighted sound level) for each regulator station at the closest NSAs assuming expected maximum operating conditions.

The results of the noise analysis indicate that the sound attributable to each regulator station would be lower than the FERC L_{dn} criterion of 55 dBA at the nearby NSAs.

TABLE 4.11.2-13

Noise Assessment for Each Regulator Station

Facility (milepost [a])	Closest NSA and Type of NSA	Distance and Direction of Closest NSA	Calculated L_{dn} of Each Regulator Station (via Estimated A-wt. Sound Level) (dBA)	Ambient L_{dn} (dBA)	Estimated Total L_{dn} (Regulator Station Noise + Ambient Noise) (dBA)	Noise Increase Above Ambient [a] (dB)
North Diamond Regulator Station (L 92.7)	Residence	950 feet (SSE)	44.8	52.8	53.4	0.6
West Diamond Regulator Station (L 114.0)	Residence	1,075 feet (SE)	43.4	42.7	46.1	3.4
River Road Regulator Station (Transco Mainline MP 1,683.3)	Residence	1,550 feet (NW)	38.0	41.9	43.4	1.5

[a] L = Leidy Line System Milepost

[b] Assumes operational noise control measures detailed below have been implemented.

Mainline Valve Sites

Noise from MLV sites is typically associated with emergency or maintenance blowdown events. Blowdowns are required for certain maintenance activities and are performed between MLVs and not for the entire pipeline. Blow-off valves are provided with each MLV setting so that each section of pipeline between MLVs can be depressurized.

If blow-off valves are to be used during planned maintenance, Transco would affix a silencer to the blow-off valve to minimize noise impacts. Depressurizing the pipeline is not a typical operation and blow-off valves seldom need to be used. Due to the infrequency and short duration of the blowdown events, noise impacts are expected to be minimal. In addition, a maintenance blowdown event would typically occur only during daytime hours. Transco plans to notify all landowners in the immediate area of the blowdown event.

4.12 RELIABILITY AND SAFETY

The reliability and safety analysis addresses the potential hazard to the public from failure of project components resulting from accidents, natural catastrophes, or acts of terrorism and describes how the project facilities would be designed, constructed, operated, and maintained to minimize these potential hazards. 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. We received comments concerning the toxicity of methane if there was a release of natural gas to the atmosphere. Methane is inactive biologically and essentially nontoxic. It is not listed in the International Agency for Research on Cancer, National Toxicology Program, or by the Occupational Safety and Health Administration as a carcinogen or potential carcinogen.

Methane is buoyant at atmospheric temperatures, disperses rapidly in air, has an auto-ignition temperature of 1,000 °F, and is flammable at concentrations between 5 and 15 percent in the air. Unconfined mixtures of methane in air are not explosive but may ignite if there is an ignition source; however, a flammable concentration within an enclosed space in the presence of an ignition source can explode.

Depending on population densities (in accordance with 49 CFR 192.625), small amounts of a chemical odorant, mercaptan, would be added to the natural gas stream to provide a means to detect the presence of natural gas by a person with a normal sense of smell. Mercaptan possesses a rotten egg smell.

Transco would install odorization equipment at Compressor Station 605 and the Springville Meter Station in Pennsylvania. Transco would also install supplemental odorization equipment and odor detection at the 42 meter/regulator stations along the existing Transco Mainline system in North Carolina and South Carolina. Odor masking/deodorization equipment would be installed at 14 MLVs, and at four existing compression stations in North Carolina and South Carolina. The modifications for odorization would ensure that Transco maintains a consistent level of odorant (per 49 CFR 192.625) throughout the affected part of the Transco Mainline system.

4.12.1 Safety Standards

The DOT is mandated to provide pipeline safety under 49 USC 601. Within the DOT, the Pipeline and Hazardous Materials Safety Administration (PHMSA), Office of Pipeline Safety 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 the required safety standard.

PHMSA ensures that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the federal, state, and local level. 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 the DOT's agent to inspect interstate facilities within its boundaries; however, the DOT is responsible for enforcement action. Within the project area, the DOT is responsible for inspecting interstate pipeline facilities and enforcement actions. The DOT pipeline standards are published in 49 CFR 190–199. Part 192 specifically addresses natural gas pipeline safety issues.

Under a *Memorandum of Understanding on Natural Gas Transportation Facilities* (Memorandum) dated January 15, 1993, between the DOT and FERC, the DOT is recognized as having the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of the FERC's regulations require that an applicant certify that it 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, or shall certify that it has been granted a waiver of the requirements of the safety standards by the DOT in accordance with section 3(e) of the Natural Gas Pipeline Safety Act. FERC accepts this certification and does not impose additional safety standards other than the DOT standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum to promptly alert the DOT. The Memorandum also provides instructions 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 DOT's Technical Pipeline Safety Standards Committee, which determines if proposed safety regulations are reasonable, feasible, and practicable.

The pipeline and aboveground facilities associated with the Project would be designed, constructed, operated, and maintained in accordance with or in exceedance of the DOT's Minimum Federal Safety Standards in 49 CFR 192. These regulations, which are intended to protect the public and to prevent natural gas facility accidents and failures, include specifications for material selection and qualification, minimum design requirements, and protection of the pipeline from internal, external, and atmospheric corrosion. Many commenters expressed concern about how the pipeline would be maintained over time and the long-term safety of operations. As stated previously, any natural gas facility has some degree of risk and, although any structure would eventually degrade, the DOT regulations require regular inspection and maintenance, including repairs as necessary, to ensure the pipeline has adequate strength to transport the natural gas safely.

During scoping, commenters expressed concern about the safety of bidirectional flow. The DOT's Advisory Bulletin ADB 2014-04, issued September 18, 2014, advises all operators to refer to *Guidance for Pipeline Flow Reversals, Product Changes, and Conversion to Service.* Transco has developed specific engineering controls to safely implement bidirectional flow in compliance with the

DOT's pipeline safety standards in 49 CFR 191 and 192 for stations and pipeline segments involved with flow reversals.

The Pipeline Safety, Regulatory Certainty and Job Creation Act of 2011 (H.R. 2845), was passed by Congress and signed into law on January 3, 2012, by President Barack Obama. Among other requirements, this Act mandates that within no later than 2 years of the date of enactment, after considering factors specified in the Act, the DOT Secretary, if appropriate, shall require by regulation the use of automatic or remote control shut-off valves, or equivalent technology, where economically, technically, and operationally feasible on transmission pipeline facilities constructed or entirely replaced after the date on which the DOT Secretary issues the final rule containing such requirement. As required, Transco is committed to using remote control shut-off valves on the proposed pipeline.

The DOT defines area classifications based on population density in the vicinity of the pipeline and specifies more rigorous safety requirements for populated areas. Pipe wall thickness and pipeline design pressures, hydrostatic test pressures, MAOP, inspection and testing of welds, and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas. The class locations 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; and
- Class 4 – location where buildings with four or more stories aboveground are prevalent.

In accordance with federal standards, class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. Pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil and 18 inches in consolidated rock. 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. Transco would provide additional depth of cover of 36 inches in normal soils in Class 1 locations, 48 inches in active agricultural land (e.g., corn, soybeans), and 60 inches under drainage ditches of public roads and railroad crossings. Class locations also specify the maximum distance to sectionalized block valves (i.e., 10.0, 7.5, 4.0, and 2.5 miles in Class 1, 2, 3, and 4 locations, respectively). Pipe wall thickness and pipeline design pressures; hydrostatic test pressures; MAOP; inspection and testing of welds; and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas.

CPL North would consist of 57.4 miles of 30-inch-diameter pipeline starting at MP L114.0 of the existing Transco Leidy Line in Columbia County, Pennsylvania. CPL North would continue east for 21.3 miles, collocated with the Transco Leidy Line right-of-way. At MP 21.3 in Luzerne County, the pipeline would turn northeast, separating from the existing Transco Leidy Line system, and continue through Wyoming and Susquehanna Counties, Pennsylvania, to the proposed Zick Meter Station in Susquehanna County. The pipeline system would operate with an MAOP of 1,480 psig. About 1.9 miles (3 percent) of this pipeline would be in Class 3 areas (two segments in Columbia and Luzerne Counties, Pennsylvania), 9.2 miles (16 percent) in Class 2 areas, and 46.2 miles (81 percent) in Class 1 areas.

CPL South would consist of 126.3 miles of new 42-inch-diameter pipeline in Pennsylvania with an MAOP of 1,480 psig. The currently proposed route of CPL South is adjacent to (or collocated with) existing pipeline or electric transmission utility rights-of-way for about 14.2 miles. It would begin at MP 1,683.3 of the existing Transco Mainline system in Lancaster County, Pennsylvania, and would continue north through Lebanon, Schuylkill, Northumberland, and Columbia Counties, Pennsylvania, before reaching its terminus at MP L114.0 of the existing Transco Leidy Line system. About 3.2 miles (3 percent) of this pipeline would be in Class 3 areas (five segments located in Lancaster, Lebanon, and Columbia Counties, Pennsylvania), 27.7 miles (22 percent) in Class 2 areas, and 94.3 miles (75 percent) in Class 1 areas.

Chapman Loop would consist of 2.9 miles of 36-inch-diameter pipeline with an MAOP of 1,200 psig collocated with the existing Transco Leidy Line system between MPs L186.0 and L188.9 in Clinton County, Pennsylvania. Once placed into service, Transco would refer to Chapman Loop as the Leidy Line D. The entire length of the Chapman Loop would be in Class 1 areas.

Unity Loop would consist of about 8.6 miles of 42-inch-diameter pipeline with an MAOP of 1,200 psig collocated with the existing Transco Leidy Line system between MPs L120.3 and L128.9 in Lycoming County, Pennsylvania. Once placed into service, Transco would refer to Unity Loop as the Leidy Line D. About 0.9 mile (10 percent) of this loop would be in Class 2 areas and 7.7 miles (90 percent) in Class 1 areas.

Transco would also replace noncontiguous segments of its existing 30-inch-diameter Mainline A and B pipelines totaling 2.5 miles along the existing Transco Mainline system between MPs 1,578.7 and 1,581.0 in Prince William County, Virginia. The pipeline replacements would be designed to an MAOP of 800 psig. The entire length of the Mainline A and B Replacements would be in Class 3 areas.

A summary of class locations based on current population density along the proposed pipeline route is provided in table 4.12.1-1.

If the Project is approved, the regulations require that the pipeline be designed, at a minimum, to the appropriate class location standards and that the spacing between the MLVs meets the DOT requirements. Transco proposed a more robust design than what is required. Specifically, Transco has committed to several measures that exceed the DOT's requirements. These additional measures would include:

- installation of Class 2 design pipe in all Class 1 locations;
- installation of the pipeline deeper than required for Class 1 locations with a minimum depth of 36 inches in normal soils and 24 inches in consolidated rock (a level suitable for Class 2, 3, and 4 locations);
- inspection of 100 percent of mainline pipeline welds;
- hydrostatic testing of the entire pipeline at a higher level suitable for Class 3 locations (i.e., Class 1 testing is performed at a test pressure ratio of 1.1 of the MAOP, Class 2 at 1.25 of the MAOP, and Class 3 and 4 at 1.5 of the MAOP); and
- spacing of MLVs at closer intervals to meet Class 2 requirements in all areas.

TABLE 4.12.1-1

Area Classifications Along the Pipeline Facilities Associated with the Atlantic Coast Sunrise Project

Pipeline/County, State	Begin Milepost	End Milepost	Class Location	Project Design Class
CPL North				
Columbia, PA	M-0115 0.0	1.0	1	2
	1.0	1.7	3	3
	1.7	5.0	1	2
Luzerne, PA	5.0	M-0056 0.5	1	2
	M-0056 0.5	10.0	2	2
	10.0	12.4	1	2
	12.4	14.6	2	2
	14.6	15.3	1	2
	15.3	16.7	2	2
	16.7	17.0	1	2
	17.0	17.6	2	2
	17.6	21.6	1	2
	21.6	M-0060 0.6	3	3
	M-0060 0.6	22.9	2	2
	22.9	M-0141 0.3	1	2
	M-0141 0.3	24.8	2	2
	24.8	25.3	1	2
	25.3	M-0088 0.1	2	2
	M-0088 0.1	M-0088 2.3	1	2
Wyoming, PA	M-0088 2.3	M-0088 4.1	1	2
	M-0088 4.1	M-0071 0.0	2	2
	M-0071 0.0	35.6	1	2
	35.6	35.9	2	2
	35.9	37.7	1	2
	37.7	39.0	2	2
	39.0	39.3	1	2
	39.3	39.6	2	2
	39.6	50.5	1	2
Susquehanna, PA	50.5	M-0119 0.0	1	2
CPL South				
Lancaster, PA	M-0352 0.0	0.3	1	2
	0.3	M-0147 0.2	2	2
	M-0147 0.2	M-0147 0.8	1	2
	M-0147 0.8	M-0405 0.0	2	2
	M-0405 0.0	M-0405 0.3	1	2
	M-0405 0.3	11.6	2	2
	11.6	14.0	1	2
	14.0	14.7	2	2
	14.7	15.4	1	2
	15.4	16.4	2	2
	16.4	20.2	1	2
	20.2	20.8	2	2
	20.8	22.2	1	2
	22.2	23.1	3	3
	23.1	27.9	1	2
	27.9	M-0162 0.0	3	3
	M-0162 0.0	29.7	1	2
	29.7	M-0308 0.0	2	2
	M-0308 0.0	36.5	1	2
Lebanon, PA	36.5	39.9	1	2
	39.9	40.5	2	2
	40.5	M-0424 1.5	1	2
	M-0424 1.5	M-0183 0.9	3	3

TABLE 4.12.1-1 (cont'd)

Area Classifications Along the Pipeline Facilities Associated with the Atlantic Coast Sunrise Project

Pipeline/County, State	Begin Milepost	End Milepost	Class Location	Project Design Class
	M-0183 0.9	47.0	1	2
	47.0	48.4	2	2
	48.**4**	49.**6**	1	2
	49.6	50.4	2	2
	50.4	52.4	1	2
	52.4	M-0199 0.2	2	2
	M-0199 0.2	54.7	1	2
	54.**7**	56.**5**	2	2
	56.**5**	58.6	1	2
	58.6	M-0176 0.1	2	2
	M-0176 0.1	61.4	1	2
	61.4	62.7	2	2
	62.7	64.1	1	2
	64.1	64.4	2	2
Schuylkill, PA	64.4	65.4	2	2
	65.4	70.8	1	2
	70.8	71.2	2	2
	71.2	M-0247 0.4	1	2
Northumberland, PA	M-0247 0.4	89.8	1	2
	89.**8**	90.**7**	2	2
	90.**7**	**91.0**	1	2
Columbia, PA	91.0	91.7	1	2
Northumberland, PA	91.7	M-0271 0.1	1	2
Columbia, PA	M-0271 0.1	M-0285 0.0	1	2
	M-0285 0.0	97.0	2	2
	97.0	M-0390 0.1	1	2
	M-0390 0.1	101.6	2	2
	101.6	101.9	3	3
	101.9	102.0	2	2
	102.0	M-0423 1.5	1	1
	M-0423 1.5	M-0423 1.7	3	3
	M-0423 1.7	M-0423 4.7	1	2
	M-0423 4.7	M-0214 0.2	2	2
	M-0214 0.2	114.7	1	2
	114.7	115.6	2	2
	115.6	M-0353 0.1	1	2
Chapman Loop				
Clinton, PA	L186.0 [a]	L188.**5**	1	2
Unity Loop				
Lycoming, PA	L120.4	L122.5	1	2
	L122.5	L123.4	2	2
	L123.4	L128.9	1	2
Mainline A Replacement				
Prince William, VA	1,578.7	1,579.0	3	3
	1,579.0	1,579.4	3	3
	1,579.4	1,579.8	3	3
	1,580.8	1,581.0	3	3
Mainline B Replacement				
Prince William, VA	1,578.7	1,579.4	3	3
	1,579.4	1,579.8	3	3
	1,580.8	1,581.0	3	3

[a] L = Leidy Line system milepost

If the Project is approved, the regulations require that the pipeline be designed, at a minimum, to the appropriate class location standards and that the spacing between the MLVs meets the DOT requirements. Transco proposed a more robust design than what is required. Specifically, Transco has committed to several measures that exceed the DOT's requirements. These additional measures would include:

- installation of Class 2 design pipe in all Class 1 locations;
- installation of the pipeline deeper than required for Class 1 locations with a minimum depth of 36 inches in normal soils and 24 inches in consolidated rock (a level suitable for Class 2, 3, and 4 locations);
- inspection of 100 percent of mainline pipeline welds;
- hydrostatic testing of the entire pipeline at a higher level suitable for Class 3 locations (i.e., Class 1 testing is performed at a test pressure ratio of 1.1 of the MAOP, Class 2 at 1.25 of the MAOP, and Class 3 and 4 at 1.5 of the MAOP); and
- spacing of MLVs at closer intervals to meet Class 2 requirements in all areas.

During operation of the pipeline, the operating company is required to periodically reassess the class locations along its pipelines. If a subsequent increase in population density adjacent to the right-of-way indicates a change in class location for the pipeline, Transco would be required to reduce the MAOP or replace the segment with pipe of sufficient grade and wall thickness, if required, to comply with the DOT code of regulations for the new class location.

The Pipeline Safety Improvement Act of 2002 also requires operators to develop and follow a written integrity management program that contains all the elements described in 49 CFR 192.911 and addresses the risks on each transmission pipeline segment. Specifically, the law establishes an integrity management program that applies to all high consequence areas (HCAs).

We received several comments about the potential effects of a pipeline rupture and natural gas ignition (the area of potential effect is sometimes referred to as the potential impact radius[37]). It should be noted that when a pipeline rupture does occur the natural gas does not necessarily ignite. However, the DOT published rules that define HCAs where a gas pipeline accident could do considerable harm to people and their property and requires an integrity management program to minimize the potential for an accident. This definition satisfies, in part, the Congressional mandate for the DOT to prescribe standards that establish criteria for identifying each gas pipeline facility in a high-density population area.

The HCAs may be defined in one of two ways. In the first method, an HCA includes:

- current Class 3 and 4 locations;

[37] The potential impact radius is calculated as the product of 0.69 and the square root of the MAOP of the pipeline in pounds per square inch multiplied by the pipeline diameter in inches.

- any area in Class 1 or 2 locations where the potential impact radius is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle[38]; or

- any area in Class 1 or 2 locations where the potential impact circle includes an identified site.

An identified site is:

- an outside area or open structure that is occupied by 20 or more persons on at least 50 days in any 12-month period;

- a building that is occupied by 20 or more persons on at least 5 days a week for any 10 weeks in any 12-month period; or

- a facility that is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate (e.g., hospitals, prisons, schools, daycare facilities, retirement or assisted-living facilities).

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 plan to those segments of the pipeline within the HCAs. The DOT regulations specify the requirements for the integrity management plan at Part 192.911. The pipeline integrity management rule for HCAs requires inspection of the pipeline every 7 years. Pipeline operators must continually monitor conditions along the pipeline. When they become aware of population or usage changes that create or change an HCA (e.g., population expands to encompass more of the area near the pipeline right-of-way), this information is factored into its integrity assessment planning, risk analysis, and consideration of the need for additional preventive and mitigative risk controls. Transco would add the new pipeline segments to its current overall comprehensive integrity management plan, which meets these regulations. The HCAs associated with the Project have been determined based on the relationship of the pipeline centerline to other nearby structures and identified sites. Of the 199.4 miles of the proposed pipeline routes, Transco has identified about 11.5 miles that would be classified as an HCA. A summary of the HCAs along the proposed pipeline route is provided in table 4.12.1-2.

We received comments from residents who were concerned about constructing new structures or residences within an HCA and if there are any construction guidelines. There are no restrictions for building within an HCA; the area would be assessed during pipeline inspections and could be reclassified based on the type of structures built. Setback restrictions for new buildings and structures would be based on the terms of the pipeline easement.

We also received comments from residents who were concerned about collocated pipelines on their property increasing the potential impact radius. Based on the construction and design methods of pipelines collocated within a shared right-of-way it is unlikely that one pipeline failure would cause the adjacent pipeline to also fail.

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38 The potential impact circle is a circle of radius equal to the potential impact radius.

TABLE 4.12.1-2

High Consequence Areas Crossed by the Pipeline Facilities Associated with the Atlantic Sunrise Project [a]

Pipeline/County, State	Begin Milepost	End Milepost	HCA Length (miles)
CPL North			
Wyoming, PA	45.1	45.6	0.5
CPL South			
Lancaster, PA	M-0147 0.7	2.0	0.4
	2.6	M-0184 0.0	0.3
	10.0	10.4	0.4
	11.2	11.7	0.5
	15.3	15.8	0.5
	20.3	20.7	0.4
	27.0	M-0162 0.6	1.7
Lebanon, PA	37.9	38.8	0.9
	M-0183 0.3	M-0183 1.0	0.7
	53.2	53.6	0.4
	62.2	63.0	0.8
Schuylkill, PA	70.7	M-0181 0.3	0.4
Northumberland, PA	M-0235 0.1	M-0235 0.7	0.6
Columbia, PA	101.5	101.9	0.4
Mainline A Replacement			
Prince William, VA	1,578.7	1,579.0	1.3
	1,579.1	1,579.3	0.2
	1,580.8	1,581.0	0.2
	1,578.7	1,579.4	0.7
	1,580.8	1,581.0	0.2

[a] HCA designations are based on Transco's assessment of HCA locations along the pipeline routes. No HCAs are crossed by the Chapman or Unity Loops.

As previously described, the Project would be designed and constructed in accordance with or in exceedance of the DOT's Minimum Federal Safety Standards in 49 CFR 192. In constructing the pipeline, Transco would use specified welding protocol and hydrostatic testing to ensure the integrity of the pipeline, and pipeline coating and cathodic protection systems[39] to meet requirements established by the DOT for protection of metallic facilities from external, internal, and atmospheric corrosion. Transco would inspect all welds and use a non-destructive method, such as radiographic or ultrasonic inspections, to ensure pipeline structural integrity and compliance with the applicable DOT regulations. Those welds that do not meet established specifications would be repaired or replaced. Once the welds are approved, a protective coating would be applied to the welded joints and the entire pipeline would be visually inspected for any faults, scratches, or other coating defects. Any damage would be repaired before the pipeline is installed. Upon completion of construction, the integrity of the pipelines would be verified by hydrostatic testing as described in section 4.3.2.5. During operation, the pipelines would be protected by a cathodic protection system, which would impress a low voltage current on the pipelines to offset natural soil and groundwater corrosion potential during operation. After its installation, the functional capability of the cathodic protection system would be inspected frequently to ensure proper operating conditions for corrosion mitigation.

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

After construction and as required by the DOT regulations, the pipeline facilities would be marked at line-of-sight intervals and at crossings of roads, railroads, waterways, and other prominent points. The markers would indicate the presence of the pipeline and provide a telephone number where a company representative could be reached in the event of an emergency or before any third-party excavation in the area of the pipeline. Transco participates in the "Call Before You Dig" and "One Call" programs and other related pre-excavation notification organizations in the states in which they operate. In addition, if there is excavation occurring near one of Transco's pipelines, operational personnel would be on site during the work near the pipeline to ensure there is no risk of damage to Transco's facilities.

The DOT prescribes the minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities. Each pipeline operator must establish an emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency. Key elements of Transco's emergency procedures would include but are not limited to the following:

- receiving, identifying, and classifying emergency events such as gas leakage, fires, explosions, and natural disasters;
- establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;
- emergency shutdown of system 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, including evacuating individuals and rerouting traffic as necessary to avoid any area that is deemed to be unsafe.

The DOT 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. Transco would provide the appropriate training to local emergency service personnel before the pipeline is placed in service.

Transco would incorporate the project into its existing gas monitoring and control systems, which would include a gas control center that monitors system pressures, flows, and customer deliveries on its entire system. The center would be staffed 24 hours a day, 7 days a week, and 365 days a year from Houston, Texas.

Transco's pipeline systems (which would include the proposed facilities) would also be equipped with remote control valves that can be operated remotely by the gas control center. In the event of an emergency, usually evidenced by a sudden loss of pressure, the gas control center would send a command signal to initiate the closure of the remote control valves.

In accordance with the regulations, the pipeline would be patrolled on a routine basis. Transco committed to walking and visually inspecting the pipeline corridor. These patrols would identify:

- soil erosion that may expose the pipe;
- dead vegetation that may indicate a leak in the line;
- status of the vegetation cover and erosion control measures;
- unauthorized encroachment on the right-of-way, such as buildings and other substantial structures; and
- other conditions that could present a safety hazard or require preventive maintenance or repairs.

Transco would also perform annual aerial inspections of the right-of-way and annual leak detection surveys of the proposed pipeline facilities. It would inspect valves annually and rectifiers six times per year, and verify the cathodic protection system annually. These surveys would provide early detection of leaks and reduce the likelihood for pipeline failure. Transco would also use both caliper and smart pigs to identify pipeline defects, corrosion, and other areas in need of repair.

Transco representatives have already met with emergency services departments in the counties that would be affected by the Project, and would continue to meet annually with the departments in all of the counties along the proposed pipeline route. Transco would provide these departments with emergency numbers and emergency response plans. Affected public landowners, emergency responders, public officials, and excavators would receive annual updates about the pipeline. Transco is partnering with the Pennsylvania State Fire Academy to provide a 4-hour Pipeline Emergency Awareness Training class, which will be offered to each of the first responder communities located within the greenfield portion of the Project. An additional 8-hour Pipeline Emergency Operations Training class will be held for the same communities at a future date. The Pennsylvania State Fire Academy is working with the local emergency management offices to encourage attendance at these training sessions.

Transco would implement various public safety measures during construction in residential areas, including but not limited to:

- installing safety fencing at the construction work area boundary to ensure equipment, materials, and spoil remain in the construction right-of-way and that the public is excluded from hazardous areas;
- ensuring piping is welded and installed as quickly as reasonably possible, consistent with prudent pipeline construction practices to minimize the duration of construction within a neighborhood;
- backfilling the trench as soon as the pipe is laid or temporarily installing a steel plate over the open trench; and
- completing final cleanup and installation of permanent erosion control measures within 10 days after the trench is backfilled, weather conditions permitting.

Transco has developed a *Traffic and Transportation Management Plan* as part of its ECP. Transco's construction contractors would provide traffic warning signs and flagmen as required by local and/or state road encroachment specifications. For those roads where Transco installs the pipeline using an open-cut construction method, one lane of traffic would remain open at all times or an alternate route would be provided to maintain traffic flow and provide ingress/egress to the public and emergency responders. Further, Transco would coordinate with towns, townships, and counties prior to construction to ensure both Transco and local representatives have appropriate contact information.

We received comments from residents who were concerned about the potential effects of construction and operation of the Project, including the effects of possible pipeline ruptures on vulnerable populations (e.g., children, the elderly, or the infirm). Transco routed the pipeline, and is continuing to evaluate alternative route modifications, to minimize risks to local residents and vulnerable locations/populations (e.g., hospitals, prisons, schools, daycare facilities, retirement or assisted-living facilities). The DOT regulations summarized in section 4.12.1 are designed to ensure adequate safety measures are implemented to protect all populations.

We also received comments from residents who were concerned about construction noise emitted from the operation of construction equipment and associated safety features (e.g., back-up alarms). The work associated with pipeline construction is relatively short term and temporary, and is not anticipated to have a significant effect on existing ambient noise levels (see section 4.11.2).

4.12.2 Pipeline Accident Data

The DOT requires all operators of natural gas transmission pipelines to notify the DOT of any significant incidents and to submit a report within 20 days. Significant incidents are defined as any leaks that:

- cause a death or personal injury requiring hospitalization; or
- involve property damage of more than $50,000 in 1984 dollars.[40]

During the 20-year period from 1995 through 2014, a total of 1,269 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 4.12.2-1 provides a distribution of the causal factors, as well as the number of each incident by cause. The dominant causes of natural gas transmission pipeline incidents are corrosion and pipeline material, weld, or equipment failure, which constitute 49.5 percent of all significant incidents. The pipelines included in the data set for table 4.12.2-1 vary widely in terms of age, pipe diameter, and level of corrosion control. Each variable influences the incident frequency that may be expected for a specific segment of pipeline. The frequency of significant incidents is strongly dependent on pipeline age. Older pipelines have a higher frequency of corrosion incidents because corrosion is a time-dependent process.

[40] $50,000 in 1984 dollars is approximately $113,000 as of April 2015 (Bureau of Labor Statistics, 2015).

TABLE 4.12.2-1

Natural Gas Transmission Pipeline Significant Incidents by Cause (1995 to 2014) [a]

Cause	Number of Incidents	Percentage [b]
Corrosion	290	22.9
Excavation [c]	207	16.3
Pipeline material, weld, or equipment failure	337	26.6
Natural force damage	149	11.7
Outside forces [d]	79	6.2
Incorrect operation	40	3.5
All other causes [e]	167	13.2
TOTAL	**1,269**	**--**

[a] From PHMSA (PHMSA, 2015b).
[b] Due to rounding, column does not total 100 percent.
[c] Includes third-party damage.
[d] Fire, explosion, vehicle damage, previous damage, intentional damage.
[e] Miscellaneous causes or unknown causes.

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

About 34.2 percent of significant pipeline incidents are caused by outside forces, including excavations and natural events. Table 4.12.2-2 presents information on the outside forces incidents by cause. These mostly 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.

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 pipeline systems contain a disproportionate number of smaller diameter pipelines, which have a greater rate of outside forces incidents because they are more easily crushed or broken by mechanical equipment or earth movements.

Since 1982, operators have been required to participate in “One Call” public utility programs in populated areas to minimize unauthorized excavation activities in the vicinity of pipelines. The “One Call” program is a service used by public utilities and some private sector companies (e.g., oil pipeline and cable television companies) to provide preconstruction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts.

TABLE 4.12.2-2

Outside Forces Incidents by Cause (1995 to 2014) [a]

Cause	Number of Incidents	Percent of all Incidents [b]
Third-party excavation damage	173	13.6
Operator excavation damage	23	1.8
Unspecified equipment damage/previous damage	11	0.9
Heavy rain/floods	72	5.7
Earth movement	35	2.8
Lightning/temperature/high winds	27	2.1
Unspecified natural force	9	0.7
Vehicle (not engaged with excavation)	47	3.7
Fire/explosion	8	0.6
Previous mechanical damage	6	0.5
Intentional damage	1	0.1
Fishing or maritime activity	7	0.6
Electrical arcing from other equipment/facility	1	0.1
TOTAL	**420**	**--**

[a] Excavation, outside forces, and natural force damage from table 4.12.2-1 (PHMSA, 2015b).
[b] The sum of addends does not equal 34.2 percent due to rounding.

We received scoping comments regarding Transco's safety record. Williams currently owns and operates about 15,000 miles (10,200 miles under Transco) of interstate natural gas pipelines, which represents approximately 14 percent of all FERC-regulated interstate natural gas transmission pipelines in the United States. Transco has had 15 pipeline rupture incidents associated with its interstate natural gas pipeline system since 1984, two of which resulted in injuries (see table 4.12.2-3). No fatalities were associated with the pipeline ruptures. Pipeline operator compliance and incident history is publically available on the PHMSA website at www.phmsa.dot.gov/pipeline.

TABLE 4.12.2-3

Transcontinental Gas Pipe Line Company, LLC Onshore Pipeline Ruptures Since 1984

Report No.	Date	County	State	Fatalities	Injuries	Cause
19841073	12/3/1984	Pointe Coupee	LA	0	3	Damage by outside force
19870112	5/24/1987	St Landry	LA	0	0	Damage by outside force
19900091	2/25/1990	St Helena	LA	0	0	Corrosion
19900180	12/16/1989	Acadia	LA	0	0	Damage by outside force
19910030	1/18/1991	West Feliciana	LA	0	0	Other
19920166	10/5/1992	Dallas	AL	0	0	Other
19930219	11/15/1993	Wharton	TX	0	0	Damage by outside force
19940120	4/17/1994	West Feliciana	LA	0	0	Other
19940142	5/6/1994	Acadia	LA	0	0	Damage by outside force
19940168	6/30/1994	Culpeper	VA	0	0	Corrosion
19940182	8/10/1994	Terrebonne	LA	0	0	Corrosion
19950059	3/19/1995	St Helena	LA	0	0	Damage by outside force
20080090	9/14/2008	Appomattox	VA	0	5	External corrosion
20110392	12/3/2011	Marengo	AL	0	0	External corrosion
20150091	6/9/2015	Lycoming	PA	0	0	Material failure (pipe or weld)

Source: PHMSA, 2016

4.12.3 Impact on Public Safety

The incident data summarized in table 4.12.2-1 include pipeline failures of all magnitudes with widely varying consequences.

Table 4.12.3-1 presents the average annual injuries and fatalities that occurred on natural gas transmission lines between 2010 and 2014. The data have been separated into employees and nonemployees, to better identify a fatality rate experienced by the general public. Fatalities among the public averaged two per year over the 5-year period from 2010 to 2014.

TABLE 4.12.3-1

Annual Average Fatalities – Natural Gas Transmission Pipelines [a]

	Injuries		Fatalities	
Year	Employees	Public	Employees	Public
2010 [b]	3	58	0	10
2011	1	0	0	0
2012	1	6	0	0
2013	0	2	0	0
2014	0	0	1	0

a From PHMSA (PHMSA, 2015b).

b All of the public injuries and fatalities in 2010 were due to the September 9, 2010 Pacific Gas and Electric Company pipeline rupture and fire in San Bruno, California.

The majority of fatalities from pipelines involve local distribution pipelines. These are natural gas pipelines that are not regulated by FERC and 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, often made of plastic or cast iron rather than welded steel, and tend to be older pipelines that are more susceptible to damage. In addition, distribution systems do not have large rights-of-way and the pipeline markers commonly associated with FERC-regulated natural gas transmission pipelines.

The nationwide totals of accidental fatalities from various manmade and natural hazards are listed in table 4.12.3-2 in order to provide a relative measure of the industry-wide safety of natural gas transmission pipelines. Direct comparisons between accident categories should be made cautiously, however, because individual exposures to hazards are not uniform among all categories. Furthermore, the fatality rate is more than 25 times lower than the fatalities from natural hazards such as lightning, tornados, floods, earthquakes, etc.

The available data show that natural gas transmission pipelines continue to be a safe, reliable means of energy transportation. From 1995 to 2014, there were an average of 63 significant incidents and 2 fatalities per year (PHMSA, 2015b). 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. Therefore, the operation of the Project would represent a slight increase in risk to the nearby public.

TABLE 4.12.3-2

Nationwide Accidental Deaths [a]

Type of Accident	Annual Number of Deaths
All accidents	123,706
Motor vehicle	43,945
Poisoning	29,846
Falls	22,631
Injury at work	5,113
Drowning	3,443
Fire, smoke inhalation, burns	3,286
Floods [b]	85
Tornado [b]	75
Lightning [b]	51
Natural gas distribution lines [c]	14
Natural gas transmission pipelines [c]	2

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[a] All data, unless otherwise noted, reflect 2007 statistics from U.S. Census Bureau, Statistical Abstract of the United States: 2012 (131st Edition) Washington, DC, 2011 (http://www.census.gov/compendia/statab).

[b] NOAA National Weather Service, Office of Climate, Water and Weather Services, 30-year average (1984-2013) (http://www.weather.gov/om/hazstats.shtml).

[c] From PHMSA (PHMSA, 2015b).

4.12.4 Terrorism

Safety and security concerns have changed the way pipeline operators as well as regulators must consider terrorism, both in approving new projects and in operating existing facilities. The U.S. Department of Homeland Security, Office of Homeland Security is tasked with the mission of coordinating the efforts of all executive departments and agencies to detect, prepare for, prevent, protect against, respond to, and recover from terrorist attacks within the United States. Among its responsibilities, the Office of Homeland Security oversees the Homeland Infrastructure Threat and Risk Analysis Center, which analyzes and implements the National Critical Infrastructure Prioritization Program that identifies and lists Tier 1 and Tier 2 assets. The Tier 1 and Tier 2 lists are key components of infrastructure protection programs and are used to prioritize infrastructure protection, response, and recovery activities.

The Commission, in cooperation with other federal agencies, industry trade groups, and interstate natural gas companies, is working to improve pipeline security practices, strengthen communications within the industry, and extend public outreach in an ongoing effort to secure pipeline infrastructure. Unfortunately, we are unable to provide more details in this analysis. The Commission is faced with the dilemma of how much information can be offered to the public while still providing a significant level of protection for facilities and pipelines. Consequently, energy facility design plans and location information have been removed from its website to ensure that sensitive information filed under Critical Energy Infrastructure Information is not readily available (RM02-4-000 and PL02-1-000, issued February 20, 2003).

The likelihood of future acts of terrorism or sabotage occurring at the proposed facilities, or at any of the myriad of natural gas pipeline or energy facilities throughout the United States, is unpredictable given the disparate motives and abilities of terrorist groups. The continuing need to construct facilities to support the future natural gas pipeline infrastructure is not diminished from the threat of any such future acts.

4.13 CUMULATIVE IMPACTS

In accordance with NEPA, we considered the cumulative impacts of the Atlantic Sunrise Project and other projects or actions in the region of influence (ROI) or geographic scope of the Atlantic Sunrise Project. Cumulative impacts represent the incremental effects of a proposed action when added to impacts associated with past, present, or reasonably foreseeable future projects, regardless of what agency or person undertakes such other actions. Although the individual impact of each separate project may be minor, the additive or synergistic effects of multiple projects could be significant. The direct and indirect impacts of the Atlantic Sunrise Project are described in other sections of this EIS.

The purpose of this analysis is to identify and describe cumulative impacts that would potentially result from implementation of the Atlantic Sunrise Project. This cumulative impacts analysis uses an approach consistent with the methodology set forth in relevant guidance (CEQ, 1997b, 2005; EPA, 1999). Under these guidelines, inclusion of actions within the analysis is based on identifying commonalities of impacts from other actions to potential impacts that would result from the construction and operation of the Project. We received comments on the draft EIS to expand our cumulative impacts analysis, both temporally and geographically. In order to avoid unnecessary discussions of insignificant impacts and projects and to adequately address and accomplish the purposes of this analysis, the cumulative impacts analysis for the Project was conducted using the following guidelines:

- To be included in the analysis, an action must affect a resource category potentially affected by the Project. For the most part, the area of potential cumulative impact is limited to the area directly affected by the Project and areas surrounding the Project. The effects of more distant actions are, in most cases, not assessed because the impacts of most actions are localized and would not contribute significantly to the impacts within the geographic scope of the Atlantic Sunrise Project. The potential cumulative impact area for certain resources, such as air quality, watersheds, and visual impacts encompasses a larger geographic area; therefore, we considered these on a broader, more regional basis.

- The distance into the past and future (i.e., the temporal range) that other actions could potentially contribute to cumulative effects within the geographic scope of the Project depends on the duration and permanency of the impacts. Past projects including existing roads, electric transmission lines, pipelines, agriculture, and commercial and residential development have and continue to cumulatively affect the lands that would be crossed by the Atlantic Sunrise Project. These past projects and developments represent the baseline condition of the project area. With respect to these resources, we have considered how the proposed Project would add to these existing impacts. We have also considered how concurrent and reasonably foreseeable future projects would contribute further to the cumulative impact of past projects (i.e., baseline conditions) and the proposed Project. Most of the impacts associated with the Atlantic Sunrise Project would be short term and limited to the construction phase, which is estimated to start in 2017. The potential for cumulative impacts associated with the Atlantic Sunrise Project would be greatest during this period for most resources. The potential long-term cumulative impacts associated with the operation of the Atlantic Sunrise Project and other actions (i.e., cumulative impacts extending well beyond the period of construction of the Project) would include effects related to the clearing and conversion (permanent or otherwise) of forestland to non-forest cover types, the establishment of new or expanded rights-of-way, and air emissions. For these resources, we expanded the temporal range of our cumulative impact analysis.

- Where a potential for cumulative impacts was determined to exist, the impacts were quantified to the extent practicable; however, in some cases the potential impacts can only be described qualitatively. This is particularly the case for projects that:
  - are in the planning stages;
  - are contingent on economic conditions, availability of financing, and/or the issuance of permits; or
  - for which there is a lack of available information.

The criteria listed below define the Project's ROI or geographic scope of impact, which is used in this cumulative impacts analysis to describe the general area for which the Project could contribute to cumulative impacts. The ROI/geographic scope of impact varies depending on the resource being discussed.

The impacts of the Project on geology and soils, land use, residential areas, recreational areas (non-linear), and visual resources would be highly localized and primarily confined to within 0.5 mile of the Atlantic Sunrise Project facilities. Therefore, the geographic area we evaluated for direct and indirect cumulative impacts associated with other projects was within 0.5 mile of the proposed construction work areas for the Project. For linear recreational areas (i.e., trails), we used a ROI of 10.0 miles to encompass the array of potential cumulative impacts on recreationists including visual impacts, air quality impacts, and noise. We determined that the ROI for cultural resources would be limited to the Project's APE as defined in section 4.10.

Waterbody and wetland crossings, as well as impacts from the Project on groundwater, vegetation, and wildlife would be localized. The impacts on these resources would also be temporary, with the exception of the effects related to the clearing and conversion (permanent or otherwise) of forested to non-forested cover types, and the establishment of new or expanded rights-of-way, which would be long term. Therefore, we evaluated other projects within the same watersheds (8-digit hydrologic unit codes) as the Project to address the possible cumulative effects on wetlands, surface waters, groundwater, vegetation, and wildlife.

The natural gas-fired compressor stations associated with the Project would result in long-term impacts on air quality. Therefore, other projects with the potential to result in long-term impacts on air quality (e.g., natural gas compressor stations or industrial facilities) located within an AQCR crossed by the Project were considered in our cumulative impact assessment of air quality impacts.

We have identified four types of actions that would potentially result in cumulative impacts when considered with the Atlantic Sunrise Project. These are:

1. proximal Marcellus Shale development (wells and gathering systems);
2. FERC-jurisdictional natural gas pipelines;
3. other natural gas facilities that are not under the Commission's jurisdiction (non-jurisdictional project-related facilities); and
4. other actions including electric transmission and generation projects, transportation projects, and residential and commercial developments.

The table in appendix Q lists other actions that have been recently constructed, are being constructed presently, or are planned or proposed near the various Atlantic Sunrise Project facilities. Maps showing the locations of the projects listed in appendix Q were filed as part of Transco's application and can be viewed on FERC's eLibrary website in attachment 1-3 of Transco's response to FERC's July 29, 2015 data request (accession number 20150729-5077).

4.13.1 Geographical Analysis of Cumulative Impacts

We evaluated the potential for cumulative impacts from a geographical perspective recognizing that the proximity of other actions to the Project is a major predictor of where cumulative impacts would most likely result. In general, the closer another past, present, or future action is to the Atlantic Sunrise Project, the greater the potential for cumulative impacts and the more resources that could be cumulatively affected. The analysis below assesses the types of actions most likely to contribute to cumulative impacts in the different areas and regions that would be crossed by the Atlantic Sunrise Project facilities. The sections that follow this geographical analysis consider the potential for cumulative impacts on each resource that would be affected (e.g., soils, surface waters, land uses, etc.).

CPL North Pipeline

The potential for cumulative impacts would be greatest at the northern end of the CPL North pipeline, particularly in Susquehanna County, where CPL North begins. This area, especially to the west of the Atlantic Sunrise Project, has been affected by past and ongoing development of natural gas wells and gathering pipelines and the construction and operation of associated meter stations and compressor stations (see section 4.13.3.2). Figure 4.13.1-1 shows the location of other natural gas development near the proposed Project in Susquehanna County. Past projects along the CPL North route include road crossings, existing utility corridors, and other development. A little over 25 miles of the CPL North route would parallel either the existing Transco Leidy Line, power lines, Williams field services pipeline, or other pipeline rights-of-way, which have contributed to the baseline conditions including cumulative resource impacts.

Other planned developments that would contribute to the cumulative resource impacts of the Atlantic Sunrise Project in Susquehanna County include Williams' (midstream) 5.9-mile-long Owego pipeline and Zick Compressor Station Discharge pipeline, which are scheduled to be constructed in 2016 and 2017. Further south, cumulative impacts would result from construction of the new electric transmission line to supply power to the electric motor-driven compressor at Compressor Station 605 in Wyoming County. Construction of this transmission line would result in mostly temporary, but also some long-term, soil, land use, vegetation, wildlife, air quality, noise, and visual impacts. The recently completed UGI Auburn Pipeline Expansion Project, the planned Central New York Oil & Gas Company's (CNYOG) MARC II Pipeline Project, and to a lesser extent (due to its distance from the Project) the proposed PennEast Pipeline Project would contribute to the cumulative impacts of the Atlantic Sunrise Project in Luzerne County. The Auburn Pipeline Expansion Project was completed in early 2014 and crosses the CPL North pipeline route. The MARC II Pipeline Project, which is tentatively scheduled to be constructed in 2017, but has not yet been proposed, would be 3.6 miles southeast of CPL North at its closest point. These pipelines have or would have similar resource impacts as the proposed pipeline. The majority of impacts associated with these projects were or would be temporary including impacts on soils, groundwater, surface water, wetlands, vegetation, wildlife, land uses, construction emissions, and noise. However, some impacts would contribute to permanent or long-term cumulative impacts, including the loss of forest cover, visual impacts, and forest fragmentation effects associated with the maintenance of a new right-of-way.

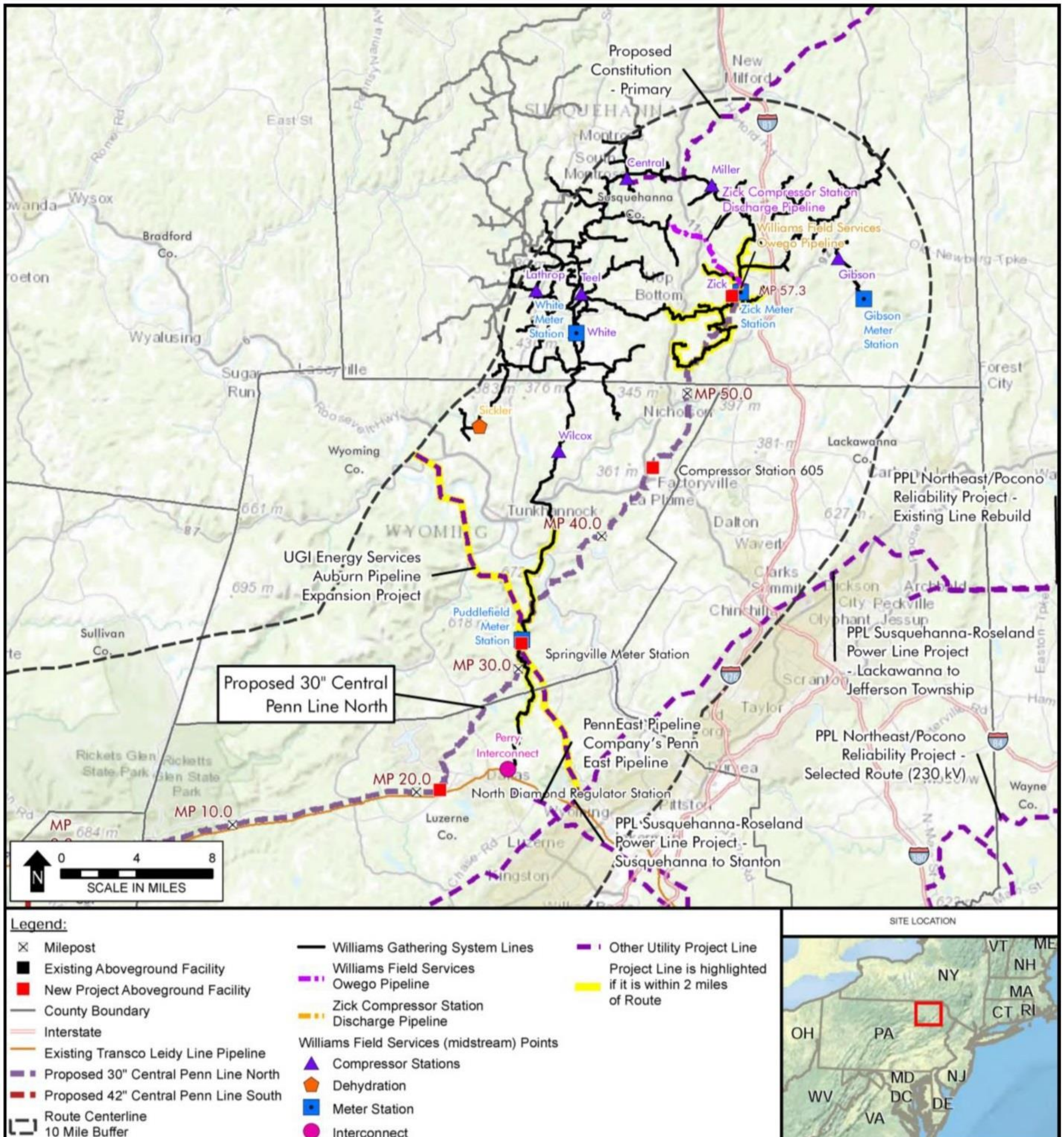

Figure 4.13.1-1
Atlantic Sunrise Project
Natural Gas Development Near the Atlantic Sunrise Project in Susquehanna County

Another past project that includes facilities in many of the same northern Pennsylvania counties as the Project is the Leidy Southeast Expansion Project, which was placed into full service on January 5, 2016. This project includes additional natural gas compression at Transco's existing Compressor Station 520 in Lycoming County (discussed under the CPL South Pipeline and Unity Loop heading below), Compressor Station 517 in Columbia County (one new 30,000 hp compressor and replacement of an existing 12,500 hp compressor with a new 16,000 hp compressor), and Compressor Station 515 in Luzerne County (one new 16,000 hp compressor). The Leidy Southeast Expansion Project also included 29.8 miles of new pipeline loop including the 5.3-mile-long Dorrance Loop in Luzerne County and the 11.5-mile-long Franklin Loop in Luzerne and Monroe Counties.

CPL South Pipeline and Unity Loop

Past projects along CPL South include road construction, utility corridors, and other development. Nearly 15 miles of the CPL South route would be parallel to either power lines, or other pipeline rights-of-way, which have contributed to the baseline conditions including cumulative resource impacts. One proposed action that would contribute to the cumulative impacts of the Atlantic Sunrise Project in Columbia County along the CPL South route is the new electric transmission line that would supply power to the electric motor-driven compressor at Compressor Station 610. Construction of this transmission line would result in mostly temporary but also some long-term soil, land use, vegetation, wildlife, air quality, noise, and visual impacts. In Lycoming County, the recently completed 2.2-mile-long Muncy Loop, which was part of Transco's Northeast Supply Link Project, would also contribute to cumulative impacts. The effects of this pipeline were likely similar to those anticipated for the Atlantic Sunrise Project but on a smaller scale. These would have included temporary impacts on soils, groundwater, surface water, wetlands, vegetation, wildlife, land uses, construction emissions, and noise. However, the Muncy Loop would also have some permanent or long-term impacts including the loss of forest cover, visual impacts, and forest fragmentation effects associated with the maintenance of a new right-of-way. Other actions that could contribute regionally to cumulative impacts near the northern 70 miles of the CPL South pipeline route in Columbia, Northumberland, and Lycoming Counties and Unity Loop in Lycoming County include the Leidy Southeast Expansion Project, which includes an added 20,500 hp of additional natural gas compression at Transco's existing Compressor Station 520 in Lycoming County, and six active or planned PennDOT projects. The new compression at Compressor Station 520 would contribute to cumulative regional emissions. The transportation projects generally involve bridge replacements or rehabilitations. The closest of these is the ongoing replacement of the State Road 2019 bridge over German Run, which is 3.6 miles from the Atlantic Sunrise Project pipeline route. These PennDOT projects would or could contribute to cumulative impacts on soil, surface waters, traffic, and visual effects during their construction. However, most of these effects would be temporary, highly localized, and for the most part confined to previously disturbed areas.

Two actions that would contribute to the cumulative impacts of the Atlantic Sunrise Project in Lebanon County include the recently constructed Texas Eastern Appalachia to Market 2014 Grantville West Discharge, which crosses the CPL South route near MP 50.2, and the proposed Sunoco Logistics Mariner East 2 Pipeline Project, which would cross the CPL South route near MP 41.7. The Texas Eastern line was completed in late 2014. The Mariner East 2 Pipeline Project is scheduled to start construction in in early 2017. The majority of potential impacts associated with these pipelines would be similar to the impacts associated with the Atlantic Sunrise Project, including impacts on soils, groundwater, surface water, wetlands, vegetation, wildlife, land uses, construction emissions, and noise. Most of these impacts would be temporary, but some impacts would be permanent or long term including the loss of forest cover, visual impacts, and forest fragmentation effects associated with the maintenance of a new right-of-way. Other actions that would or could contribute regionally to cumulative impacts in Schuylkill and Lebanon Counties (primarily between MPs 45 and 55 in Lebanon County) include two PennDOT projects and seven residential, commercial, or mixed use developments. Three of the seven residential, commercial, or mixed use developments would be crossed; all of the others would be within 0.5 mile of the CPL South route in Lebanon County. The two PennDOT projects involve bridge replacements in Lebanon County. The closest of these is the Colebrook Road bridge replacement, which is currently under construction, about 0.4 mile from the CPL South route. The other is 3.3 miles away and is scheduled to be constructed in 2016. These projects could contribute to the cumulative impacts of the Atlantic Sunrise Project on surface water, land uses, soil, residences, groundwater, vegetation, wildlife, traffic, visual effects, air quality, and noise. However, the majority of these impacts would be temporary, highly localized, and, in the case of the PennDOT projects, confined to previously disturbed areas.

One action that has and will contribute to cumulative impacts in Lancaster County is the Transco Rock Springs Expansion Project, which connects to the southern end of CPL South near MP 0.0. It includes about 10.1 miles of new pipeline that was placed in service on August 1, 2016. The effects of this action would be similar to the Atlantic Sunrise Project, only on a smaller scale. These would include temporary impacts on soils, groundwater, surface water, wetlands, vegetation, wildlife, land uses, construction emissions, and noise. However, some of the impacts of the Rock Springs Expansion Project will be permanent or long term, including the loss of forest cover, visual impacts, and forest fragmentation effects associated with the maintenance of a new right-of-way. Other actions that would or could contribute to the cumulative impacts of the Atlantic Sunrise Project in Lancaster County include 11 planned or potential residential developments that are within 0.5 mile of the CPL South route between MPs 0.0 and 8.0, and two planned PennDOT road projects (one bridge replacement and one bridge rehabilitation). Only one of the planned PennDOT projects is within 2.0 miles of the Atlantic Sunrise Project. The impacts of the nearby residential and road projects would or could include effects on land uses, soils, traffic, and visual resources. The more distant actions would or could contribute mostly to cumulative air and, in some cases, traffic impacts during their construction. Most of these effects would be temporary and highly localized and, in the case of the PennDOT projects, confined to previously disturbed areas; therefore, they would not contribute to long-term cumulative impacts.

Chapman Loop

Past projects along the Chapman Loop include road construction, utility corridors, and other development. The entire Chapman Loop would be parallel to and collocated with Transco's Leidy Line, which has contributed to the baseline conditions including cumulative resource impacts. Other actions in Clinton County that could contribute to cumulative impacts include oil and gas well development. Based on our review, there do not appear to be any ongoing oil and gas developments or other recently completed or planned projects close to the proposed Chapman Loop.

Unity Loop

Past projects along the Unity Loop include road construction, utility corridors, and other development. The entire Unity Loop would be parallel to and collocated with Transco's Leidy Line, which has contributed to the baseline conditions including cumulative resource impacts.

Mainline A and B Replacements

Past projects along the Mainline A and B Replacements include road construction, utility corridors, and other development. These Mainline A and B Replacements would be collocated with Transco's mainline pipeline system, which has contributed to the baseline conditions including cumulative resource impacts. Other actions that would contribute to the cumulative impacts of the Mainline A and B Replacements in Prince William County, Virginia, are primarily potential residential and non-residential development projects (listed in the table as inventory areas) and, to a lesser extent, Virginia Department of Transportation (VDOT) projects. The majority of the transportation projects involve bridge replacements and rehabilitations, interchange improvements, and road widening. The closest of these to the proposed Mainline A and B Replacements are the Nokesville Road widening project and the Arden Road bridge replacement project, which are located about 1.5 miles away. Both projects are under construction and scheduled to be completed in November 2016. These actions would or could contribute to the cumulative impacts of the Atlantic Sunrise Project on surface water, land uses, soil, residences, groundwater, vegetation, wildlife, traffic, visual effects, air quality, and noise. The other road projects that are further away would or could contribute to cumulative air and in some cases traffic impacts. Dominion Transmission's 9,200-foot-long TL-465 Pipeline Replacement project, which was completed at the end of 2013, also contributes to the cumulative impacts of the Atlantic Sunrise Project in Prince William County. At its closest point, this pipeline replacement is 1.6 miles from the Project. The impacts associated with it would have been similar to those anticipated for the Atlantic Sunrise Project but on smaller scale. These effects were primarily temporary in nature; although the TL-465 Pipeline Replacement likely resulted in some permanent or long-term impacts including loss of forest cover, visual impacts, and forest fragmentation effects associated with the maintenance of a right-of-way.

Aboveground Facilities

Past projects in the vicinity of the proposed aboveground facility sites include road construction, utility corridors, and other development. As part of the Project, Transco would add additional compression at existing Compressor Stations 190, 517, and 520. The previous construction and ongoing operation of these compressor stations has contributed to the baseline conditions including cumulative resource impacts.

4.13.2 Marcellus Shale Development

Background

The Marcellus Shale is an approximately 385-million-year-old, organic-rich shale formation that exists beneath 93 million acres of Pennsylvania, southern New York, eastern Ohio, and northern West Virginia. Over geologic time and with the pressure and temperature associated with deep burial, oil and natural gas can be generated within organic-rich shale formations. However, because shale is generally impermeable (that is, fluids do not readily flow through the formation), the oil and natural gas contained in these types of rocks cannot be economically produced using conventional well drilling and completion methods. Within the last 20 years, however, the petroleum industry has developed deep directional drilling techniques in conjunction with hydraulic fracturing (fracking), which has been in use for over 50 years, to recover natural gas from shale reservoirs. Fracking involves the injection of fluids and sand under high pressure to fracture the shale around the wellbore, thus enabling the flow of natural gas to the well.

Using these techniques, the first natural gas production from the Marcellus Shale in Pennsylvania began in 2005. Prior to 2005, Pennsylvania was producing about 0.5 bcf/d of natural gas from conventional reservoirs. With development of the Marcellus Shale, Pennsylvania produced over 4 trillion cubic feet (tcf) of natural gas in 2014, and is projected to produce between 13 to 14 bcf/d by 2020 (Governor's Marcellus Shale Advisory Commission, 2011; Energy Information Administration, 2015b). In 2014, the United States consumed about 26.7 tcf of natural gas (Energy Information Administration, 2015a); thus, the Marcellus Shale represents a significant natural gas deposit that accounts for nearly 14 percent of the natural gas consumed annually.

Natural gas production from the Marcellus Shale involves the drilling and completion of wells and construction of gathering systems and consequent rights-of-way. We received comments concerning these "upstream" production activities; however, FERC's authority under the NGA review requirements relate only to natural gas facilities that are involved in interstate commerce. Thus, the facilities associated with the production of natural gas are not under FERC jurisdiction.

We received comments concerning the development of natural gas reserves in the Marcellus Shale. Development of the Marcellus Shale natural gas resource is not the subject of this EIS nor is the issue directly related to the Project. Production and gathering activities, and the pipelines and facilities used for these activities, are not regulated by FERC but are overseen by the affected region's state and local agencies with jurisdiction over the management and extraction of the Marcellus Shale gas resource. FERC's jurisdiction is further restricted to facilities used for the transportation of natural gas in interstate commerce, and does not typically extend to facilities used for intrastate transportation.

We received comments that the draft EIS failed to consider the indirect effects of shale gas development that is both causally related to and a reasonably foreseeable consequence of the Atlantic Sunrise Project. CEQ regulations direct federal agencies to examine the direct, indirect, and cumulative impacts of proposed actions. Indirect impacts are defined as those "which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems." Accordingly, to determine whether an impact should be studied as an indirect impact, the Commission must determine whether it: (1) is caused by the proposed action; and (2) is reasonably foreseeable.

With respect to causation, NEPA requires a reasonably close causal relationship between the environmental effect and the alleged cause in order to make an agency responsible for a particular effect under NEPA. As the Supreme Court explained, a but-for causal relationship is insufficient to establish cause for purposes of NEPA.[41] Thus, some effects that are caused by a change in the physical environment in the sense of but-for causation, will not fall within NEPA if the causal chain is too attenuated. Further, the Court has stated that, where an agency has no ability to prevent a certain effect due to its limited statutory authority over the relevant actions, the agency cannot be considered a legally relevant cause of the effect. An effect is reasonably foreseeable if it is sufficiently likely to occur that a person of ordinary prudence would take it into account in reaching a decision. NEPA requires reasonable forecasting, but an agency is not required to engage in speculative analysis or to do the impractical, if not enough information is available to permit meaningful consideration.

The Commission does not have jurisdiction over natural gas production. The potential impacts of natural gas production, with the exception of GHGs and climate change, would be on a local and regional level. Each locale includes unique conditions and environmental resources. Production activities are thus regulated at a state and local level. In addition, deep underground injection and disposal of wastewaters and liquids are subject to regulation by the EPA under the Safe Drinking Water Act. The EPA also regulates air emissions under the CAA. On public lands, federal agencies are responsible for enforcing regulations that apply to natural gas wells.

As we have previously concluded in natural gas infrastructure proceedings, the environmental effects resulting from natural gas production are generally neither caused by a proposed pipeline (or other natural gas infrastructure) project nor are they reasonably foreseeable consequences of our approval of an infrastructure project, as contemplated by CEQ regulations. A causal relationship sufficient to warrant Commission analysis of the non-pipeline activity as an indirect impact would only exist if the proposed

[41] *Sierra Club and Galveston Baykeeper v. FERC*, No. 14-1275, slip op., at 16 (D.C. Cir. June 28, 2016); Sierra Club v. FERC, No. 14-1249, slip op., at 13-14 (D.C. Cir. June 28, 2016).

pipeline would transport new production from a specified production area and that production would not occur in the absence of the proposed pipeline (i.e., there would be no other way to move the gas). The record does not show that the Atlantic Sunrise Project, or other projects for that matter, cause predictable development of gas reserves. In fact, the opposite causal relationship is more likely (i.e., once production begins in an area, shippers or end users will support the development of a pipeline to move the produced gas). It would make little economic sense to undertake construction of a pipeline in the hope that production might later be determined to be economically feasible and that the producers will choose the previously constructed pipeline as best suited for moving their gas to market.

Even if one accepts that a specific pipeline project would cause natural gas production as several commentors have suggested based on production company pronouncements to its shareholders, which is not proof of the causal relationship alluded to, we have found that the potential environmental impacts resulting from such production are not reasonably foreseeable. The Commission does not have sufficient information to determine the origin of the gas that would be transported by the Atlantic Sunrise Project. It is the states, rather than the Commission, that have jurisdiction over the production of natural gas and thus would be most likely to have the information necessary to reasonably foresee future production. We are not aware of forecasts by such entities that would make it possible for the Commission to meaningfully predict production-related impacts, many of which are highly localized. Thus, even if the Commission knows the shippers and general source area of gas likely to be transported on the Atlantic Sunrise Project, a meaningful analysis of production impacts would require more detailed information regarding the number, location, and timing of wells, roads, gathering lines, and other appurtenant facilities, as well as details about production methods, which can vary per producer and the applicable state regulations. Accordingly, the impacts of natural gas production are not reasonably foreseeable because they are so nebulous that we cannot forecast their likely effects in the context of an environmental analysis of the impacts related to a proposed interstate natural gas pipeline.

Regardless of its regulation, Marcellus Shale development is upstream of the project impacts and has contributed to cumulative impacts including forest, air quality, and water impacts. To the extent Marcellus Shale development has, is, or is planned within the ROI or geographic scope of cumulative impact for a particular resource, it is evaluated in our cumulative impact analysis below.

4.13.3 Natural Gas Production

4.13.3.1 Wells

Marcellus Shale production wells involve improvement or construction of roads, preparation of a well pad, and drilling and completion of the well. Between July 2011 and February 3, 2015, 1,135 gas wells were permitted in Pennsylvania counties within 10 miles of the Project (PADEP, 2015c). It is likely that permits for drilling will continue to be issued in the Marcellus Shale through the anticipated period of construction of the Project, but the extent of such drilling is unknown. Assuming all of the wells that have been permitted are drilled and permits are issued at the same rate of approximately 260 per year, it is conceivable that between 700 and 800 new wells could be drilled by the time the Atlantic Sunrise Project is scheduled to be completed.

Transco has shippers that have committed to the Atlantic Sunrise Project to deliver 1.7 MMDth/d. Due to the complexities of interstate natural gas transmission, gas may enter and exit Transco's system from multiple areas of the United States, making any specific identification or analysis of individual wells beyond the scope of this EIS. However, the number of wells needed to supply the Atlantic Sunrise Project can be estimated. A typical production well can provide between 0.3 to 8.7 million cubic feet of natural gas per day (MMcf/d) (304 to 8,830 Dth/d) (NYSDEC, 2011). The median 30-day initial production rate of Marcellus shale wells in mid-2013 was 5 MMcf/d (Unconventional Oil and Gas

Report, 2014). At this median production rate, about 340 gas wells would be required to provide the 1.7 MMDth of gas required for the Atlantic Sunrise Project. Because well production declines over time, the actual number of wells necessary to supply the Atlantic Sunrise Project over many years would be much higher.

4.13.3.2 Pipeline Gathering Systems

Multiple non-jurisdictional FERC intrastate natural gas well interconnect and gathering facilities are either proposed, under construction, or have been constructed within the ROI or geographic scope of cumulative effects for the Project. These non-jurisdictional pipeline systems gather natural gas from Marcellus Shale wells for transport to local customers or the interstate natural gas transmission system. These include over 80 facilities that Transco identified as having been constructed and placed into service since 2010. The vast majority of these are gathering pipelines, ranging from 56 feet to 3.6 miles in length. A small percentage of these projects involve aboveground facilities. These include: meter stations (three), dehydration facilities (two), and compressor stations (seven). The horsepower associated with the compressor stations ranges from 14,156 to 28,512 hp. All but eight of these gathering lines and aboveground facilities are in Susquehanna County, Pennsylvania. Most of the rest are located in Wyoming County, Pennsylvania.

Five recently constructed or planned gathering system pipelines would intersect or cross the Atlantic Sunrise Project pipeline corridor and, as infrastructure providing natural gas volumes to the Project, may contribute cumulatively to downstream impacts. They include:

- Williams' (midstream) 3.6-mile-long, 12-inch-diameter Millard pipeline in Susquehanna County, Pennsylvania, which was completed and placed into service in 2013;
- Williams' (midstream) proposed 5.9-mile-long, 24-inch-diameter Owego pipeline and the associated 742-foot-long Zick Compressor Station discharge piping in Susquehanna County, which is scheduled to be constructed in 2016 and 2017;
- Williams' (midstream) 5.2-mile-long, 12-inch-diameter Hickory Ridge pipeline, which was completed in 2014;
- the 28-mile-long, 20-inch-diameter UGI Energy Services Auburn Pipeline Expansion Project in Wyoming and Luzern Counties, Pennsylvania, which was constructed in 2013 and placed into service in January 2014; and
- Williams' (midstream) Wyoming pipeline system, comprising 10 miles of 16-inch-diameter pipeline in Susquehanna, Luzerne, and Wyoming Counties, which was completed and put into service in 2011.

Five other recently constructed gathering pipelines or aboveground facilities are within 0.25 mile of the Atlantic Sunrise Project pipeline route. Four of these are in Susquehanna County, including:

- Williams' (midstream) Clark and Hartley pipelines, which are two of the four facilities, collectively comprise 1.5 miles of 10-inch-diameter pipeline; these pipelines were constructed and placed into service in 2014;
- Williams' (midstream) Zick Meter Station, which was completed in 2012; and
- Williams' (midstream) 28,512-hp Zick Compressor Station, which was completed and placed into service in 2013.

The fifth is Williams' Puddlefield Meter Station in Wyoming County, which was completed in 2012.

All the gathering system projects and facilities that would be crossed by CPL North are within the Upper Susquehanna Watershed and the Northeast Pennsylvania – Upper Delaware Valley AQCR. Construction of these gathering system facilities would have involved activities similar to construction of interstate natural gas transmission facilities, although land requirements for construction are typically less for gathering systems due to the installation of smaller-diameter pipe.

4.13.4 FERC-Jurisdictional Natural Gas Pipeline Projects

There are 10 planned, proposed, or existing FERC-jurisdictional natural gas transmission projects within the ROI or geographic scope of cumulative effects for the project facilities. A description of each project is included in the table in appendix Q, and additional details regarding each project can be obtained through our website at www.ferc.gov by entering the docket number given for each project. At the time of issuance of this EIS, the Marc II Pipeline Project does not have a docket number, because it is still in the company's planning stage and has not entered into the pre-filing process with FERC.

The Constitution Pipeline and Wright Interconnect Projects were approved by FERC in 2014 and are scheduled to be constructed in 2016 and be completed the second half of 2017.[42] The Constitution Pipeline Project includes about 124 miles of new 30-inch-diameter natural gas pipeline in Pennsylvania and New York, two new meter stations, and other facilities. At its closest point in Susquehanna County, the southern terminus of the Constitution Pipeline route is 6.5 miles northeast of the Atlantic Sunrise Project. Most of the pipeline would be constructed using a 100- to 125-foot-wide construction right-of-way, of which 50 feet would typically be retained to operate the facilities.

Tennessee Gas Pipeline Company, L.L.C.'s (TGP) Northeast Upgrade Project,[43] which crosses Bradford, Wayne, Pike, and Susquehanna Counties, Pennsylvania and Sussex County, New Jersey, was put into service in 2013. The Northeast Upgrade Project consists of a 40.9-mile-long, 30-inch-diameter pipeline loop and modifications to four existing compressor stations. The Northeast Upgrade pipeline is 5.5 miles from the Atlantic Sunrise Project at its closest point and was constructed using a 100-foot-wide construction right-of-way consisting of 25 feet of existing permanent right-of-way, 25 feet of new permanent right-of-way, and 50 feet of temporary right-of-way. The nearest compressor station modification associated with the Northeast Upgrade Project involved adding one Taurus 70 compressor unit at TGP's existing Compressor Station 321, which is over 30 miles from Transco's nearest compressor station (Compressor Station 517).

Transco's Leidy Southeast Expansion Project[44] (discussed briefly in section 4.13.1) was approved by FERC in December 2014 and placed into service on January 5, 2016. This project involved:

- construction of 29.8 miles of new 42-inch-diameter pipeline loop in four separate segments in Mercer, Somerset, and Hunterdon Counties, New Jersey, and Monroe and Luzerne Counties, Pennsylvania;
- addition of compression and modifying existing Compressor Stations 205, 515, 517, and 520 in Mercer County, New Jersey, and Luzerne, Columbia, and Lycoming Counties, Pennsylvania, respectively;

42 Docket No. CP13-499-000.

43 Docket No. CP11-161-000.

44 Docket No. CP13-551-000.

- modification of existing compressor stations in North Carolina (one facility), Virginia (five facilities), and Maryland (one facility); and

- modification of existing M&R stations, MLVs, and pig launchers and receivers in North Carolina, Pennsylvania, Virginia, and Maryland.

At its closest points in Luzerne, Lycoming, and Columbia Counties, facilities associated with the Leidy Southeast Expansion Project are between 0.0 and 8.4 miles from the Atlantic Sunrise Project. The project was built using a 105-foot-wide construction right-of-way with a 50-foot-wide permanent right-of-way retained for operation, although, due to overlap, most of this comprises existing permanent right-of-way associated with existing Transco pipelines.

Dominion Transmission's TL-465 Project[45] was constructed in 2013 and placed into service in December of the same year. This project involved the replacement of 1.74 miles of existing 24-inch-diameter pipeline in Prince William County. This new 24-inch-diameter pipeline was installed at a 10-foot offset parallel to the existing pipeline. After the replacement pipeline was installed, the existing pipeline was cut and removed. At its closest point, the TL-465 Project is 1.6 miles southeast of the Atlantic Sunrise Project in Prince William County. Dominion used a 40-foot-wide construction right-of-way to build its pipeline, comprising 30 feet of existing right-of-way and 10 feet of new permanent right-of-way that was retained for operation.

TGP's Uniondale Expansion Project[46] was completed in September 2014. It includes modifications at TGP's existing Compressor Station 321 and existing Uniondale Meter Station. Specifically, TGP installed an inlet air cooling system to two compressor station engine units at the compressor station and installed measurement equipment capable of delivering the 34,000 Dth/d of increased capacity at the meter station that the project added to TGP system. There were no emission changes as a result of these modifications. At its closest point in Susquehanna County, the Uniondale Expansion Project facilities are about 5.6 miles northeast of the proposed Atlantic Sunrise Project.

Spectra Energy's Texas Eastern Appalachian to Market 2014 (TEAM 2014) Project[47] was completed in November 2014. The TEAM 2014 Project is in Pennsylvania, West Virginia, Ohio, Kentucky, Tennessee, Alabama, and Mississippi. This project increased the capacity of the existing Texas Eastern pipeline system by about 600 MMcf/d. In Pennsylvania, the TEAM 2014 Project involved the installation of 33.6 miles of new 36-inch-diameter pipeline loop and related aboveground facilities in Fayette, Perry, Dauphin, Lebanon, and Berks Counties, as well as the installation of four new compressor stations and associated facilities at existing compressor stations in Westmoreland, Indiana, and Huntingdon Counties, Pennsylvania. The project also includes modifications and maintenance work at various existing facilities throughout the other six states in which it is sited (Spectra Energy, 2014). The TEAM 2014 Project is closest to the Atlantic Sunrise Project in Lebanon County, Pennsylvania, where the 2.3-mile-long Grantville West Discharge Loop crosses the Atlantic Sunrise Project route. The next nearest TEAM 2014 Project facility is the 3.8-mile-long Grantville East Loop, which at its closest point is 4.6 miles southeast of the Atlantic Sunrise Project. Spectra Energy generally used a 100-foot-wide construction right-of-way to construct the 36-inch-diameter pipeline, of which 50 feet was retained as permanent right-of-way to operate the facilities. All of the new compression facilities associated with the TEAM 2014 Project are more than 30 miles from Transco's existing Compressor Stations 190, 517, and 520.

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45 Docket No. CP13-26-000.

46 Docket No. CP13-526-000.

47 Docket No. CP13-84-000.

Transco's Northeast Supply Link Project,[48] which was placed into service in November 2013, adds 250,000 Dth/d to the existing Transco pipeline's incremental firm natural gas transportation capacity (Williams, 2013). The Northeast Supply Link Project comprises:

- 12.0 miles of new 42-inch-diameter pipeline loop in Lycoming and Monroe Counties, Pennsylvania, and Hunterdon County, New Jersey;
- replacement of a 0.05-mile-long segment of 36-inch-diameter pipeline in Essex County, New Jersey;
- uprating of 25.6 miles of existing 36-inch-diameter pipeline in Essex, Passaic, Bergen, and Hudson Counties, New Jersey;
- construction of a new 25,000-hp compressor station in Essex County, New Jersey;
- modification of two existing compressor stations in Somerset County, New Jersey, and Luzerne County, Pennsylvania; and
- modification of other existing aboveground facilities in Pennsylvania, New Jersey, and New York (EPA, 2012c).

The closest Northeast Supply Link Project facility to the Atlantic Sunrise Project is the Muncy Loop in Lycoming County, which is 0.04 mile northeast of the Project. In most areas, Transco used a 105-foot-wide right-of-way to construct the new pipeline and retained a 50-foot-wide permanent right-of-way.

Transco's Rock Springs Expansion Project[49] was authorized by the Commission on March 19, 2015, and construction of the project began on April 24, 2015. Transco placed the facilities into service in August 2016. The facilities will include:

- about 11.2 miles of new 20-inch-diameter lateral pipeline to connect Transco's existing pipelines in Lancaster County, Pennsylvania to Old Dominion Electric Cooperative's Wildcat Plant in Cecil County, Maryland;
- a 4,000-hp, electric motor-driven compressor station (Compressor Station 196) in Cecil County, Maryland;
- metering facilities and a pig receiver at the terminus of the lateral; and
- piping and valve modifications to Transco's existing Compressor Station 200 in Chester County, Pennsylvania to allow for bi-directional flow along Transco's mainlines.

The north terminus of the Rock Springs Expansion Project began near the southern end of the CPL South pipeline. Transco used a 95-foot-wide construction right-of-way for the Rock Springs pipeline. Following construction, Transco would retain a 40-foot-wide permanent pipeline easement, as well as permanent aboveground facility sites and permanent access roads.

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48 Docket No. CP12-30-000.

49 Docket No. CP14-504-000.

PennEast is proposing the PennEast Pipeline Project,[50] which would include 114.0 miles of 36-inch-diameter pipeline in Luzerne, Carbon, Northampton, and Bucks Counties, Pennsylvania and Hunterdon and Mercer Counties, New Jersey; 2.1 miles of 24-inch-diameter lateral pipeline in Northampton County, Pennsylvania; and 0.6 mile of 12-inch-diamter pipeline and 1.4 miles of 36-inch-diameter pipeline in Hunterdon County, New Jersey. The project would also include a new 47,700-hp compressor station on a 60-acre site in Carbon County, Pennsylvania, and block valves and interconnections with other pipelines. At its closest point, the PennEast Pipeline Project would be 3.6 miles southeast of the Atlantic Sunrise Project. PennEast filed its application on September 24, 2015. PennEast proposes to begin construction in the spring of 2017 assuming it receives all of the necessary approvals. PennEast is proposing to use a 100-foot-wide construction right-of-way and retain a 50-foot-wide easement for operation of the Project.

As currently envisioned, CNYOG's MARC II Project would involve constructing a 30-mile, 30-inch-diameter pipeline in Sullivan, Wyoming, and Luzerne Counties, Pennsylvania, that would connect CNYOG's existing MARC I pipeline with Transco's Leidy pipeline and the proposed PennEast pipeline. The southern end of the MARC II pipeline would cross the Atlantic Sunrise Project pipeline in Luzerne County, Pennsylvania. The MARC II Project is currently in the planning stages and has not yet entered into the pre-filing process with FERC.

Based on various combinations of their distance from the proposed and planned projects, scope, and schedule, construction and operation of some of the aforementioned FERC-jurisdictional projects could contribute to cumulative impacts in the areas where they cross or are close to the Atlantic Sunrise Project. These cumulative effects, however, are not expected to be significant. All of the FERC-jurisdictional projects would be constructed and maintained in accordance with the FERC Plan and Procedures and other construction, operation, and mitigation measures that may be required by federal, state, or local permitting authorities, further reducing the potential for cumulative impacts.

4.13.5 Non-Jurisdictional Project-Related Actions

As described in section 1.4, the non-jurisdictional facilities associated with the Atlantic Sunrise Project would include:

- the Owego pipeline and associated discharge piping at the Zick Compressor Station;
- two 69-kV extension electrical transmission lines to supply power to Compressor Stations 605 and 610;
- new electrical service distribution at both Compressor Stations 517 and 520 to power the new compressor buildings, power and control room buildings, motor control center, and other ancillary equipment; and
- a new distribution electrical service at Compressor Station 190 to power the new compressor building, power and control room building, motor control center, and other ancillary equipment.

The Owego pipeline and associated Zick Compressor Station discharge piping would be about 5.9 miles in length and within Susquehanna County. It would begin southwest of Tiffany Pond and would proceed generally east across U.S. Route 11 south of Kingley, Pennsylvania. From there it would proceed southeast across a mixture of mostly hayfields, pasture, and forestland to the Zick Compressor Station.

[50] Docket No. CP15-558-000

The two 69-kV extension electrical transmission lines to supply power to Compressor Stations 605 and 610 would be constructed by PPL Electric Utilities. The route of the 3.5-mile-long transmission line serving Compressor Station 605 at MP 45.8 on CPL North would extend southeast from the compressor station in Wyoming County to PPL Electric Utilities' existing Stanton-Brookside 69-kV line near the Brookside Substation in Lackawanna County, Pennsylvania. The route of the 1.8-mile-long transmission line serving Compressor Station 610 at MP 112.3 on CPL South would extend from the compressor station to the Scott-Rohrsburg section of PPL Electric Utilities' existing Columbia-Scott 69-kV line in Columbia County, Pennsylvania.

The new distribution electrical service to be provided by PPL Electric Utilities at Compressor Stations 517 and 520 in Columbia and Lycoming Counties, respectively, would not contribute significantly to cumulative impacts because no new transmission lines would be required. The exact routes of the two distribution lines have not been determined but each would be about 1,000 feet long.

The new distribution electrical service to be provided by BGE at Compressor Station 190 in Howard County, Maryland, would not contribute significantly to cumulative impacts because no new transmission line would be required. The route of the buried distribution line has not been determined but would be about 700 feet long.

Resource impacts resulting from the non-jurisdictional pipeline and electric transmission lines would be similar to the Project except on a smaller scale due to the smaller diameter and more limited disturbance per mile of electric transmission lines as compared to pipelines. Therefore, we conclude that construction and operation of the non-jurisdictional project-related facilities would result in some cumulative impacts in the region.

4.13.6 Non-Jurisdictional Non-Project-Related Actions

Sunoco Logistics is repurposing its existing Mariner East 1 pipeline, which is a 300-mile-long crude oil pipeline between Delmont in Westmoreland County and Marcus Hook in Delaware County, Pennsylvania, to transport 70,000 barrels per day of natural gas liquids. The Mariner East 1 Project went into service in February 2016. Sunoco Logistics also recently announced plans to move forward with the proposed Mariner East 2 Pipeline Project. This project would involve a new pipeline designed to carry up to 275,000 barrels per day of natural gas liquids from producing areas of Ohio, West Virginia, and Pennsylvania to Marcus Hook, Pennsylvania, where the liquids would be shipped to local and regional markets or exported to international customers. The Mariner East 2 pipeline would originate in eastern Ohio, cross the panhandle of West Virginia, and then cross 16 southern Pennsylvania counties including Lancaster and Lebanon Counties, where it would cross the Atlantic Sunrise Project pipeline route. The Mariner East 2 Pipeline Project would require a minor source operating permit for emissions; however, this source would be over 30 miles from Transco's Compressor Stations 190, 517, and 520. The currently planned construction for the Mariner East 2 Pipeline Project is during the first half of 2017. The Mariner East 2 Pipeline Project would result in impacts similar to the Atlantic Sunrise Project. If constructed in 2017, as currently envisioned, it could contribute to cumulative impacts near where it crosses the Atlantic Sunrise Project pipeline route. The effect, however, would be localized and would be mitigated by measures required by federal, state, and/or local permitting authorities.

4.13.7 Other Actions

4.13.7.1 Electric Generation and Transmission Projects

In addition to the new, non-jurisdictional electric transmission and distribution lines described in section 4.13.5, there is one other electric transmission line project and two electric generation projects within the ROI or geographic scope of cumulative effects for the Atlantic Sunrise Project, all in

Pennsylvania. The electric transmission line is PPL Electric Utilities' Roseland Power Line Project, which was completed in May 2015. The Susquehanna to Stanton section of this project in Luzerne County is about 4.9 miles southeast of the Atlantic Sunrise Project. The Stanton to Lackawanna section of this project in Lackawanna County is about 7.2 miles southeast of the Atlantic Sunrise Project.

The two electric generation projects are the Tenaska Lebanon Valley Generation Station in Lebanon County and the Mehoopany Wind Farm in Wyoming County. The Tenaska Lebanon Valley Generating Station will burn natural gas to generate up to 950 megawatts of electricity. A major facility plan approval was issued for the facility by the PADEP in April 2015. At its closest point, the generating facility would be 6.1 miles from the Atlantic Sunrise Project pipeline route, but it would be more than 30 miles from Transco's Compressor Stations 190, 517, and 520. The Mehoopany Wind Farm is operational and includes 88 wind turbines on a 9,000-acre site capable of generating 141 megawatts of electricity. This site is about 7.1 miles from the closest proposed Atlantic Sunrise Project facilities.

Resource impacts resulting from these electric transmission and generation projects are likely similar to those expected for the Atlantic Sunrise Project, except on a smaller and more limited geographic scale. Due to the distance of these actions from the Project, we conclude that their construction and operation would result in some cumulative impacts on air quality (the air quality impacts of the wind farm would be limited primarily to emissions during construction).

4.13.7.2 Transportation and Commercial/Residential Development Projects

Transportation Projects

The PennDOT and the VDOT are overseeing multiple ongoing and proposed infrastructure projects in the ROI for the Atlantic Sunrise Project. Transco identified 27 of these projects within 10 miles of the Project including 15 in Pennsylvania, mostly near the CPL South pipeline route, and 12 in Virginia near the Mainline A and B Replacements. Fifteen of these projects are within 5.0 miles but only four are less than 2.0 miles away. The scopes of these transportation projects vary but include bridge removals and replacements, highway interchange improvements, and road widening projects. The projects within 2.0 miles of the Atlantic Sunrise Project include the following actions:

- The State Road 106 Tunkhannock Creek Bridge Replacement Project is about 1.7 miles northeast of the pipeline route in Susquehanna County, Pennsylvania. The construction schedule for this project is unknown.
- The Veteran's Memorial Bridge Rehabilitation Project is about 1.8 miles southwest of the pipeline route in Lancaster County, Pennsylvania. The construction schedule for this project is unknown.
- The Colebrook Road Bridge Replacement Project is about 0.4 mile northwest of the pipeline route in Lebanon County, Pennsylvania. Construction of this project was completed in 2015.
- The Nokesville Road Widening Project is about 1.5 miles southeast of the Atlantic Sunrise Project in Prince William County, Virginia. Construction of this project began in 2014 and is scheduled to be completed in November 2016.

The dates for some of these actions are known and others are not; however, the timelines for them generally range from 2014 to 2018. Therefore, at least some could coincide with construction of the Atlantic Sunrise Project. The closest of these transportation projects could contribute to the cumulative impacts of the Atlantic Sunrise Project on soils, surface water, air quality, and noise. The majority of these impacts would be temporary, highly localized, and generally confined to previously disturbed areas; therefore, the potential contribution of these actions to the cumulative impacts associated with the Atlantic Sunrise Project would be minor.

Commercial/Residential Development Projects

Transco identified a number of planned or proposed residential, commercial, and mixed development projects within 0.5 mile of the proposed Atlantic Sunrise Project facilities. Based on correspondence received to date by Transco from county and local planning boards, and other contacts and research, these include:

- 1 residential development crossed by the proposed Atlantic Sunrise pipeline in Luzerne County, Pennsylvania;
- 1 residential, 5 commercial, and 1 mixed use development in Lebanon County, Pennsylvania, 3 of which (1 residential, 1 commercial, and the mixed use area) would be crossed by the Atlantic Sunrise pipeline route;
- 11 residential developments in Lancaster County, Pennsylvania, the closest of which is 0.1 mile southeast of the proposed Atlantic Sunrise pipeline route; and
- 1 residential inventory area and 1 non-residential inventory area that have received zoning approval and would be crossed by the Atlantic Sunrise Project in Prince William County, Virginia.

Details of the locations of the developments relative to the projects are provided in the table in appendix Q.

The developments that would be closest to the Atlantic Sunrise Project would or could contribute to the cumulative impacts on soil, residences, groundwater, vegetation, wildlife, land uses, traffic, visual effects, air quality, and noise in Lancaster, Lebanon, and Prince William Counties. The majority of these impacts would be temporary and highly localized. We anticipate that these commercial/residential and mixed development projects would require state and/or local approvals and that BMPs would be implemented to minimize environmental impacts such as erosion and sedimentation. Following construction, disturbed areas would be stabilized and would be revegetated if not occupied by structures, driveways or other hard surfaces. As such, the potential contribution of these actions to the cumulative impacts associated with the Atlantic Sunrise Project would be minor.

4.13.8 Potential Cumulative Resource Impacts of the Proposed Action

The potential impacts that we consider as part of our cumulative impacts review pertain to:

- geology and soils;
- groundwater, surface water, and wetlands;
- vegetation;
- wildlife;
- fisheries and aquatic resources;
- land use, recreation, special interest areas, and visual resources;
- socioeconomics (including traffic);
- cultural resources; and
- air quality and noise.

In the following analysis we describe the potential cumulative impacts associated with the general development of the above-identified FERC-regulated projects, Marcellus Shale development, nearby non-jurisdictional project-related actions, residential development projects, and transportation projects. For the reasons described above, we did not consider more distant actions in our analysis.

4.13.8.1 Geology and Soils

Projects that require blasting, significant excavation, or grading would have temporary, direct impacts on near-surface geology and soils. Because the effects would be highly localized and limited primarily to the period of construction, cumulative impacts on geology and soils would primarily occur if other projects are constructed at the same time and place as the Atlantic Sunrise Project. A small number of the FERC-regulated pipelines, non-jurisdictional natural gas wells, and natural gas gathering systems, electric transmission and distribution lines, and residential developments or improvements listed in the table in appendix Q potentially fit this description, including:

- some upstream facilities and Williams' (midstream) Owego pipeline and Zick Compressor Station discharge piping in Susquehanna County;
- Transco's Rock Springs Expansion in Lancaster County;
- the non-jurisdictional transmission and distribution lines to service the proposed new compressor stations and the modifications at existing compressor stations associated with the Atlantic Sunrise Project; and
- some of the residential developments in Lancaster and Lebanon Counties, Pennsylvania and Prince William County, Virginia.

The Atlantic Sunrise Project would cross about 101.1 miles of areas with shallow lithic bedrock where blasting may be required. The Project would also likely cross areas of abandoned or ongoing mining operations, steep slopes, side slopes, and karst terrain. It is likely that some of the other actions would also cross or affect these potential geologic hazards. Transco would minimize the potential for cumulative impacts associated with these activities by conducting any required blasting activities in accordance with a blasting plan designed to minimize effects, and preventing impacts associated with fly rock or other unsafe or unstable conditions. Transco has also identified specific mitigation measures for shallower and deeper potential mine subsidence areas, and developed a *Karst Investigation and Mitigation Plan* (see appendix J).

As described in section 2.2.1.1 and listed in table 2.2.1-1, about 53.6 miles or 27 percent of the pipelines would be collocated with other existing utility corridors, principally the Transco Leidy Line, power lines, or Williams Field Services pipelines. The Project would add to the cumulative impacts on previously disturbed soils in these areas of past construction but would minimize impacts on areas of undisturbed soil.

Like the Atlantic Sunrise Project, the other FERC-regulated projects would be required to implement the FERC's Plan or equivalently protective measures that would reduce soil impacts and ensure the restoration of contours and drainages, and the revegetation of disturbed soils. These projects and the upstream facilities associated with the development of the Marcellus Shale would also need to comply with state erosion control and restoration requirements. The PADEP has developed BMPs for the construction and operation of upstream oil and gas production facilities. These BMPs include:

- erosion and sediment control practices;
- setback requirements from springs, wetlands, and waterbodies;

- wetland and waterbody crossing procedures;
- access road construction practices;
- soil amendment procedures; and
- right-of-way restoration measures.

Implementation of these measures, in combination with the measures outlined in Transco's Plan and the other companies erosion control plans would avoid or minimize cumulative impacts on geology and soils in the ROI.

Because the schedule for construction of some of these actions, including the residential and commercial developments is not known, we are unable to determine if any or all would be constructed at the same time as the Atlantic Sunrise Project. We also cannot say for sure what soil and erosion control measures, if any, these projects would implement. However, at least for the larger projects, we expect that their sponsors would be required by the state and local permitting agencies to adhere to BMPs to minimize erosion pursuant to federal and state required storm water permitting requirements. The potential for cumulative soil impacts resulting from one or more of these actions is low and primarily temporary because construction of other pipeline facilities would generally not result in losses or other long-term impacts on soils. Residential and commercial developments could result in some loss of productive soils from the additions of impervious surfaces (e.g., building footprint, driveways, sidewalks); however, these would be limited in scope and distributed along the length of the Atlantic Sunrise Project pipeline route and not concentrated in any one area. Furthermore, we expect these developments would be restored and bare soils revegetated following construction, thereby minimizing exposure of soils to erosive forces.

Because Transco and the sponsors of these other actions would follow the recommended measures stipulated in their permits and approvals, the cumulative effect of the projects on geological resources and soils would be temporary and minor.

4.13.8.2 Water Resources

Construction and operation of the Project would likely result in only short-term impacts on water resources (see section 4.3). These impacts, such as increased turbidity, would return to baseline levels over a period of days or weeks following construction.

Groundwater

Cumulative effects on groundwater resources are expected to be limited to areas that are affected by other actions near the Atlantic Sunrise Project facilities. The potential groundwater impacts of these actions would be similar to those described in section 4.3.1 and could include increased turbidity, reduced water levels, and contamination. Nearby water wells could also be damaged by construction.

We received comments that the draft EIS did not adequately assess the Project's cumulative impacts on groundwater. The impact of the Atlantic Sunrise Project on groundwater resources is expected to be short term and minor. Nearly all of the water demands of the Project would be associated with either hydrostatic testing or HDD activities during construction, and the demand for ground water supplies would be negligible and thus would not significantly contribute to cumulative impacts on groundwater supplies; and water would for the most part be returned to the watershed resulting in non-consumptive use of the resource. The Project is also not expected to contribute to cumulative impacts on groundwater quality during operation. The proposed facilities would transport natural gas. With the exception of the HDDs, all of the proposed facilities would be at or just below the ground surface. If there were a gas leak during operation of the facilities, the majority of the gas would rise and escape into the atmosphere and would not impact groundwater. The greatest potential for impacts on groundwater would be during construction; these impacts would be temporary and associated with trenching and blasting. Groundwater could also be affected if there were a spill of hazardous materials during construction. As described in section 4.3, Transco would implement mitigation measures to avoid or minimize direct and indirect impacts on groundwater resources. This would include the use of both standard and specialized construction techniques, including the measures specified in its ECP, Plan and Procedures, Spill Plan, and Blasting Plan. If a water supply well is damaged as a result of project construction, Transco would ensure that a temporary source of water is provided until the damaged water well is restored to its preconstruction capacity and quality, a replacement water source would be provided, or the landowner would be fairly compensated for damages.

All of the other major actions, although perhaps not the smaller scale projects, in the table in appendix Q that are near the Atlantic Sunrise Project, including other FERC-regulated projects, natural gas wells and gathering lines associated with Marcellus Shale development, would be required to obtain water use and discharge permits, implement erosion and sediment controls, and as appropriate adhere to various Spill Plans as mandated by federal and state agencies. These same measures would reduce the potential for the Project to contribute to cumulative groundwater impacts. The principal threats to groundwater in Pennsylvania include industrial facilities, underground storage tanks, hazardous waste sites, abandoned landfills, aboveground storage tanks, manure/fertilizer applications, chemical facilities, septic systems, AMD, and abandoned oil and gas wells (PADEP, 2014h). The Atlantic Sunrise Project would not involve any of these principal threats to groundwater with the potential exceptions of applying fertilizer during revegetation and the installation of septic systems at the new compressor station sites. The other projects listed in the table in appendix Q would also not be expected to pose a threat to groundwater. However, even if they did affect groundwater in some minor way, there would not be a cumulative effect because the Atlantic Sunrise Project would not be expected to affect groundwater. Thus construction of the Atlantic Sunrise Project would temporarily contribute to the cumulative impacts on groundwater; however, impacts would generally cease once the pipeline is installed, the trench is backfilled, and contours are restored.

Specific concerns have been raised regarding the potential impact that completion of natural gas wells in the Marcellus Shale may have on groundwater quality due to gas migration and the use of chemical additives in the fracking water to stimulate gas flow. The Atlantic Sunrise Project does not involve fracking and thus would not contribute directly to groundwater impacts associated with fracking. In response to groundwater concerns about fracking in Pennsylvania, in 2012 the PADEP updated its regulations governing the drilling, casing, cementing, testing, monitoring, and plugging of oil and gas wells and for the protection of water supplies. This rulemaking includes updated material specifications and performance testing; and amended design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. Oil and gas wells must also be sited at least 500 feet from a drinking water well and at least 100 feet from a spring. According to the PADEP, the new 2012 requirements will provide an increased degree of protection for both public and private water supplies. Drilling companies must now also disclose the chemical additives used in fracking gas wells and appropriately manage drilling return water to prevent impacts on water resources.

For these reasons, we anticipate that the Project would only contribute to minor and temporary cumulative impacts on groundwater.

Waterbodies and Wetlands

Cumulative effects on waterbodies and wetlands affected by the Atlantic Sunrise Project would be limited primarily to the wetlands and waterbodies that are affected by other actions within the same major watershed that are constructed at approximately the same time. The Atlantic Sunrise pipeline facilities would cross four major watershed basins (i.e., 6-digit hydrologic unit codes): the Upper Susquehanna, the Lower Susquehanna, and the West Branch Susquehanna in Pennsylvania, and the Potomac in Virginia; and eight watershed subbasins: the Upper Susquehanna-Lackawanna, the Upper Susquehanna-Tunkhannock, the Lower Susquehanna, the Lower Susquehanna-Swatara, the Lower Susquehanna-Penns, the Middle West Branch Susquehanna, and the Lower West Branch Susquehanna in Pennsylvania, and the Middle Potomac-Anacostia-Occoquan in Virginia. The majority of the actions identified in the table in appendix Q are within these same watersheds. Table 4.13.8-1 lists the other major recently constructed or proposed FERC-regulated projects within these watersheds and the waterbodies, wetlands, forestland, and open land affected by each project within the watershed.

The four largest sources of reported impairment for surface water quality and aquatic life are agriculture, abandoned mine drainage, source unknown, and urban runoff/storm sewers (PADEP, 2014h). Construction of the Atlantic Sunrise Project would temporarily contribute to the cumulative impacts on surface water associated with these past and present sources of surface water impairment. However, unlike the other primary sources of impairment, the potential for sedimentation and water quality impacts would be limited primarily to the periods of active construction. These effects would generally cease shortly after the crossing and hydrostatic testing are completed and the bed and banks and adjacent uplands are restored and revegetated. As described in section 4.3, Transco would implement mitigation measures to avoid or minimize direct and indirect impacts on surface waters. Many of the projects listed in appendix Q are located within the geographic scope of cumulative impacts we assessed, including the TL-465 Project, the Appalachian to Market Project, the Northeast Supply Link Project, and Rock Springs Expansion Project. Most of these projects were either constructed or will be constructed well before the proposed start of the Atlantic Sunrise Project. This separation in time will largely avoid the potential for cumulative surface water and groundwater impacts. However, the PennEast and CNYOG would potentially be constructed during the same timeframe as the Atlantic Sunrise Project, so the potential for cumulative impacts on resources, such as waterbodies, would be higher.

The Atlantic Sunrise Project would involve 388 waterbody crossings, including 229 perennial streams, 104 intermittent streams, 51 ephemeral streams, 3 ponds, and 1 area of open water It would also cross a total of 276 wetland areas and affect 46.3 acres of wetland, including 11.3 acres of forested wetlands. For the ten FERC-jurisdictional projects discussed in section 4.13.4, we were able to calculate potential cumulative impacts on waterbodies and wetlands using publically available project information and the 8-digit hydrologic unit codes boundaries as the ROI. For the purpose of grouping impacts, we have merged the 8-digit hydrologic unit codes into the four 6-digit hydrologic unit codes watershed basins that would be crossed by the Atlantic Sunrise Project. These projects would cross 5 waterbodies within the West Branch Susquehanna watershed basin; 114 waterbodies within the Upper Susquehanna watershed basin; and 115 waterbodies within the Lower Susquehanna watershed basin. No waterbodies would be crossed by these projects within the Potomac watershed basin. These projects would also affect about 0.3 acre of wetlands within the West Branch Susquehanna watershed basin; 17.0 acres within the Upper Susquehanna watershed basin; 11.1 acres within the Lower Susquehanna watershed basin; and 0.1 acre within the Potomac watershed basin. The potential surface water and wetland impacts of the transmission and distribution lines and the Owego pipeline and Zick Compressor Station discharge pipeline are unknown but, based on the lengths of the projects, the impact would likely be less than the FERC-jurisdictional projects.

TABLE 4.13.8-1

FERC-Jurisdictional Projects Located Within the Region of Influence of Cumulative Effects for the Atlantic Sunrise Project

Watershed/Project Name and Facility	Subbasin (Hydrologic Unit Code [HUC] 8)	Number of Waterbodies Crossed	Wetland Impacts (acres)		Upland Forest Impacts (acres)		Open Land Impacts (acres)	
			Construction (total/forested)	Operation (total/forested)	Construction	Operation	Construction	Operation
West Branch Susquehanna								
North East Supply Link – Muncy Loop	Lower West Branch Susquehanna	5	0.3/0.0	0.2/0.0	5.3	2.0	10.5	1.9
Subtotal		**5**	**0.3/0.0**	**0.2/0.0**	**5.3**	**2.0**	**10.5**	**1.9**
Upper Susquehanna								
Leidy Southeast Expansion – Dorrance Loop	Upper Susquehanna-Lackawanna	10	3.4/0.3	0.4/0.1	19.9	3.1	45.7	6.1
MARC II Pipeline [a]	Upper Susquehanna Lackawanna and Upper Susquehanna Tunkhannock	No data	No data	No data	No data	No data	No data	No data
Northeast Upgrade – Loop 317	Upper Susquehanna-Tunkhannock	37	5.3/1.9	0.4/0.4	25.2	7.1	13.1	1.9
Northeast Upgrade – Loop 319	Upper Susquehanna-Tunkhannock	2	2.8/0.3	0.2/0.1	2.2	0.5	5.2	1.3
Constitution Pipeline	Upper Susquehanna-Tunkhannock	25	4.1/0.2	0.2/0.1	224.0 [b]	113.4 [b]	50.3 [b]	11.8 [b]
Uniondale Expansion Project	Upper Susquehanna-Tunkhannock	0	0.0/0.0	0.0/0.0	0.0	0.0	0.0	0.0
Penn East Pipeline Project	Upper Susquehanna-Lackawanna	40	1.4/0.2	0.5/0.1	183.7 [b]	118.2 [b]	27.7 [b]	0.0 [b]
Subtotal		**114**	**17.0/2.9**	**1.7/0.8**	**455.0**	**242.3**	**142.0**	**21.1**
Lower Susquehanna								
Rock Springs Expansion Project	Lower Susquehanna	10	2.1/1.1	0.3/0.0	20.0	5.9	13.8	1.4

TABLE 4.13.8-1 (cont'd)

FERC-Jurisdictional Projects Located Within the Region of Influence of Cumulative Effects for the Atlantic Sunrise Project

Watershed/Project Name and Facility	Subbasin (HUC 8)	Waterbodies Crossed	Wetland Impacts (acres)		Upland Forest Impacts (acres)		Open Land Impacts (acres)	
			Construction (total/forested)	Operation (total/forested)	Construction	Operation	Construction	Operation
Texas Eastern Appalachia to Market 2014 – Perulack West	Lower Susquehanna-Swatara	12	0.3/0.0	0.1/0.0	15.2	4.8	9.8	1.4
Texas Eastern Appalachia to Market 2014 – Perulack East	Lower Susquehanna-Swatara	11	2.3/0.0	0.1/0.0	4.9	2.2	17.9	3.0
Texas Eastern Appalachia to Market 2014 – Shermans Dale	Lower Susquehanna-Swatara	47	1.7/0.1	0.2/0.0	44.8	9.1	50.1	8.3
Texas Eastern Appalachia to Market 2014 – Grantsville West	Lower Susquehanna-Swatara	16	2.2/1.5	0.9/0.8	3.3	0.3	8.0	9.0
Texas Eastern Appalachia to Market 2014 – Grantsville East	Lower Susquehanna-Swatara	19	2.5/0.3	0.8/0.1	5.7	2.3	4.0	0.8
Subtotal		**115**	**11.1/3.0**	**2.4/0.9**	**93.9**	**24.6**	**103.6**	**23.9**
Potomac								
TL-465 Pipeline Replacement Project	Middle Potomac-Anacostia-Occoquan	0	0.1/0.0	0.1/0.0	0.0	0.0	8.7	0.0
Subtotal		**0**	**0.1/0.0**	**0.1/0.0**	**0.0**	**0.0**	**8.7**	**0.0**

[a] Project is in preliminary stages and no detailed data are available.

[b] Land use impacts specific to the HUC 8 could not be determined. Impacts listed for these projects include the entire portion within Pennsylvania. Actual potential cumulative impacts for these projects would likely be less than the numbers listed in this table.

Neither the Atlantic Sunrise Project nor to our knowledge any of the other actions would involve the permanent filling of waterbodies or construction of new permanent diversions or dams. Therefore, the only impacts on surface waters would be temporary and mostly associated with active construction activities, ceasing upon settling of turbidity and proper restoration and stream bank revegetation. The greatest of these potential impacts would be an increase in sediment loading to surface waters and an increase in internal sediment loading due to channel/floodplain instability as a result of a change in erosion/deposition patterns. The level of impact would depend on precipitation events, sediment loads, stream area/velocity, channel integrity, bed material, and the proposed construction and restoration methods. These impacts would be avoided or minimized by Transco's implementation of its ECP, Plan and Procedures, and Spill Plan, and Transco's use of the HDD and other dry crossing methods for all but a few of the crossings. Pursuant to their respective regulations, FERC, the USACE, and state agencies would require similar mitigation be implemented by the sponsors of the other major listed actions, although it is possible that some of the smaller scale projects would not implement these measures. Collectively, these measures would reduce the cumulative impacts on the watersheds encompassing the waterbodies that would be affected by the Atlantic Sunrise Project.

Concerns have been raised regarding the potential impact of Marcellus Shale development on surface water resources. We do not have information about the amount of water withdrawals associated with Marcellus Shale development within each of the watersheds or subbasin watersheds that would be affected by the Project, but about 1.9 million gallons of water per day is used for Marcellus Shale development in the state of Pennsylvania, or about 0.02 percent of the 9.5 billion gallons of water withdrawn (from surface or groundwater sources) in Pennsylvania per day for all general uses and consumption (Governor's Marcellus Shale Advisory Commission, 2011). The Susquehanna River Basin Commission (SRBC) is responsible for reviewing all consumptive water uses in the Susquehanna River basin, including water used for shale gas production. For each action, the SRBC reviews whether a proposed withdrawal would cause adverse impacts on other water uses, fish, wildlife, threatened and endangered species, recreation, flow regime, and other resources, and can place conditions on any approval, if it chooses to do so, to protect these resources. The Atlantic Sunrise Project would require about 72 million gallons of water during construction, primarily for hydrostatic testing. The SRBC does not consider hydrostatic test water as a consumptive use. The proposed one-time use of water by the Atlantic Sunrise Project would account for about 0.64 percent of the total water withdrawn per day in Pennsylvania for a short period of time, after which water withdrawals associated with the Project would be negligible, thus the Project would not contribute significantly to cumulative water use impacts.

Flowback water from fracking operations could also threaten water quality. Operators report that about 15 percent of the 4 to 5 million gallons of water used on average to fracture a Marcellus Shale well is returned to the surface. The flowback water contains pollutants of concern, particularly high levels of total dissolved solids (TDS); however, some of the municipal waste treatment plants that well drillers previously used to treat and dispose of the flowback water were unable to adequately remove the total dissolved solids to meet state drinking water standards. At the request of the Governor, the Pennsylvania well drilling industry agreed to cease taking flowback water to waste treatment plants lacking the appropriate technology to remove total dissolved solids. The PADEP's Chapter 95 regulations address the remaining treatment facilities and eliminate any potential cumulative impact from natural gas development wastewater discharges (Governor's Marcellus Shale Advisory Commission, 2011). Well drillers are also implementing other measures, such as recycling, to reduce the volume of flowback water for treatment and disposal. Furthermore, as previously noted, the PADEP requires operators to implement BMPs during construction and operation of upstream facilities, including wells and gathering systems, to avoid or reduce potential impacts on sensitive resources, including water resources. The Atlantic Sunrise Project does not involve fracking and thus would not contribute to cumulative impacts associated with flowback water from fracking. The pipeline facilities to be hydrostatically tested would consist of new internally coated steel pipe that would be free of chemicals and lubricants, and Transco does not propose to use any chemical additives for drying or other purposes. Transco would also comply with any stipulations within the authority of the SRBC and PADEP through the water withdrawal or discharge application approval processes.

We do not have information about the specific wetland functions and values affected by the projects listed in appendix Q, but the construction and operation of these projects would result in a loss of some wetland functions. One of the primary impacts of utility corridors on functions and values is the long term loss or permanent conversion of woody wetlands, especially forested wetlands, to maintained emergent wetlands. We do not have information regarding these conversion impacts for all of the projects listed in appendix Q, but we evaluated to the extent possible the wetland conversion impacts of the other FERC-regulated projects within the same watersheds as the Atlantic Sunrise Project. As indicated in table 4.13.8-1, within the West Branch Susquehanna and Potomac watersheds, these other projects would result in less than 0.2 acre of forested wetland impacts within each watershed, and no permanent conversion of forested wetlands to emergent or scrub shrub wetlands. In the Upper Susquehanna watershed, these other projects would result in 17.0 acres of total wetland impacts, including 1.7 acres of forested wetland impacts, of which 0.8 acre would be permanently converted from forested wetland to scrub shrub or emergent wetland. In the Lower Susquehanna watershed these other projects would result in 11.0 acres of total wetland impacts, including 2.4 acres of forested wetland impacts, of which 0.9 acre would be permanently converted from forested wetland to scrub shrub or emergent wetland.

The Atlantic Sunrise Project facilities would contribute to the cumulative impacts on wetland functions and values within these watersheds. Transco would mitigate unavoidable construction-related impacts on wetlands associated with the Project by implementing the wetland protection and restoration measures contained in its Procedures and by complying with the conditions of any wetland permits issued by the USACE and state agencies, as well as compensatory mitigation requirements. Pursuant to federal and state regulations, similar mitigation would be required for any unavoidable wetland impacts associated with the other projects listed in the table in appendix Q. Although construction of the Atlantic Sunrise Project along with the other actions in the ROI would result in the conversion or reduction in the amount of forested and woody wetlands in the vicinity, the creation of new wetlands and restoration or enhancement of existing wetlands as may be required by the USACE and individual states for the larger projects would mitigate for these impacts and minimize any cumulative wetland effects.

We also received a comment on the draft EIS that we did not address the cumulative impact of existing utility corridors on waterbodies and wetlands, especially exceptional value wetlands where the Atlantic Sunrise Project would be collocated with these corridors. As described above, the Atlantic Sunrise Project's impacts on surface waters would be temporary and mostly associated with active construction, ceasing upon restoration and stream bank revegetation. As such, we do not believe the collocation of the Project with other utility corridors would meaningfully increase cumulative impacts on surface waters. Conversely, there would be cumulative impacts on wetlands associated with collocating with existing rights-of-way. The cumulative impact could include re-disturbing or expanding the disturbance of wetlands previously affected by other projects. This could include remixing of previously disturbed soils, clearing previously disturbed and recovering wetland vegetation, and expanding the area of impact including the conversion of forested wetland habitats to scrub shrub and emergent wetland habitats associated with the long term or permanent widening of an existing corridor.

We reviewed the wetlands, including exceptional value wetlands that would be affected by the Atlantic Sunrise Project where it is collocated with existing rights-of-way (table 2.2.1-1 identifies where the Project pipelines are collocated with existing rights-of-way). In the Upper Susquehanna watershed, which includes the CPL North and part of the CPL South pipelines, the Project would cross 57 wetland areas, and impact 17.8 acres of wetlands where the Project is collocated with other existing rights-of-way. Twenty-eight (28) of these wetland areas, totaling 9.6 acres, are exceptional value wetlands. Most of the wetland impact would involve emergent wetlands, but 3.2 acres are forested wetlands and 1.9 acres are scrub shrub wetlands, of which 1.2 acres of forested and 1.3 acres of scrub shrub are exceptional value wetlands. In the Lower Susquehanna watershed, which includes most of the CPL South route, the Project would cross 10 wetland areas, and impact 2.0 acres of wetlands where the Project is collocated with other existing rights-of-way. Two (2) of these wetland areas, totaling 0.8 acre, are exceptional value wetlands. A little more than half of the wetland impact (1.2 acres), including 75 percent of the impact on exceptional value wetlands would involve forested wetlands. Within the West Branch Susquehanna watershed, which includes both the Chapman and Unity Loops, the Project would cross 15 wetland areas, and impact 2.3 acres of wetlands where the Project is collocated with other existing rights-of-way. All of these wetland areas are exceptional value wetlands. Most of the impact would involve emergent wetlands, but 0.3 acre of the affected area would be forested wetlands. Within the Potomac watershed, which includes the Mainline A and B Replacements, the Project would cross 9 wetland areas, and impact 2.2 acres of wetlands where the Project is collocated with other existing rights-of-way. All of these wetland areas are emergent wetlands. By its collocation with existing rights-of-way where it crosses these wetlands, the Atlantic Sunrise Project facilities would contribute to the cumulative impacts on these previously affected wetlands.

4.13.8.3 Vegetation and Wildlife

Right-of-way clearing and grading and other construction activities associated with the Atlantic Sunrise Project along with some of the other past, present, and future actions listed in the table in appendix Q would result in the removal of vegetation; alteration of wildlife habitat; the temporary displacement of wildlife; and other potential secondary effects such as increased population stress, predation, and the establishment of invasive plant species. As described in more detail in sections 4.5 and 4.6, the construction of the Atlantic Sunrise Project would affect about 3,309.3 acres of vegetated land, including about 1,054.5 acres of forested[51], 2,219.8 acres of open land and agricultural vegetation, and 35.0 acres of non-forested wetland. The effect of clearing would be greatest during and immediately following construction and would diminish when the disturbed areas are restored and revegetated and the wildlife that were displaced during construction return. Some long-term impacts would result from the ongoing maintenance of vegetation. However, these effects would be smaller in scale than the disturbance associated with construction. The effect of vegetation clearing would be greatest on forest-dwelling wildlife species because it would fragment the forest habitat, and it could be decades before the forests return to preconstruction conditions. Additionally, the removal of forest and the resulting forest fragmentation would be permanent within the areas that are maintained to operate the facilities (e.g., the permanent right-of-way). For the Atlantic Sunrise Project, these permanent effects would include the loss of about 432.1 acres of forested land (425.8 acres of upland forest and 6.3 acres of forested wetland).

Cumulative vegetation and wildlife impacts would be most likely to occur where the other actions are constructed within the same timeframe and areas as the proposed Atlantic Sunrise Project and in forested areas where it would take longer for the preconstruction habitat to recover. The precise vegetation and wildlife habitat impacts of many of the actions listed in the table in appendix Q are unknown, but information is available that allows us to estimate the cumulative impacts of several of the projects. For the ten FERC-jurisdictional projects discussed in section 4.13.4, we were able to calculate potential cumulative impacts on upland forest using publically available project information and the 8-digit hydrologic unit codes boundaries as the ROI or geographic scope of potential cumulative impact. For the purpose of grouping impacts, we merged the 8-digit hydrologic unit codes into the four 6-digit hydrologic unit codes watershed basins that would be crossed by the Project. Construction of these projects would affect about 5.3 acres of upland forest within the West Branch Susquehanna watershed basin; 455.0 acres within the Upper Susquehanna watershed basin; and 93.9 acres in the Lower

[51] Forested land includes upland forest and forested wetlands.

Susquehanna watershed basin. Of these impacts, 2.0 acres would be permanent operational impacts for the West Branch Susquehanna, 242.3 acres for the Upper Susquehanna, and 24.6 acres for the Lower Susquehanna. The combined long-term impacts of these actions on forests and associated wildlife habitat in the vicinity of the Project would comprise hundreds of acres. The Atlantic Sunrise Project would add to this long-term impact.

The Owego pipeline and associated Zick Compressor Station discharge piping in Susquehanna County collectively comprise about 6.1 miles of pipeline, a little more than a third of which is forested. Assuming a 100-foot-wide construction right-of-way, these pipelines would disturb about 72 acres of land. About 28 acres of this land is forested, and assuming a 50-foot-wide permanent right-of-way about half of that or 14 acres would be permanently converted to open land to operate the pipelines. The two 69-kV extension electrical transmission lines in Lackawanna, Wyoming, and Columbia Counties to supply power to proposed Compressor Stations 605 and 610 would be 3.5 miles and 1.8 miles long respectively. Assuming each would require a 100-foot-wide construction and permanent right-of-way, these power lines would disturb 42 and 22 acres of land, respectively. About half of the route of the longer power line is forested, thus its development would permanently affect about 21 acres of forestland. The route of the other power line is less forested, and it would permanently affect about 7 acres of forestland.

Marcellus shale development would also contribute to the cumulative vegetation and wildlife impacts. A recent assessment of the land requirements and impacts associated with natural gas wells determined that about 9 acres of land is necessary for each well pad and associated infrastructure (roads, water impoundments, and pipelines). This same assessment concluded that an additional 21 acres of indirect edge effects results from each well (Johnson et al., 2010). Based on these assumptions, the development of 340 wells (the number of wells estimated to supply the volumes associated with the Atlantic Sunrise Project for about a year) could affect 3,060 acres of land and have indirect land effects totaling 7,140 acres, much of which is probably forested.

More distant actions, and linear actions constructed before the Atlantic Sunrise Project, that have been restored and revegetated would contribute less to the cumulative impacts on vegetation and wildlife. However, the cleared rights-of-way associated with these actions would contribute to the long-term cumulative loss and fragmentation of forestland and associated wildlife habitat. The Project, combined with all of the other nearby projects, would contribute to the cumulative long-term permanent loss of forest, including interior forest habitat. This in turn would have a cumulative impact on the interior forest species that use these habitats. The most recent U.S. Forest Service forest inventory report using data from 2009 indicates that the amount of forest cover in Pennsylvania hovers at about 59 percent of total land area or about 16.7 million acres. The percentage of timberland has decreased slightly since the 1950s and the U.S. Forest Service estimates that Pennsylvania has 3.4 percent fewer trees than it did when a similar report was completed in 2004. However, while the number of trees has dropped slightly, the estimated volume of trees has increased. Between 2004 and 2009, the average volume per acre of Pennsylvania forest increased by 60 cubic feet, from 2,138 to 2,198 cubic feet. Moreover, the overall net growth-to-removals ratio was 2:1 for both forestland and timberland, indicating that forests are growing twice as much wood than is being harvested. Specifically, the overall growth-to-removals for public and private ownerships were 2.7:1 and 1.8:1, respectively. The loss of forestland in Pennsylvania is due primarily to the conversion of forestland to development (67 percent). Forest conversion, fragmentation, and parcelization are separate but highly related phenomena, cumulatively contributing to the process of land being divided into smaller, less contiguous units as forest ownership continues to change hands. Regionally, the data indicate some parts of the state are gaining forest cover while others are losing it. This trend has been occurring since the mid-1960s as the forest recovered from heavy cutting in the late 1800s and early 1900s, which reduced the forested acreage in Pennsylvania to an estimated 9 to 13 million acres. Land-use patterns suggest that the amount of forested acreage has remained stable because losses caused by development in the Southern Tier have been offset by gains resulting from agriculture declines in the Northern Tier counties (U.S. Forest Service, 2013).

The Atlantic Sunrise Project would permanently affect more than 100 acres of interior forest habitat. The potential effects of the Project on these areas are evaluated in section 4.5.3. This loss of forest interior habitat would add to the cumulative impact on forest interior habitat regionally but we are not aware of other major recently constructed or future projects within the geographic scope of our cumulative impact assessment that would affect the same interior forest habitats that would be affected by the Project. If a future pipeline or other development were to be collocated with the Project in these areas, it would increase cumulative impacts both as a result of direct impacts and indirect impacts including increased edge effects. As described in section 2.2.1.1 and listed in table 2.2.1-1, approximately 53.6 miles or 27 percent of the Project would be collocated with other existing utility corridors, principally the Transco Leidy Line, power lines, or Williams Field Services pipelines. The Atlantic Sunrise Project would widen these existing corridors, several of which border on interior forest habitats. Transco's installation of a new pipeline adjacent to existing corridors bordering on interior forest habitat would extend the edge effect into these areas, increasing the cumulative impacts on this habitat and reducing the acreage of the remaining interior forest habitat.

Transco has reduced the potential for cumulative impacts associated with the Atlantic Sunrise Project by collocating the pipeline and aboveground facilities where possible with existing rights-of-way and existing aboveground facilities. Following construction, Transco would revegetate disturbed areas and monitor these areas to ensure revegetation is successful. Previously forested areas occupying the temporary right-of-way and other temporary workspaces would be allowed to regrow, and vegetation maintenance on the permanent right-of-way would be restricted. Specifically, routine vegetation maintenance of the permanent right-of-way would be limited to annual mowing of a 10-foot-wide strip centered over the pipeline, and mowing of the full width of the right-of-way in uplands would be performed no more frequently than once every 3 years. In wetlands, regular vegetation maintenance would be further restricted by limiting it to annual maintenance of a 10-foot-wide strip and the selective clearing of woody vegetation exceeding 15 feet in height that is within 15 feet of the pipeline centerline. Other FERC-regulated projects would be required to implement similar measures and restrictions. Marcellus Shale development projects would be required by state agencies and other federal agencies to implement similar revegetation measures designed to minimize the potential for long-term resource losses. However, we cannot say whether this would be the case for the other non-jurisdictional projects. Thus, cumulative impacts on vegetation and general wildlife resulting from the Atlantic Sunrise Project, Marcellus Shale development, and other FERC-regulated and non-jurisdictional actions would be moderate, especially in areas of rapid ongoing development like Susquehanna County.

Potential cumulative effects on migratory birds would be similar to those described for wildlife as a whole and would include the temporary loss of habitat due to the initial clearing and the long-term loss of forested habitat due to the long recovery time to reestablish forest and ongoing vegetation maintenance activities. In particular, the Project would contribute to the cumulative impact on birds dependent on interior forest habitat by fragmenting interior forest stands including clearing a new corridor through a number of previous unbroken tracts of forest, and in other areas expanding the width of existing rights-of-way bordering interior forests. The Project would also increase edge effects that would extend the impacts on interior forest and the species that depend on them beyond the directly affected area. Concerns regarding migratory birds primarily relate to direct impacts resulting in the loss of migratory birds and the effects on nesting birds. While pipeline projects result in the long-term loss of forested habitat and thus impact birds that use this habitat, the majority of FERC-regulated projects, including the Atlantic Sunrise Project have implemented measures to avoid nesting birds. For example, Transco would avoid mortalities or injuries to breeding birds and their eggs or young by clearing vegetation outside of the breeding season to the extent practicable, particularly in key habitat areas. Transco would also conduct vegetation maintenance activities during the operations phase of the Project outside of the breeding season.

The cumulative impact on migratory birds would be additionally mitigated by the restoration and revegetation of disturbed areas and by Transco's implementation of the *Migratory Bird Plan* described in section 4.7.2 and plans implemented by the proponents of other actions.

4.13.8.4 Fisheries and Other Aquatic Resources

Cumulative impacts on fisheries and other aquatic resources could occur if other actions take place within the same segment of a waterbody and have similar construction timeframes as the Atlantic Sunrise Project or result in permanent or long-term impacts on the same or similar habitat types. The potential effects of the Atlantic Sunrise Project are described in section 4.6.2, and include increased sedimentation and turbidity, habitat alteration, stream bank erosion, entrainment or entrapment due to water withdrawals or construction crossing operations, blasting, and the potential for spills and releases of hazardous materials into waterways. All of these effects would be temporary and limited to the construction and restoration period. Impacts on fisheries during operation of the Atlantic Sunrise Project would be negligible and limited to the effects of vegetation maintenance where the right-of-way crosses each waterbody. Impacts could include increased solar radiation and possibly associated water temperature effects. The magnitude of these operational effects would be minor due to the narrow width of the right-of-way. Most of the actions listed in the table in appendix Q are located within the same watersheds as the Project and could have similar effects as the proposed Project on fisheries and other aquatic resources. There is a potential for cumulative impacts if one or more of these projects crosses the same waterbodies or sub-watersheds in the same area and same general timeframe as the Atlantic Sunrise Project. While we are not aware of any other planned or proposed actions that would cross waterbodies at the same time and location as the Project, some, particularly those that cross or intersect with the Project, would affect the same sub-watersheds. These are discussed in more detail section 4.13.8.2 above.

Transco has proposed measures that would reduce the potential for cumulative impacts. These include implementation of its Plan and Procedures as well as adherence to its Spill Plan and compliance with state erosion control permits. Specific measures include installing sediment barriers at the edges of waterbodies, utilizing dry crossing methods for crossing coldwater fishery streams, completing crossings and restoring streambed and stream banks quickly, using temporary bridges to transport equipment across waterbodies, revegetating steam banks following construction, adhering to strict storage and refueling procedures near waterbodies, and dewatering through filtering devices and in well-vegetated areas to prevent silt-laden water from entering streams. The other FERC-regulated and state-regulated actions would be required to implement similar protective measures. As such, none of these impacts are expected to be cumulatively significant.

4.13.8.5 Special Status Species

Transco and the sponsors of all other actions are required to consult with the appropriate federal, state, and local agencies to identify special status species that may be found in the area of the actions; evaluate the potential impacts of their proposed activities on any identified species; and to implement measures to avoid, minimize, or mitigate impacts on special status species and their habitat. To support these consultations, Transco also conducted surveys for both federally and state-listed species including the:

- Indiana bat;
- northern long-eared bat;
- eastern small-footed bat;
- Allegheny woodrat;

- bog turtle;
- timber rattlesnake;
- northeastern bulrush;
- harperella; and
- several state-listed plants.

As described in section 4.7, we have determined that the Project *may affect, but would not likely adversely affect* four federally listed species: the northern long-eared bat, Indiana bat, bog turtle, and northeastern bulrush. Our determination is based on the current status of each species, which takes into account past effects as well as the direct, indirect, and incremental cumulative impacts on each species and its habitat and is consistent with the *Endangered Species Consultation Handbook Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act* (Handbook).

We received comments on the draft EIS that cumulative impacts on bog turtle, northeastern bulrush, and timber rattlesnake were not properly disclosed. Our assessments of federally listed and state-listed species are included in sections 4.7.2 and 4.7.3, respectively.

The FWS is required to consider cumulative effects when it formulates opinions. As stated in the Handbook, cumulative effects include effects of future state, tribal, local, and private actions, not involving a federal action, that are reasonably certain to occur within the action area under consideration. The "reasonably certain to occur" clause is a key factor in assessing and applying cumulative effects in biological opinions. First, cumulative effects involve only future non-federal actions: past and present impacts of non-federal actions are part of the environmental baseline. The environmental baseline is a "snapshot" of a species' health at a specified point in time. Speculative actions that may never be implemented are not factored into the "cumulative effects" analysis.

We also note that protection of threatened, endangered, and other special status species is part of the federal and state permitting processes, cumulative impacts on such species would be reduced or eliminated through conservation and mitigation measures identified during those relevant permitting processes. Consequently, we conclude that past and present projects in combination with the Atlantic Sunrise Project would have minor cumulative effects on special status species.

4.13.8.6 Land Use, Recreation, Special Interest Areas, and Visual Resources

Land Use

The Atlantic Sunrise Project in combination with other foreseeable future actions listed in the table in appendix Q would result in temporary and permanent changes to current land uses. Construction of the Project (pipelines and new and modified aboveground facilities) would affect about 3,741.0 acres of land. The primary land use types affected during construction would be agricultural land (48 percent), upland forest (28 percent), open land (12 percent), and industrial/commercial land (7 percent). Transportation, residential, wetlands, and open water would make up the remaining 5 percent of land types affected during construction. The majority of land use impacts associated with the Atlantic Sunrise Project would be temporary because most land uses would be allowed to revert to prior uses following construction. However, about 1,235.4 acres of new land outside of Transco's existing permanent right-of-way would be permanently encumbered by new permanent easements associated with operation of the Project. The primary land uses that would be permanently and newly encumbered would be agricultural land (49 percent), upland forest (34 percent), and open land (10 percent). Agricultural, transportation, and residential lands; wetlands; and open water comprise the remaining 7 percent of land use types associated with the permanent right-of-way, aboveground facilities, and permanent access roads.

Of the actions listed in the table in appendix Q, those with the greatest potential for cumulative impacts on land uses are the other FERC-regulated pipelines, the non-jurisdictional project-related facilities, Marcellus Shale development, residential developments, and electric transmission lines that are within the 0.5-mile ROI or geographic scope of cumulative impact of the proposed Project would be constructed at the same time as the Atlantic Sunrise Project. These include:

- the Owego pipeline and associated Zick Compressor Station discharge piping in Susquehanna County;
- the ongoing Marcellus shale development in Susquehanna County;
- the two 69-kV extension electrical transmission lines in Lackawanna, Wyoming, and Columbia Counties to supply power to proposed Compressor Stations 605 and 610; and
- Transco's Rock Springs Expansion Project in Lancaster County.

As described in the cumulative impact analysis for vegetation and wildlife, the precise land use effects of the ongoing Marcellus shale development are difficult to discern. It has been estimated that about 9 acres of land is necessary for each natural gas well pad and associated infrastructure (roads, water impoundments, and pipelines) and that an additional 21 acres of indirect edge effects results from each well (Johnson et al., 2010). Based on these assumptions, the development of 340 wells (the number of wells estimated to supply the volumes associated with the Atlantic Sunrise Project) could affect 3,060 acres of land and have indirect land effects totaling 7,140 acres, the majority of which is probably forested. We estimate the Owego pipeline and Zick Compressor Station discharge piping would disturb about 72 acres of land. A little more than a third of this disturbance would be in forestland. The remainder would be mostly hayfields and pastureland. The two 69-kV electrical transmission lines in Lackawanna and Columbia Counties would disturb about 42 and 22 acres of land, respectively. Between one-third and one-half of this acreage would affect forestland, the rest would affect pasture and agricultural land. Transco's Rock Springs Expansion Project in Lancaster County will affect about 194.7 acres of land, in Pennsylvania. Most of this will be agricultural land but about 20 acres of forestland and 13.8 acres of non-agricultural open land will also be affected.

The Atlantic Sunrise Project would contribute to the cumulative impact on land uses. Most of this effect would be in forested lands where tree clearing would have long-term or permanent effects. The cumulative impact of the Atlantic Sunrise Project and other actions on agricultural land and other non-forested land use types would be temporary because most land uses, including those on the permanent right-of-way, would be allowed to revert to prior uses following construction. Additionally, impacts would be minimized or mitigated through the use of resource-specific construction plans (for example, Transco's Plan and Procedures) and consultation with state and federal agencies and landowners.

Residences

We received a comment that the draft EIS did not address cumulative impacts on residences. As discussed in section 4.8.3.1 and shown in table O-2 in appendix O, the workspace for the Project would be within 50 feet of 152 residential and commercial structures. The Atlantic Sunrise Project would add to the cumulative impact on the residences in areas where the proposed facilities would be collocated with existing rights-of-way. This cumulative impact would include the widening of the existing corridors, loss of vegetation bordering the existing corridors, and the additional encumbrance of land associated with the new permanent right-of-way.

We reviewed where the Project workspace would be near residences and determined that there are 42 residences and townhouses, and 17 other structures within about 50 feet of proposed workspaces where the Project is collocated with existing rights-of-way. Most of these (24 houses and 11 garages, sheds, barns, and other structures) are along the CPL North route in Luzerne and Columbia counties, Pennsylvania. Where the CPL North route follows existing rights-of-way in the vicinity of the residences and structures, Transco's typical construction right-of-way would extend up to 60 feet outside of the existing right-of-way corridor, and its permanent right-of-way would increase the width of the existing corridor by 25 feet. There are seven residences and four garages, sheds, or other structures, primarily in Lancaster County, Pennsylvania, within about 50 feet of proposed workspaces where the CPL South route is collocated with existing rights-of-way. Where the CPL South route follows existing rights-of-way in the vicinity of the residences and structures, Transco's typical construction right-of-way would extend up to 90 feet outside of the existing right-of-way corridor and its permanent right-of-way would increase the width of the existing corridor by 50 feet.

In the other areas where the Project is collocated with existing rights-of-way, there are three houses within 50 feet of the proposed construction workspace along the Chapman Loop in Clinton County, Pennsylvania; three houses and a shed within 50 feet of the proposed construction workspace along the Unity Loop in Lycoming County, Pennsylvania; and five townhouses and one commercial building within 50 feet of the proposed construction workspace along the Mainline A and B Replacements in Prince William County, Virginia. Transco's typical construction right-of-way for the Chapman and Unity Loops where it follows existing rights-of-way in the vicinity of the residences and structures would extend up to 60 and 65 feet outside of the existing right-of-way corridor, respectively, and its permanent right-of-way would increase the width of the existing corridor by 25 feet. Along the Mainline A and B Replacements, all of the proposed workspace for the construction right-of-way and the permanent right-of-way would be within the existing right-of-way. As described in section 4.8.3.1, Transco has proposed several measures to minimize residential impacts, including reducing the construction right-of-way width near certain residences. These measures would help reduce but not eliminate cumulative vegetation, right-of-way widening, and encumbrance impacts on residences previously affected by existing infrastructure and utility corridors. Residential construction plans are included in appendix G.

There would also be a potential for cumulative impacts associated noise, dust, traffic, and other construction-related effects but these would only occur if another planned project was actively constructing in the same area at the same time. Although there are planned developments within 0.1 mile of a few of the existing residences and structures near the workspace for Atlantic Sunrise Project, we are not aware that any of these developments would be constructed at the same time as the Atlantic Sunrise Project. Therefore, we do not anticipate that the Atlantic Sunrise Project would contribute to cumulative residential impacts with the other projects listed in appendix Q.

Recreation and Special Interest Areas

As described in section 4.8.5, a number of recreational or other special interest areas would be affected by the Atlantic Sunrise Project. The majority of impacts on these recreational and special interest areas would be temporary and limited to the period of active construction, which typically lasts only several days to several weeks in any one area. These impacts would be minimized by implementing Transco's ECP. Following construction, most open land uses would revert to their former uses. Longer-term impacts would occur in areas that are forested because of the time required to restore the woody vegetation to its preconstruction condition. Further, forestland within the new permanent right-of-way would be permanently affected.

We received comments regarding the cumulative impact assessment of recreational areas in the draft EIS. Specifically, commenters requested an expanded cumulative impact assessment of three areas:

the Appalachian Trail, Captain John Smith Chesapeake National Historic Trail or water trail, and Ricketts Glen State Park.

The Appalachian Trail would be crossed by CPL South at MP M-0200 0.1 in Lebanon County, Pennsylvania. The PennEast Pipeline Project would cross the Appalachian Trail in Carbon County, Pennsylvania, about 40 miles east of CPL South, and outside of the ROI or geographic scope of impact of the proposed Project. However, we evaluated other trail crossings within 10 miles of the proposed crossing by reviewing maps, aerial photography, and other electronically available data. The 10-mile area west of the proposed crossing is forested and not crossed by any other corridors except within 1 mile west of the crossing, where maps indicate there is one other natural gas pipeline crossing. However, the corridor associated with this crossing is not visible on aerial photography. Within 1.5 miles east of the proposed crossing, the Appalachian Trail is crossed by two smaller roads and Interstate Highway 81, which is a divided roadway. For the next 8.5 miles east of the proposed crossing, there is only one other road crossing and one other natural gas pipeline crossing of the Appalachian Trail (these crossings are about 6.8 to 7.1 miles east of the Interstate 81 crossing). We did not identify any planned projects within the ROI of the Appalachian Trail crossing.

Based on a review of aerial photography, the existing pipeline crossings of the Appalachian Trail are no longer visible and, except for occasional maintenance, would have little impact on the recreational experience of users of the trail. The existing roads would likely have a greater impact on recreational users of the trail. This impact would include long-term visual impacts as well as noise impacts associated with traffic that could likely be heard over a relatively long distance, especially in the case of the interstate, which has near constant traffic. The Atlantic Sunrise Project would add to cumulative visual and noise impacts experienced by recreationists, but the effect would be incremental and temporary. Any additional cumulative impact of the Atlantic Sunrise Project would be mitigated by Transco’s plan to bore the trail crossing, which would avoid vegetation clearing between the entry and exit sides of the crossing and leave a buffer of trees on either side of the trail. Furthermore, following installation of the trail crossing, Transco would restore the trees cleared from the workspaces at the entry and exit sides of the crossing. These measures would avoid direct impacts and limit indirect visual or construction noise impacts. Following construction, there would be no noise associated with the operation of the pipeline except periodic maintenance and mowing operations, which would be infrequent.

The Captain John Smith Chesapeake National Historic Trail is associated with the Susquehanna River. The Atlantic Sunrise Project would cross the Susquehanna River/water trail along CPL North at MP 35.0 and CPL South at MP 99.7. The CPL North crossing is not collocated with any other rights-of-way, but both sides of the crossing are located in open areas. There are a number of other crossings of the river within 10 miles of the proposed crossing including one existing road, two electric power transmission lines and two natural gas pipeline crossings south of the proposed crossing and one existing road, one electric power transmission line, and four natural gas pipeline crossings north of the proposed crossing. Additionally, there is existing development along the river banks including a road that generally parallels the river for several miles north and south of the proposed crossing and several residences and agricultural fields. The CPL South crossing location is collocated with an existing electric transmission line. The land uses on both sides of the river are largely agricultural interspersed with small isolated stands of forest. There is some development along the river within 10 miles of the proposed CPL South crossing and there are four road/rail crossings within 10 miles to the east and one road and several smaller electric transmission line crossings to the west.

All of the existing infrastructure mentioned above has had an impact on the existing visual and noise environment along the stretch of the river near the proposed Atlantic Sunrise Project crossing locations. Transco would use the HDD method for both crossings. This method would install the pipeline beneath the trail/river without directly affecting the river/water trail and avoid vegetation clearing between the entry and exit sides of the crossings. Transco's implementation of its ECP would minimize other indirect impacts on the river/water trail. The noise associated with the HDD would contribute to cumulative noise for several weeks; however, there would be no noise associated with the operation of the pipeline except periodic maintenance and mowing operations, which would be infrequent.

Recreational users of the river may experience noise impacts during construction that would add to the existing noise near the crossings. This effect would be temporary and would end when the HDD and other nearby construction activities are complete. Portions of the pipeline construction may also be visible from the river, but the cumulative visual effect of construction would diminish quickly following restoration and revegetation of the right-of-way. Most of the corridor near both Susquehanna River crossings would be located in open or agricultural areas, which would render portions of the pipeline corridor closest to the river crossings virtually unnoticeable once it is revegetated. This is particularly true of the CPL South crossing which is collocated with an electric transmission line corridor that is and would be much more visible than the buried pipeline. The Atlantic Sunrise Project would add to cumulative visual and noise impacts experienced by water trail users, but the effect would be incremental and mostly temporary.

Transco conducted a visual assessment of the Project to determine where the new permanent right-of-way may be visible from the Susquehanna River due to tree clearing and the post-construction vegetation maintenance and thus would have a long-term visual impact on the Captain John Smith Chesapeake National Historic Trail. A more detailed discussion of this assessment is included in section 4.10.2.

On CPL North, about 5.7 acres of the permanent tree removal associated with Transco's 50-foot-wide permanent right-of-way would visible from the Captain John Smith Chesapeake National Historic Trail (i.e., Susquehanna River). The visible areas would be between MPs M-0071 2.8 and 3.1 and MPs 34.3 and 34.8 on the west side of the HDD pipeline crossing, and between MPs 36.1 and 36.3 on the east side of the crossing. None of these areas would be where CPL North would be adjacent to existing rights-of-way. Along CPL South, about 6.6 acres of the permanent tree removal associated with the new 50-foot-wide permanent right-of-way would be visible from the Captain John Smith Chesapeake National Historic Trail. The visible areas would be between MPs 100.2 and 100.5 on the north side of the HDD crossing, and between MPs M-0179 0.1 and 0.26 and MPs M-0423 0.4 and 1.1. It is likely that some permanent tree removal along the CPL South right-of-way near MP 22.2 would also be visible from the river. All of these areas would be located adjacent to an existing (up to 200-foot-wide) electric powerline right-of-way. At these locations, the new corridors and widening of existing corridors associated with the permanent rights-of-way for CPL North and CPL South would contribute to the long-term cumulative visual impact of other past and current developments on the Captain John Smith Chesapeake National Historic Trail.

CPL North would cross the southernmost tip of Ricketts Glen State Park at two locations, once between MPs 7.4 and 7.9 and the other at MP 8.4, for a total crossing distance of about 0.5 mile in Luzerne County. The entire portion of CPL North within Ricketts Glen State Park is collocated with Transco's existing Leidy Line system. Transco proposes to use a 90-foot-wide right-of-way to construct CPL North, which would overlap Transco's existing right-of-way by 30 feet. A total of 4.9 acres of Ricketts Glen State Park would be affected during construction of the Atlantic Sunrise Project. Following construction, Transco would retain an additional 0.9 acre of permanent right-of-way within the park adjacent to its existing right-of-way. This would result in a cumulative incremental widening of the right-of-way and re-disturbance of areas previously disturbed by the installation of the existing pipeline. Transco's implementation of its ECP would minimize these effects and we do not believe the resulting cumulative effects would have a substantial impact on park uses or functions.

Based on the above, we conclude that the cumulative impacts on the Appalachian Trail, Captain John Smith Chesapeake National Historic Trail, and Ricketts Glen State Park associated with the construction and operation of the Atlantic Sunrise Project would also be minor.

Cumulative impacts on other recreational or special interest areas could result if the other foreseeable future actions listed in the table in appendix Q affect the same area at the same time as the Project. For example, potential visitors may choose not to visit a recreational area if they discover or assume a variety of ongoing construction activity, which could decrease their enjoyment of the area. At present, we are not aware of recreational areas that would be cumulatively affected by the Atlantic Sunrise Project and other potential actions. As a result, although the Project would affect recreation and special interest areas, we do not anticipate significant cumulative impacts on these areas.

Visual Resources

The visual character of the existing landscape is defined by historic and current land uses such as recreation, conservation, and development. The visual qualities of the landscape have been further influenced by existing linear installations such as highways, railroads, pipelines, and electrical transmission and distribution lines. All of the actions in the table in appendix Q would result on some visual impacts. Temporary visual impacts would be most evident during their construction due to clearing, grading, and other activities. These impacts would diminish following the construction and after the disturbed areas are restored and revegetated. The actions listed in the table in appendix Q that include new permanent aboveground facilities such as the proposed transmission lines, commercial/residential projects, and compressor and meter stations would have the greatest potential to cumulatively impact on visual resources. The new pipelines and transportation actions would have less visual impact. Pipelines would create new rights-of-way or, where collocated, would add to existing visual impacts by widening existing corridors; however, the actual infrastructure would be buried and out of site. The transportation actions generally involve improvements to existing infrastructure that would have only incremental visual effects.

The Atlantic Sunrise Project facilities would add incrementally to the cumulative visual impacts but the overall contribution would be relatively minor given that the majority of the Project facilities would be buried (i.e., the pipeline). About 53.6 miles or 27 percent of the pipelines would be collocated with other existing utility corridors, principally the Transco Leidy Line, power lines, or Williams Field Services pipelines. In these areas, the Project would contribute to widening existing corridors but would have less visual impact than in other areas where it would create a new corridor. Transco would promptly revegetate disturbed areas after construction, thereby limiting the duration of many of the visual impacts. The primary long-term cumulative visual effects of the Project would be the new aboveground facilities and the new permanent right-of-way through forested areas. Transco has reduced the potential for visual impacts by collocating the pipeline with other existing rights-of-way where possible (thus avoiding the creation of a completely newly cleared corridor) and is considering plantings in site-specific areas to screen the right-of-way from residences. The majority of aboveground facilities associated with the Project consist of modifications to existing structures that would be conducted within or adjacent to Transco's existing compressor station buildings and generally within the footprint of existing commercial/industrial properties. Transco's new compressor and meter stations would have greater visual impact on the surrounding areas. Other than the proposed non-jurisdictional electric transmission lines to supply power to new Compressor Stations 605 and 610, there are no other existing, recently constructed, or planned compressor stations or other similar major aboveground facilities associated with the projects listed in appendix Q that would add to the cumulative visual impact of the new compressor stations. Additionally, the visual effect of these would be reduced by Transco's implementation of site-specific mitigation measures (e.g., facility design, vegetation screening, minimal artificial lighting).

4.13.8.7 Socioeconomics

Present and reasonably foreseeable future actions and activities could cumulatively affect socioeconomic conditions in the ROI.

Employment

The actions considered in this section would have cumulative effects on employment during construction if more than one project is built at the same time. Transco has estimated that the Atlantic Sunrise Project would employ between 2,127 and 2,496 workers during construction, of which between 534 and 623 are expected to be local hires. Local hires could include surveyors, welders, equipment operators, and general laborers. Due to the relatively low populations, if other projects requiring similarly skilled workers are built at the same time, the demand for workers could exceed the local supply of appropriately skilled labor.

A small number of new permanent employees (estimated to be 15 people) would be hired to operate the Atlantic Sunrise Project, but this would not have a measurable cumulative impact on the economy or employment.

Temporary Housing

Temporary housing would be required for construction workers not drawn from the local area. The increase in demand for temporary housing would temporarily reduce vacancy rates throughout the project area. However, given the current vacancy rates and the number of rental housing units in the area, and the number of hotel/motel rooms available in the vicinity of the actions, construction workers should not encounter difficulty in finding temporary housing. Temporary housing is still expected to be available even if construction of the Atlantic Sunrise Project occurs at the same time as some of the other actions listed in the table in appendix Q, but it may be slightly more difficult to find and/or more expensive to secure. Regardless, these effects would be temporary, lasting only for the duration of construction, and there would be no long-term cumulative impact of the Atlantic Sunrise Project on housing due to the small number of permanent employees that would be hired.

Infrastructure and Public Services

The cumulative impact of the Atlantic Sunrise Project and the other actions listed in the table in appendix Q on infrastructure and public services would depend on the number of projects under construction at one time. The small incremental demands of several projects occurring at the same time could strain the ability of some local police, fire, and emergency service departments, particularly in rural areas. This problem would be temporary, occurring only for the duration of construction. Local jurisdictions would be aware of the levels of project activity and would likely plan accordingly by adjusting staffing levels or efforts. This could also be mitigated by the various project sponsors providing their own personnel to augment the local capacity or by providing additional funds or training for local personnel.

Traffic, including heavy equipment and material deliveries resulting from the Atlantic Sunrise Project, would increase wear and tear and could affect some road surfaces. In combination with the increased use of local roadways associated with other actions, this could accelerate the degradation of roadways and the need for early replacement of road surfaces. Transco has committed to repairing any roads damaged as a direct result of pipeline construction, which would reduce the cumulative effect of the project on roadways.

No long-term cumulative effects on infrastructure and public services are anticipated.

Transportation and Traffic

Construction of the Atlantic Sunrise Project could result in temporary impacts on road traffic in some areas and could contribute to cumulative traffic, parking, and transit impacts if other actions are scheduled to take place at the same time and in the same area. The local road and highway system in the vicinity of the Atlantic Sunrise Project is readily accessible by interstate highways, U.S. highways, state highways, secondary state highways, county roads, and private roads. However, the majority of the Project would be in rural areas and most of the roads affected by the project would be county or private roads. Transco has stated that it would utilize major highways, as well as the construction right-of-way to the extent practicable, to reduce impacts on local roadways.

Generally, Transco would complete construction of major road crossings and most high-volume state and local road crossings using conventional bore techniques, with little to no effect on road traffic. However, less traveled and smaller paved and unpaved roads and drives would be crossed using an open-cut trenching method. Where this occurs, traffic patterns would be affected. Transco would make provisions for detours and/or other traffic control measures (e.g., creating temporary travel lanes) to allow the continued flow of traffic during trenching activities. Transco states that it would further minimize impacts associated with road crossings through implementation of its *Traffic and Transportation Management Plan* (see attachment 16 of Transco's ECP).

The addition of traffic associated with construction personnel commuting to and from the Atlantic Sunrise Project would contribute to regional traffic congestion. However, any cumulative traffic impacts due to construction of the Project would be temporary and short term. Workers would generally commute to and from the pipeline right-of-way, contractor yards, or aboveground facility sites during off-peak traffic hours (e.g., before 7:00 a.m. and after 6:00 p.m.). In addition, Transco has committed to providing shuttle bus service from various off-site locations where practicable and would encourage workers to carpool to reduce potential effects on traffic flow and volume. Most of the other actions listed in the table in appendix Q would not have similar commuting schedules, either because they have already been constructed or because their construction schedules would not overlap with the construction schedule of the Atlantic Sunrise Project. The few actions that are scheduled to be constructed in the same area and time, such as the Rock Springs Expansion Project, Owego pipeline, and Zink Compressor Station discharge piping, and some of the oil and gas developments and gathering systems, transportation, and residential and commercial developments would increase road traffic and may contribute to cumulative road traffic impacts, but these effects would be mostly temporary and would diminish when construction of the facilities are completed.

The Atlantic Sunrise Project would not contribute to any long-term cumulative impact on the transportation infrastructure because only a small number of new permanent employees would be required to operate the proposed facilities.

Economy and Taxes

Based on estimates by researchers at the Pennsylvania State University, construction of the Atlantic Sunrise Project would have a positive effect on the regional economy. It is estimated that construction would result in $275 million in labor income and increased economic activity in the project area amounting to about $1.7 billion, which would help stimulate the local economy (Blumsack and Kleit, 2015). Construction would also have a positive impact on tax generation. In Pennsylvania, construction would generate about $16.9 million in state, corporate, personal income, excise, custom, production, and other sales and use tax revenues.

Workers involved in the construction of the Atlantic Sunrise Project could visit recreational areas or tourist sites during their off, non-working hours but any effect would be temporary and would not contribute to cumulative impacts on these resources.

Transco would acquire temporary and permanent easements to construct and operate the Atlantic Sunrise Project. Seven residential structures (one house associated with CPL North and four sheds and two houses associated with CPL South) are within the proposed construction workspace. Of these structures, two would intersect the pipeline centerline, including a house (seasonal hunting cabin) near MP 34.2 of CPL North and a shed near MP 65.2 of CPL South. Transco has compensated or would compensate the landowners for the relocation or removal of any residential structures. With the exception of the displaced residents and the lands required for aboveground facilities, Transco would not purchase lands in fee. Transco would pay negotiated or fair market value for easements, compensate landowners for any crop losses or other damages, and allow most preconstruction land uses (e.g., farming) to resume following construction.

4.13.8.8 Cultural Resources

Cumulative impacts on cultural resources could only occur if other actions were to affect the same historic properties affected by the Atlantic Sunrise Project. Impacts could include direct effects associated with ground disturbance and indirect effects on the viewshed that encompasses the areas adjacent to the Atlantic Sunrise Project. Only a small number of the actions listed in the table in appendix Q would be within the direct or indirect APE of the Atlantic Sunrise Project. Those that are defined as federal actions (this would include all of the FERC-regulated projects, federal highway projects, and other projects requiring USACE permits) would be required to develop mitigation measures designed to avoid or minimize additional direct impacts on cultural resources. Where direct impacts on significant cultural resources are unavoidable, mitigation (e.g., recovery of data and curation of materials) would occur before construction. Non-federal actions would need to comply with any mitigation measures required by the affected states. Transco developed project-specific plans to address unanticipated discoveries of cultural resources and human remains in the event they are discovered during construction. Therefore, the Project may incrementally add to the cumulative effects of other actions that may occur at the same time. However, this incremental increase would not be significant.

4.13.8.9 Air Quality and Noise

Air Quality

Construction and operation of the Atlantic Sunrise Project would contribute to cumulative air quality impacts. The combined impact of multiple actions occurring in the same airshed and timeframe as the Atlantic Sunrise Project could temporarily add to the ongoing air impacts in the project area. Potentially affected air resources include temporary and long-term air pollutant concentrations in ambient air and contribution of the Project's potential GHG emissions to state-wide total annual GHG emissions. The ROI or geographic scope of cumulative effects for air quality is the AQCRs crossed by the Project.

<u>Construction Emissions</u>

Construction emissions would be intermittent and temporary. The majority of emissions generated during construction would be particulate matter (PM_{10} and $PM_{2.5}$) in the form of fugitive dust that would result from clearing, grading, excavation, and vehicle traffic on paved and unpaved roadways. Typically, fugitive dust emissions settle quickly near the construction site. Transco's implementation of its FDCP would help ensure that project-related fugitive dust effects are intermittent and temporary and would remain within or very near the construction area. The actions identified in the table in appendix Q, including natural gas well development, natural gas gathering lines, and FERC- and non-FERC jurisdictional projects would likely result in similar fugitive dust effects. To a lesser extent, this would also likely be the case for the other types of projects in the table in appendix Q, including transportation projects and electric transmission line and distribution line projects. We expect most of these actions would also implement dust control measures. Due to Transco's implementation of the FDCP, the likely use of similar dust control measures by the other actions that could be constructed at the same time, and their distance from the Atlantic Sunrise Project, we do not anticipate any significant cumulative effects due to fugitive dust.

Construction of the Project and the actions identified in the table in appendix Q are expected to involve the use of heavy equipment that generate emissions of pollutants such as CO, particulate matter (PM_{10} and $PM_{2.5}$), NO_X, and GHGs. The type and quantity of equipment used would vary from site to site based on the type of facility under construction. Because pipeline construction moves through an area quickly, the air emissions associated with it would be intermittent and temporary. The majority of impacts would be further minimized because the construction schedules of most of the actions in the table are not expected to overlap with the Atlantic Sunrise Project and, even for those that do, it is unlikely that equipment would be operating in close proximity. Consequently, although these actions would result in intermittent and temporary construction air emissions, they are not likely to significantly affect cumulative long-term air quality in the region.

Construction at the proposed new and modified compressor station sites would be concentrated at a single location and would continue for a period of up to 12 months. Thus, there is a potential for cumulative construction-related air quality impacts if there are other significant construction projects in the vicinity of the compressor stations. Construction of Compressor Station 610 would overlap with the construction of the electric transmission line that would deliver power to the station. There are also several PennDOT projects that are either underway or planned within the ROI of Compressor Station 610. However, these actions consist primarily of bridge replacement or bridge rehabilitation work that would likely have negligible construction emissions. Thus, the cumulative air emissions of the actions near the Compressor Station 610 site would be minor.

Several PennDOT transportation infrastructure projects are either under construction, in development, or planned within the ROI of Compressor Station 605. These include bridge replacement or rehabilitation projects, roadway widening projects, or intersection improvement projects. The construction of these projects would produce intermittent and temporary construction emissions. As described above, these types of road projects would likely result in negligible emissions. Thus, the cumulative air emissions of the actions near the Compressor Station 605 site would be minor.

Construction activities at Compressor Stations 517, 520, and 190 would involve installation of an additional compressor unit at each station. As noted in section 4.11.1.3, construction emissions at each of these stations would be minor. Because there are no significant other actions near these compressor stations, we do not anticipate any cumulative construction emission impacts in these areas.

Based on Transco's September 2016 revised construction emission estimates, which compressed the construction schedule for the Project to one year (2017), the 2017 NO_X construction emissions for Lancaster County would exceed the General Conformity *de minimis* threshold. We developed a draft General Conformity Determination for the Project and issued it for public comment on November 3, 2016. Transco has committed to using ERCs to demonstrate conformity and is currently working with the PADEP and the EPA to verify the amount of ERCs required and the location from which the ERCs must be taken to offset the 2017 NO_X construction emissions for Lancaster County. Correspondence with the PADEP has indicated that the use of ERCs is an acceptable method for demonstrating compliance with the Pennsylvania State Implementation Plan and that sufficient NO_X ERCs are available. We requested additional information to allow us to prepare a final General Conformity Determination; however, based on information currently available, we conclude that the portions of the Project to which General Conformity would apply would conform to the Pennsylvania State Implementation Plan. Therefore, the NO_X construction emissions would not further contribute to the existing Lancaster County nonattainment area.

Operational Emissions

As described in section 4.11.1.3, emissions would be produced during operation of some of the Project facilities. The facilities with the greatest potential to contribute to cumulative air impacts are the proposed modifications at Compressor Stations 517 and 520 in Pennsylvania and Compressor Station 190 in Maryland. These involve installation of gas turbine-driven compressor units that burn natural gas and produce combustion emissions. Two of these stations, Compressor Station 517 in Columbia County, Pennsylvania and Compressor Station 520 in Lycoming County, Pennsylvania, are currently under expansion as part of the Leidy Southeast Expansion Project. Specifically, Transco is adding 33,500 hp of new compression at Compressor Station 517 and 20,500 hp of new compression at Compressor Station 520. This new compression will be operational before the proposed construction date for the Atlantic Sunrise Project and thus would contribute to the cumulative air emissions in the areas surrounding Compressor Stations 517 and 520.

New Compressor Stations 605 and 610 in Pennsylvania would use electric-driven compressor motors that do not produce direct operational emissions; and thus would not contribute to a cumulative emission impacts. The other facilities associated with the Project either do not involve major air emission-producing equipment or would include only additions of small emission sources such as emergency generators that would not produce significant operational emissions. Thus no cumulative operational air quality impacts are expected for facilities such as pipelines, modified valves or piping, odorizing and deodorizing facilities, communication equipment, new M&R stations, and pig launcher and receiver stations.

Cumulative operational emission impacts resulting from the modifications to Compressor Stations 517, 520 and 190 would be governed and mitigated by federal and state air quality permits. During the permit application review process at each state agency, emissions from these modifications would be compared to air permitting SERs to determine the extent of air quality analysis required to assess air quality impacts. Transco was required to undergo a similar regulatory review and assessment of impacts to obtain agency approval to construct the additional compression at Compressor Stations 517 and 520 for the Leidy Southeast Expansion Project. Although not yet operational, the estimated emissions from these new Leidy Southeast Expansion Project facilities would be accounted for in the air permit applications filed for the Atlantic Sunrise Project.

The proposed Atlantic Sunrise Project modifications qualify as minor permit modifications with emissions changes below the SERs, thus these proposed compressor station modifications do not trigger further analysis under the federal PSD or NNSR regulations. The minor modifications proposed to be authorized at Compressor Stations 517, 520, and 190 would be operated in compliance with applicable air regulations; including stack testing, recordkeeping, reporting, and monitoring requirements in order to establish compliance with enforceable emission standards.

Some of the actions identified in the past, present, and reasonably foreseeable actions listed in the table in appendix Q are or would be minor operational emission sources. These would have little to no potential to contribute to the cumulative operational impact of Compressor Stations 517, 520, and 190. These actions with minor operational emissions include other gas transmission company pipelines and pipeline loops (not including compressor stations), electric transmission and distribution lines, transportation projects (e.g., bridge replacement/rehabilitation, intersection improvements, and road widening projects), and residential and commercial developments.

We evaluated the emissions associated with the Project, along with background air quality data and existing emission sources, to ensure that air emissions from the Project do not contribute to a significant cumulative impact to air quality in the vicinity of Compressor Stations 517, 520, and 190. We reviewed an air modeling analysis that showed that the project emissions and background air quality would not cause a violation of ambient air quality standards; however, we also requested that Transco include existing emissions from Compressor Stations 517, 520, and 190 in the analysis. Transco requested to complete on-site air quality monitoring at these three compressor station sites. This monitoring data was useful in assisting us to evaluate potential cumulative air quality impacts, the monitoring data for Compressor Stations 517 and 520 was collected while these stations were operating at partial load, and the monitoring data for Compressor Station 190 was collected while the station was not operating.

To further evaluate potential cumulative air quality impacts, FERC staff conducted a supplemental modeling analysis for Compressor Stations 517, 520, and 190 to present potential impacts associated with the operation of the existing emission sources at these stations, along with the proposed new sources, including monitored background. Based on this analysis, the existing sources at Compressor Stations 517, 520, and 190 are shown to be in compliance with the NAAQS for all pollutants, with the exception of the one-hour NO_2 standard at Compressor Stations 517 and 520. Based on the modeling analysis, modeled concentrations for one-hour NO_2 for existing sources at Compressor Stations 517 and 520 have the potential to exceed the NAAQS during some operating scenarios and meteorological conditions. However, the new emission sources associated with the Project would not incrementally contribute to the potential exceedance of the one-hour NO_2 standard. The potential exceedances in the model are based on existing equipment and would not be caused or significantly contributed to by the Project. To ensure that the operation of Compressor Stations 517, 520, and 190 do not result in a violation of the NAAQS, we are recommending that Transco continue to operate the air quality monitoring stations at Compressor Stations 517, 520, and 190 for a period of 3 years after the newly modified facilities begin operation. In the event that the air quality monitoring shows a violation of the NAAQS, we are recommending that Transco immediately contact the state air quality agency to report the violation and establish a plan of action to correct the violation in accordance with the terms of the facility air permit and applicable state law.

While these monitoring data do not suggest any current or future violations of NAAQS, we requested additional data from Transco to allow us to evaluate the full range of potential air quality impacts associated with these stations operating at full load for inclusion in the final EIS.

The other large emission source actions in the table in appendix Q include multiple compressor stations (Gibson, Lathrop, Miller, Teel, White, and Zick) in Susquehanna County Pennsylvania; a compressor station (Wilcox) in Wyoming County, Pennsylvania; and the Tenaska Lebanon Valley Generation Station near Lebanon, Pennsylvania. The cumulative air quality impact of these facilities in the areas where Transco's compressor station modifications would be located is minor due to the significant distance between these facilities and Transco's stations. Specifically, all of the listed compressor stations in Susquehanna County would be between 51 and 175 miles away from Compressor Stations 517, 520, and 190. The compressor station in Wyoming County would be between 28 and 163 miles away; and the Tenaska Lebanon Valley Generation Station near Lebanon would be between 61 and 82 miles away. As the emissions from each of these sources are transported away, they would disperse and mix with ambient air. At the distances listed, the potential for these emissions to contribute to cumulative air quality impacts in the vicinity of Compressor Stations 517, 520, and 190 would be minor. In addition, each of these actions is or would be regulated by air permits that would limit emissions to federally approved levels in order to minimize impacts on existing air quality.

There are gas wells to the north and west of Compressor Stations 517 and 520 within the ROI of each station. Each of the wells would need to comply with applicable air regulations, including emission controls required by regulations, which would minimize their impact on local air quality. The potential for these wells to contribute to cumulative air impacts in the areas surrounding the compressor stations is low due to the differences in the compounds emitted from well sites compared to Transco's compressor stations and the small quantity of emissions typically produced at well sites.

Noise

The Project could contribute to cumulative noise impacts. However, the impact of noise is highly localized and attenuates quickly as the distance from the noise source increases; therefore, cumulative impacts are unlikely unless one or more of the actions listed in the table in appendix Q are constructed at the same time and location. Based on the schedule and proximity of these activities, there could be cumulative noise impacts in the vicinity of the new compressor stations and proposed compressor station modifications as a result of the construction of the transmission and distribution lines that would service them. There could also be some cumulative noise impacts along the pipeline route in Susquehanna and Lancaster Counties, Pennsylvania if the locations and schedules for construction of Williams Field Service's Owego pipeline and Zick Compressor Station discharge piping, and Transco's Rock Springs Expansion Project overlap with the Atlantic Sunrise Project. The majority of cumulative noise impacts, if any, would be intermittent rather than continuous, and limited to a short period of time during daytime hours when the construction activities are occurring at a given location.

Operation of the Atlantic Sunrise Project would result in noise from the compressors; emergency generators; and compressor, control building service equipment, and the meter or regulator stations. Long-term cumulative noise impacts would occur in the immediate area surrounding Compressor Station 517 in Columbia County, and Compressor Station 520 in Lycoming County, Pennsylvania. At both of these stations, Transco is in the process of adding additional compression as part of the Leidy Southeast Expansion Project.

Based on the mitigation measures proposed, we conclude that the noise impact of the Atlantic Sunrise Project would not have a significant effect on residents and the surrounding communities during operation. The cumulative noise impacts at Compressor Stations 517 and 520 would be affected by the existing sources and Transco's approved plan to add 33,500 hp of additional compression at Compressor Station 517 and 20,500 hp of additional compression at Compressor Station 520 as part of the Leidy Southeast Expansion Project. Prior to the Leidy Southeast Expansion Project, the existing noise levels at the closest NSAs to these compressor stations was 44.1 dBA L_{dn} at Compressor Station 517 and between 59.4 and 64.7 dBA L_{dn} at Compressor Station 520. The noise level at these NSAs after the addition of the Leidy Southeast Expansion facilities is predicted to increase by 2.5 dB at Compressor Station 517 and 0.3 dB at Compressor Station 520. The new compression associated with the Atlantic Sunrise Project would further increase the noise experienced at these NSAs. Specifically, the Atlantic Sunrise Project would increase the noise levels at the NSA closest to Compressor Station 517 by 1.8 dB and at the NSAs closest to Compressor Station 520 by between 0.1 and 0.3 dB. The combined effect of the two projects would result in noise levels 4.3 dB higher at the closest NSA to Compressor Station 517 and between 0.4 and 0.6 dB higher at the closest NSAs to Compressor Station 520 than what existed prior to the Leidy Southeast Expansion Project. The noise effect of the two projects would not be perceptible at the NSAs near Compressor Station 520, but the overall noise at the NSAs would exceed 55 dBA, mostly due to existing background sources. For this reason, we have recommended in section 4.11.2.3 that the noise from all the equipment operating at full capacity at Compressor Station 520 does not exceed the previously existing noise levels. At Compressor Station 517, the two projects would produce an increase in noise that is considered perceptible but the increase would be incremental and spread over a period of 2 or more years. Moreover, the resulting noise of the combined projects at the closest NSA to Compressor Station 520 would be below the 55 dBA threshold.

We do not expect the operation of the Atlantic Sunrise Project to result in a perceptible increase in vibration at any NSA because the proposed compressors do not produce as high of levels of vibration as compared to reciprocating engines. Noise from blowdown events, which are typically infrequent, of short duration, and occur during daytime hours, may be perceptible at the NSAs, but not at an excessive level that, for example, would interrupt normal human conversation. Depending on the station, the unit blowdown silencers for the compressor additions (i.e., the new unit) would attenuate the unsilenced blowdown noise to noise levels between 55 and 60 dBA at 300 feet from the outlet of the silencer. The closest NSAs to Compressor Station 520 are more than twice that distance and the closest NSA at Compressor Station 517 is more than three times that distance away. Consequently, although the noise of a unit blowdown event could be audible at the nearby NSAs, we conclude that blowdown events associated with the Atlantic Sunrise Project would not result in significant cumulative noise impacts on residents and the surrounding communities.

4.13.8.10 Climate Change

Climate change is the change in climate over time, whether due to natural variability or as a result of human activity, and cannot be represented by single annual events or individual anomalies. For example, a single, large flood event or particularly hot summer are not indications of climate change. However, a series of floods or warm years that statistically change the average precipitation or temperature over years or decades may indicate climate change.

The Intergovernmental Panel on Climate Change (IPCC) is the leading international, multi-governmental scientific body for the assessment of climate change. The United States is a member of the IPCC and participates in the IPCC working groups to develop reports. The leading U.S. scientific body on climate change is the U.S. Global Change Research Program (USGCRP). Thirteen federal departments and agencies[52] participate in the USGCRP, which began as a presidential initiative in 1989 and was mandated by Congress in the Global Change Research Act of 1990.

The IPCC and USGCRP have recognized that:

- globally, GHGs have been accumulating in the atmosphere since the beginning of the industrial era (circa 1750);
- combustion of fossil fuels (coal, petroleum, and natural gas), combined with agriculture and clearing of forests is primarily responsible for this accumulation of GHG;
- these anthropogenic GHG emissions are the primary contributing factor to climate change; and
- impacts extend beyond atmospheric climate change alone, and include changes to water resources, transportation, agriculture, ecosystems, and human health.

In May 2014, the USGCRP issued a report, *Climate Change Impacts in the United States*, summarizing the impacts that climate change has already had on the United States and what projected impacts climate change may have in the future (USGCRP, 2014). The report includes a breakdown of overall impacts by resource and impacts described for various regions of the United States. Although climate change is a global concern, for this cumulative analysis, we will focus on the potential cumulative impacts of climate change in the Atlantic Sunrise Project area.

The USGCRP's report notes the following observations of environmental impacts that may be attributed to climate change in the Northeast region:

- average temperatures have risen about 2 °F between 1895 and 2011 and are projected to increase another 1 to 8 °F over the next several decades with more frequent days above 90 °F;

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52 The following departments comprise the USGCRP: EPA, DOE, U.S. Department of Commerce, U.S. Department of Defense, USDA, DOI, U.S. Department of State, PHMSA, Department of Health and Human Services, National Aeronautics and Space Administration, National Science Foundation, Smithsonian Institution, and Agency for International Development.

- areas that currently experience ozone pollution problems are projected to experience an increase in the number of days that fail to meet the federal air quality standards;
- an increase in health risks and costs for vulnerable populations due to projected additional heat stress and poor air quality;
- precipitation has increased by about 5 inches and winter precipitation is projected to increase 5 to 20 percent by the end of the century;
- extreme/heavy precipitation events have increased more than 70 percent between 1958 and 2010 and are projected to continue to increase;
- sea levels have risen about 1 foot since 1900 and are projected to continue increasing 1 to 4 feet by 2100 stressing infrastructure (e.g. communications, energy, transportation, water, and wastewater);
- severe flooding due to sea-level rise and heavy downpours is likely to occur more frequently;
- crop damage from intense precipitation events, delays in crop plantings and harvest, and heat stress negatively affect crop yields; invasive weeds are projected to become more aggressive due to their benefit of higher CO_2 levels;
- a change in range, elevation, and intra-annual life cycle events of vegetation and wildlife species; and
- an increase in carrier habitat and human exposure to vector-borne diseases (e.g. Lyme disease or West Nile).

While the potential environmental impacts associated with climate change in the Northeast region is unlikely to significantly affect Project construction and operation, these changes may require additional management efforts to control invasive weeds, protect aboveground facilities from flooding, or require additional air emission controls to address future air quality concerns.

A perspective on the magnitude of a project's GHG emissions can be provided by comparing project emissions to the project location's regional GHG emissions. Statewide inventories of GHG emissions are conducted for documentation purposes and follow methodology provided by the EPA. The majority of construction and operational GHG emissions for the Project would take place in Pennsylvania. Pennsylvania completed a GHG inventory in 2005 and determined statewide GHG emissions were 313 million metric tons of CO_2e. The principal GHG in the inventory was CO_2 resulting primarily from fossil fuel combustion used in generated power and transportation. The EPA has calculated that CO_2 emissions accounted for 80.9 percent of all U.S. emissions in 2014 (EPA, 2016). Methane (CH_4), which is a product of natural-gas fuel combustion and fugitive leaks, was determined to be the second most prevalent GHG, accounting for 10.6 percent of the total U.S. GHG emissions (EPA, 2016). Between 1990 and 2014, natural gas and petroleum systems accounted for 33 percent of CH_4 emissions in the United States (EPA, 2016). The carbon dioxide equivalent of CH_4 and N_2O is calculated by assigning CH_4 a GWP of 25 and N_2O a GWP of 298. Thus, although the amount of CH_4 being emitted into the atmosphere is significantly less than that of CO_2, the comparative impact of CH_4 on climate change over a 100-year period (that is its GWP) is more than 20 times greater (EPA, 2016).

The GHG emissions associated with construction and operation of the Project were identified in section 4.11.1.3. GHG emissions from construction would be short term and cease at the end of construction. Operation of Compressor Stations 605 and 610 would result in minimal direct emission of

GHG because both stations would utilize electric motor-driven compressors. The additional compression proposed for stations 517, 520, and 190 would contribute GHG emissions on a continuing basis once those modifications become operational. The Project would also result in additional downstream GHG emissions due to end-use of the natural gas transported by the Project. Assuming that all of the natural gas being transported is used for combustion, downstream end-use would result in about 32.9 million metric tons of CO_2 per year. As the precise end-uses of the gas that would be transported by the Project are unknown, and the GHG emission figure provided here represents a conservative estimate.

For the major projects included in the table, such as the Tenaska Lebanon Valley Generating Station, air permit applications for these projects are required to use BACT for GHG. Thus, the air permits issued for these major projects would minimize GHG emissions in accordance with current air permitting requirements.

Natural gas is a lower CO_2 emitting fuel when compared to other fuel sources (e.g., fuel oil or coal). Because fuel oil and coal have been and remain widely used as an alternative to natural gas in the region, increased production and distribution of natural gas would likely displace some use of higher carbon emitting fuels. This would result in a potential reduction is regional GHG emissions. Therefore, we conclude that neither construction nor operation of the Project would significantly contribute to GHG cumulative effects or climate change.

We received a number of comments on the draft EIS indicating that our analysis did not adequately address the GHG effects of CH_4 leaks or the associated cumulative impact on climate change. Methane, which results from incomplete combustion of natural gas, fugitive leaks from the natural gas production and delivery system, human and animal waste decomposition, as well as other natural processes, has been determined by the EPA to be the second most prevalent GHG, accounting for 10.6 percent of the total U.S. GHG emissions. Moreover, leading authorities on the subject have concluded that anthropogenic GHG emissions associated with the combustion of fossil fuels (coal, petroleum, and natural gas), combined with agriculture and clearing of forests are the primary contributing factors to climate change. The GHG emissions associated with construction and operation of the Project were identified in section 4.11.1.3.

Several studies have looked at the life cycle emissions of natural gas and other fossil fuels. Natural gas combustion releases less CO_2 and criteria pollutants such as SO_2, NO_X, particulate matter, and mercury compared to other fossil fuels. While natural gas has the lowest direct emissions of all fossil fuels when combusted, concerns have been raised about fugitive emissions (leaks) of CH_4 resulting from its production, processing, and transmission. The heightened interest in this topic has resulted in several new studies of the CH_4 emissions profile of natural gas systems. In a recent paper prepared for the Natural Gas Council in April 2016, ICF International (ICF) examined 75 different studies of the CH_4 emissions profile of natural gas systems (ICF, 2016). While recognizing that the results of some of the studies are contradictory and not specific to comparisons of oil versus natural gas, ICF's report contained the following conclusions:

- the EPA Inventory's most recent report (2016 estimate of 2014 inventory) estimates that CH_4 emissions from natural gas systems were equal to 1.4 percent of the volume of CH_4 in U.S. natural gas produced in 2014;
- CH_4 emissions from the natural gas industry have been declining continuously since the early 1990s;
- absolute emissions declined by 15 percent between 1990 and 2014, and CH_4 emissions per unit of gas produced declined by 43 percent over that same period;

- reasons for the decline in CH_4 emissions include: turnover and replacement of equipment, voluntary actions by industry to reduce emissions, and the co-benefit of recent regulations requiring reductions in VOC emissions; and

- according to the Energy Information Administration, U.S. CO_2 emissions are near 20-year lows, due in large part to increased use of natural gas in the U.S. power sector.

While these conclusions suggest a current trend toward reducing CH_4 emissions associated with natural gas production, CH_4 emissions from natural gas and oil extraction, processing, and transmission continues to be a serious issue that contributes to climate change. Recognizing that this must be addressed, on June 3, 2016, the EPA published important documents as part of the *President's Climate Action Plan: Strategy to Reduce Methane Emissions*, and the CAA to cut CH_4 emissions from the oil and natural gas industry. This is part of a broad strategy intended to keep the Administration on track to achieve its goal of cutting CH_4 emissions from the oil and gas sector by 40 to 45 percent from 2012 levels by 2025.

In the context of a new natural gas transmission pipeline project, the two most notable actions taken on June 3, 2016 to reduce CH_4 emissions from the oil and gas supply chain were (1) the publication of NSPS Subpart OOOOa and (2) the publication of a final Information Collection Request (ICR) on November 10, 2016. The potential applicability of NSPS Subpart OOOOa to Project facilities is discussed in section 4.11.1.2 of this EIS.

In publishing Subpart OOOOa, the EPA established a new rule to reduce emissions of CH_4, VOCs, and toxic air pollutants such as benzene from new, reconstructed, and modified oil and gas sources. The CH_4 reductions from Subpart OOOO build on the EPA's 2012 rules (Subpart OOOO) to curb VOC emissions from new, reconstructed, and modified sources in the oil and gas industry. Subpart OOOOa was notably expanded over the previous 2012 rules to include sources at oil and gas transmission and storage facilities. For example, leaks from compressors, storage vessels, and fugitive sources at transmission compressor stations are now subject to the NSPS. This NSPS subpart expands on or overlaps with complement efforts already in place in states like Pennsylvania (GP-5, Exemption 38), which already have leak detection and repair requirements in place for oil and gas operations.

By the EPA's estimates, the final NSPS is expected to reduce 510,000 short tons of CH_4 in 2025, the equivalent of reducing 11 million metric tons of CO_2. The EPA also projects that the rule will reduce other pollutants, including 210,000 tons of VOCs and 3,900 tons of air toxics in 2025.

Further, in addition to rules targeting new and modified sources, the EPA is also implementing measures to reduce CH_4 and VOC emissions from existing sources. The EPA is doing this in two ways: (1) development of a Control Techniques Guidelines that serve as model rules for ozone nonattainment areas to reduce emissions, and (2) development of an ICR to support rulemaking efforts for existing source as well as potential expansion of rules for new and modified sources.

The EPA issued the final Control Techniques Guidelines in October 2016. The guidelines apply NSPS Subpart OOOOa type controls to existing sources in nonattainment areas. States will adopt these CTGs into their State Implementation Plans as part of addressing ozone nonattainment. The rules that are expected to come from the ICR process will apply nationwide and not just to operations in nonattainment areas.

These additional measures would not eliminate the cumulative impact of CH_4 emissions on the climate but would mitigate the effects.

4.13.8.11 Reliability and Safety

Impacts on reliability and public safety would be mitigated through the use of the DOT Minimum Federal Safety Standards in 49 CFR 192, which are intended to protect the public and prevent natural gas facility accidents and failures. Additionally, Transco's construction contractors would be required to comply with the Occupational Safety and Health Administration Safety and Health Regulations for Construction in 29 CFR 1926. The DOT's minimum safety standards for operating and maintaining pipeline facilities include a requirement to establish a written plan governing these activities. Key elements of Transco's emergency procedures are described in detail in section 4.12.1.

We received several comments about potential cumulative impacts relative to safety between the Project and collocated pipelines. Based on the construction and design methods of pipelines collocated within a shared right-of-way, it is unlikely that one pipeline failure would cause the adjacent pipeline to also fail. As previously described, the Project would be designed and constructed in accordance with or in exceedance of the DOT's Minimum Federal Safety Standards and to meet requirements established for protection of metallic facilities from external, internal, and atmospheric corrosion.

Transco would provide the appropriate training to local emergency service personnel before the pipeline is placed in service and would incorporate the Project into its existing gas control center that monitors system pressures, flows, and customer deliveries on its entire system. The gas control center is staffed 24 hours a day, 7 days a week, and 365 days a year from Houston, Texas. In addition, Transco committed to walking and visually inspecting the pipeline corridor, and performing annual aerial inspections of the right-of-way and annual leak detection surveys of the proposed pipeline facilities. It would inspect valves annually and rectifiers six times per year, and verify the cathodic protection system annually. These surveys would provide early detection of leaks and reduce the likelihood for pipeline failure. Transco would also use both caliper and smart pigs to identify pipeline defects, corrosion, and other areas in need of repair.

With the implementation of these measures and those described in section 4.12, no cumulative impacts on safety and reliability are anticipated to occur as a result of the Project.

4.13.9 Conclusion

Recently completed, ongoing, and planned actions in the Atlantic Sunrise Project area were identified for inclusion in this cumulative impact analysis (see appendix Q). The majority of cumulative impacts would be temporary and minor when considered in combination with past, present, and reasonably foreseeable activities. However, some long-term cumulative impacts would occur on wetland and forested and upland vegetation and associated wildlife habitats. Some long-term cumulative benefits to the community would be realized from the increased tax revenues. Short-term cumulative benefits would also be realized through jobs and wages and purchases of goods and materials. Emissions associated with the Project would contribute to cumulative air quality impacts. There is also the potential, however, that the Project would contribute to a cumulative improvement in regional air quality if a portion of the natural gas associated with the Atlantic Sunrise Project displaces the use of other more polluting fossil fuels. In summary, due to the implementation of specialized construction techniques, the relatively short construction timeframe in any one location, and carefully developed resource protection and mitigation plans designed to minimize and control environmental impacts for the Atlantic Sunrise Project as a whole, minimal cumulative effects are anticipated when the impacts of the Project are added to the identified ongoing actions in the immediate area.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF THE ENVIRONMENTAL ANALYSIS

The conclusions and recommendations presented in this section are those of the FERC environmental staff. Our conclusions and recommendations were developed with input from the USACE and NRCS as cooperating agencies. The cooperating agencies may adopt the EIS per 40 CFR 1506.3 if, after an independent review of the document, they conclude that their permitting requirements and/or regulatory responsibilities have been satisfied. However, the cooperating agencies would present their own conclusions and recommendations in their respective and applicable records of decision or determinations. Otherwise, they may elect to conduct their own supplemental environmental analysis, if necessary.

We determined that construction and operation of the Project would result in some adverse environmental impacts. Most of these environmental impacts would be temporary or short term during construction and operation, but long-term and potentially permanent environmental impacts on vegetation, land use, visual resources, and air quality and noise would also result from the Project. However, if the Project is constructed and operated in accordance with applicable laws and regulations, the mitigating measures discussed in this EIS, and our recommendations, these impacts would be reduced to less than significant levels. This determination is based on a review of the information provided by Transco and further developed from data requests; field investigations; scoping; literature research; alternatives analysis; and contacts with federal, state, and local agencies as well as individual members of the public. As part of our review, we developed specific mitigation measures that we determined would appropriately and reasonably reduce the environmental impacts resulting from construction and operation of the Project. We are therefore recommending that our mitigation measures be attached as conditions to any authorization issued by the Commission. A summary of the anticipated impacts and our conclusions is provided below, by resource area.

5.1.1 Geology

The overall effect of the Project on geologic resources would be minor. The primary effect of construction on geologic resources would be disturbances to steep topographic features found along the construction right-of-way. All areas disturbed during construction including those considered rugged terrain would be graded and restored as closely as possible to preconstruction contours during cleanup and restoration.

We do not anticipate that the Project would be adversely affected by seismic activity, active faults, or soil liquefaction due to the low probability and low incidence/susceptibility of significant magnitude earthquakes and low incidence of conditions prone to soil liquefaction within the project area.

We received several comments on the draft EIS regarding the possible effects on the pipeline from ground vibrations associated with both an active quarry near MP M-00183 1.0 of CPL South and artillery training exercises at the firing range associated with Fort Indiantown Gap near MP 56.9 of CPL South. The active face of the quarry where blasting occurs is about 2,000 feet west of the CPL South pipeline, which would be a safe distance based on the PADEP's blasting regulations. According to Fort Indiantown Gap representatives, the nearest artillery firing range is 3 miles west of the Project and the nearest point of explosion is about 8 miles west. Due to the distance from both facilities, vibrations from quarry blasting and military exercises are not expected to adversely affect the pipeline.

Ground subsidence could occur in areas where AMLs are crossed. Transco developed categories of low, moderate, and high relative risk for subsidence for the 3.9 miles of the pipeline route that cross

AMLs. Transco developed an *Abandoned Mine Investigation and Mitigation Plan* and would implement mitigation measures designed to reduce the potential for stormwater infiltration that could initiate or accelerate subsidence, eliminate actual soft ground or void features associated with geophysical anomalies detected in relative high risk areas, and provide for long-term monitoring to identify any potential developing mine-related features following construction.

To address concerns related to slope stability and construction on steep/side slopes, Transco would implement BMPs to manage surface water and maintain slope stability as described in its *Landslide Hazard Investigation and Mitigation Plan*, including minimizing the potential for surface water ponding along the right-of-way and in open trenches; providing slope protection for falling rock on steep slopes containing boulders; removing unstable excavated material (e.g., coal refuse), where necessary; and compacting soft subsoils. Because investigations to assess AMLs are pending for some properties and secondary investigations are necessary to further characterize potential mine-related features and identify site-specific mitigation measures, we are recommending that, with its Implementation Plan, Transco file a final *Abandoned Mine Investigation and Mitigation Plan* that includes the results of all AML and secondary investigations to further characterize potential mine-related features and site-specific mitigation and monitoring measures to be implemented when crossing AML lands.

We received several comments on the draft EIS regarding the potential hazards of underground mine fires. Transco completed an investigation of mine fires as part of its A*bandoned Mine Investigation and Mitigation Plan*. No active mine fires are currently crossed by the Project. The closest mine fire (the Glen Burn Luke Fidler Mine Fire) is about 0.4 mile west of the Project. Because mine fires could pose safety and integrity concerns during operation of the project facilities, we are recommending that, with its Implementation Plan, Transco file a Mine Fire Plan that identifies methods and surveys completed to define the locations of existing mine fires near the Project and the depth and extent of coal seams that could pose a risk to the project facilities and any mitigation measures that would be implemented to protect the integrity of the pipeline from underground mine fires during the lifetime operation of the Project. The plan should also provide for revisions to the pipeline route if it is found that pipeline integrity could be compromised anytime during the lifetime operation of the Project due to the current and future predicted location of the mine fires.

Flash flooding is a potential hazard in the project area. Transco has designed waterbody crossings to minimize impacts from flash flooding, scouring, and high flow velocities during pipeline construction and operation. At waterbody crossings, the pipeline would be buried to a greater depth allowing for a minimum of 60 inches of soil cover or 24 inches of cover in consolidated rock. In addition, Transco would implement the measures in its Plan to reduce the likelihood of sedimentation and erosion during flash flood events.

There are several areas along the CPL South pipeline route and within the workspace for existing Compressor Stations 190 and 145 where a karst hazard may be present. Transco has developed a *Karst Investigation and Mitigation Plan,* which contains recommendations and mitigation measures to be employed in areas of karst terrain to minimize the risk of sinkhole formation. Because the investigations to assess karst areas are pending for some properties and secondary investigations are necessary to further characterize karst features and identify site-specific mitigation measures, we are recommending that, with its Implementation Plan, Transco file a final *Karst Investigation and Mitigation Plan* that includes results of missing karst survey areas and any additional karst features identified through examination of the 1937 to 1942 aerial photography, 2014 LiDAR imagery, and 1999 color infrared imagery. The CPL North, CPL South, Chapman Loop, and Unity Loop pipeline facilities in Pennsylvania would traverse about 121.0 miles of shallow bedrock that could require blasting. In order to minimize potential impacts from blasting, Transco would comply with all federal, state, and local regulations for blasting and has developed a Blasting Plan to be implemented during construction. In addition, Transco would prepare site-specific blasting plans as may be required by local permitting.

With the implementation of Transco's mitigation measures as well as its *Abandoned Mine Investigation and Mitigation Plan*, *Karst Investigation and Mitigation Plan*, the other plans contained in its ECP (including the Plan and Procedures), and our recommendations, we conclude that impacts on geological resources would be adequately minimized.

Paleontological resources may be found in a variety of geologic formations but are most commonly found in sedimentary rocks; however, all sedimentary rocks are not necessarily fossiliferous. CPL North, CPL South, Chapman Loop, Unity Loop, Compressor Station 185, and the Mainline A and B Replacements would be in areas of sedimentary bedrock. To minimize potential impacts on paleontological resources that may be uncovered during construction, Transco would follow the procedures provided in its Discovery Plan and notify the Pennsylvania Bureau of Topographic and Geologic Survey and/or the VDMME Division of Geology and Mineral Resources and other relevant agencies as necessary. Given these measures, we conclude that potential impacts on paleontological resources would be adequately minimized.

5.1.2 Soils

The Project would traverse a variety of soil types and conditions. Construction activities associated with the Project, such as clearing, grading, trenching, and backfilling, could adversely affect soil resources by causing erosion, compaction, and introduction of excess rock or fill material to the surface, which could hinder restoration. However, Transco would implement the mitigation measures and other project-specific plans contained in its ECP (including its Plan, Procedures, Agricultural Plan, and other project-specific plans) to control erosion, enhance successful revegetation, and minimize any potential adverse impacts on soil resources. Specifically, soil impacts would be mitigated through measures such as topsoil segregation, temporary and permanent erosion controls, and post-construction restoration and revegetation of construction work areas. Additionally, Transco would implement its Spill Plan during construction and operation to prevent and contain and, if necessary, clean up accidental spills of any material that may contaminate soils. In the event that contamination is encountered during construction, Transco would implement the protocols in its *Unanticipated Discovery of Contamination Plan*, notifications would be made to required agencies as needed, and contaminated materials would be managed in accordance with state and federal regulations.

Permanent impacts on soils would mainly occur at the aboveground facilities where the sites would be converted to industrial use. Implementation of Transco's ECP would adequately avoid, minimize, or mitigate construction impacts on soil resources for the remainder of the Project. Based on our analysis of Transco's proposed measures, we conclude that potential impacts on soils would be avoided or effectively minimized or mitigated.

5.1.3 Water Resources

Groundwater

Groundwater resources in the project area include five principal aquifer systems as well as a number of surficial unconsolidated aquifers in Pennsylvania. No surficial aquifers would be crossed by the pipeline in Virginia or be within the workspace of the proposed aboveground facilities. In addition, none of the project facilities would be within SSAs or state-designated aquifers. The Project would cross nine Zone II WHPAs in Pennsylvania.

No public water supply wells or springs are within 150 feet of the proposed construction workspaces. One hundred twenty-six private wells or springs have been identified within 150 feet of the proposed construction areas in Pennsylvania, including seven private wells within areas of known karst. Because surveys along the project route are not yet complete, we are recommending that, prior to construction, Transco provide a revised list of water wells and springs within 150 feet of any construction workspace (within 500 feet of construction workspaces in areas of known karst) based on completed surveys. Transco has agreed to test all water wells within 150 feet of the construction workspace for water quality and quantity prior to and after construction, and provide an alternative water source or a mutually agreeable solution in the event of construction-related impacts. To ensure that impacts on wells are minimized and due to the number of private wells and springs within 150 feet of the construction workspace associated with the Project, we are recommending that Transco file a *Well and Spring Monitoring Plan* for the pre- and post-construction monitoring of well yield and water quality of wells within 150 feet of the construction workspace and, in areas of known karst terrain, of wells within 500 feet of the construction workspace. In addition, we are recommending that, within 30 days of placing the project facilities in service, Transco provide a survey report describing any complaints it receives regarding water well yield or quality, the results of any water quality or yield testing that was performed, and how each complaint was resolved.

Transco has developed a *Karst Investigation and Mitigation Plan* to address risks associated with karst terrain identified prior to or during construction. Transco would also ensure that erosion and sedimentation measures adjacent to exposed karst areas are installed in accordance with all applicable standards and specifications and in a manner that would prevent direct discharge of runoff into known karst features. If possible, Transco would locate trench spoil piles on the downhill side of the karst feature to prevent direct runoff into uncovered features.

Contaminated groundwater resulting from AMD and mine pool discharges could be encountered during construction. Transco developed mitigation measures to minimize impacts from AMD and mine pool discharges and continues to consult with the PADEP regarding proposed mitigation measures to manage and dispose of contaminated groundwater. Transco would further minimize the potential for impacts associated with encountering AMD and mine pool discharges by implementing the measures in its *Abandoned Mine Investigation and Mitigation Plan*.

Transco is planning on crossing two waterbodies using the HDD method near areas of known karst topography along CPL South (the Susquehanna River HDD at MP 99.6 and the Conestoga River HDD at MP 12.3). Transco conducted geotechnical investigations and HDD feasibility studies at the two proposed HDD locations near areas of known karst terrain and developed site-specific HDD crossing plans. No karst or rock units prone to karst that would be affected by the drill path were identified at the proposed Susquehanna River HDD crossing site; however, limestone bedrock was identified at the proposed Conestoga River HDD crossing site. In the event that there is an inadvertent release of drilling fluids during these HDD crossings, Transco would follow the HDD Contingency Plan.

The Project is not likely to significantly affect groundwater resources because the majority of construction would involve shallow, temporary, and localized excavation. These potential impacts would be avoided or further minimized by the use of construction techniques and mitigation described in Transco's ECP, Procedures, and *Karst Investigation and Mitigation Plan* as well as our recommendations. Transco would prevent or adequately minimize accidental spills and leaks of hazardous materials into groundwater resources during construction and operation by adhering to its Spill Plan. We conclude that potential impacts on groundwater resources would be avoided, minimized, or mitigated.

Surface Waters

The pipeline facilities would cross 388 waterbodies (229 perennial waterbodies, 104 intermittent waterbodies, 51 ephemeral waterbodies, 3 ponds, and 1 area of open water). The Project would cross five major waterbodies (greater than 100 feet wide): the Susquehanna River and Tunkhannock Creek along CPL North and the Conestoga River, Swatara Creek, and the Susquehanna River along CPL South. None of the proposed aboveground facilities would affect waterbodies.

Transco is proposing to use trenchless crossing methods at 11 waterbody crossing locations (4 conventional bore crossings of a single waterbody each and 4 HDD crossings, 2 of which would cross multiple waterbodies), including both Susquehanna River crossings and the Conestoga River. Transco would cross 325 waterbodies via dry crossing methods (dam-and-pump or flume). As discussed previously, several waterbodies along the pipeline route and access roads are within Transco's proposed construction workspaces, but would not be directly crossed by the pipeline. Impacts on such waterbodies would be avoided to the extent possible. The access roads that would cross waterbodies are existing roads with existing culverts; Transco has not proposed to replace any of the existing culverts and does not anticipate the need for any culvert repairs during the use of these roads. Implementation of the mitigation measures outlined in Transco's ECP and other project-specific plans would aid in the effective avoidance or minimization of impacts on surface water resources.

Feasibility studies conclude that the HDD crossing method is feasible at the CPL North and CPL South Susquehanna River crossings, the Conestoga River crossing, and the I-80/Little Fishing Creek crossing and that the risk of inadvertent drilling returns is low. In the draft EIS, we recommended that Transco provide all outstanding geotechnical feasibility studies for HDD crossing locations and identify mitigation measures to be implemented to minimize drilling risks at the HDDs. Transco provided this information in August 2016. In the event that any of the HDD crossings fail, we are recommending that Transco provide final site-specific contingency crossing plans concurrent with its USACE application for an alternative crossing method.

The Project would cross source water protection areas associated with the Susquehanna River and Swatara Creek and four waterbodies with potable water intakes within 3.0 miles downstream of the proposed waterbody crossing. In the draft EIS, we recommended that Transco develop and implement mitigation measures to protect all Zone A source water protection areas. Transco provided updated information regarding the PADEP's *Source Water Assessment and Protection Program* and mitigation measure requirements in June 2016. Because Transco has not indicated that consultations are complete with surface water intake operators, we are recommending that Transco provide a notification plan developed in consultation with the surface water intake operators identifying points of contact and procedures in the event of an inadvertent release of hazardous materials upstream of the surface water intake or within Zone A source water protection areas.

Transco requested alternate measures from its Procedures in several areas where it concluded that site-specific conditions do not allow for a 50-foot setback of extra workspace from waterbodies. Based on our review, we are recommending that, with its Implementation Plan, Transco provide additional justification for the need for the ATWS at several locations.

No long-term effects on surface waters are anticipated as a result of construction and operation of the Project. No designated water uses would be permanently affected because the pipeline would be buried beneath the bed of the waterbodies, erosion controls would be implemented during construction, and streambanks and streambed contours would be restored as closely as possible to preconstruction conditions. Operation of the Project would not result in any surface waters effects, unless maintenance activities involving pipe excavation and repair in or near streams are required. If this should occur, Transco would employ protective measures similar to those proposed for construction of the Project. Consequently, we conclude that any maintenance-related effects would be short term and similar to those described above for the initial pipeline construction.

Surface Water Uses During Construction

Transco is proposing to use both surface water and municipal water sources for hydrostatic testing. Transco would require about 72 million gallons of water for hydrostatic testing of the pipelines and new and existing aboveground facilities. During HDD crossings, Transco would use water from the waterbody being crossed to create the drilling mud used to lubricate the drill bit, remove drill cuttings, and hold the hole open. After completion of the HDDs, the recovered drilling mud would be recycled or disposed of at a suitable upland location or disposal facility.

The Project would also require municipal and/or surface water for dust suppression. Given the length of the pipeline and that weather conditions would play a large role in determining need, the amount of water that Transco would need for dust suppression would be determined at the time of construction.

Impacts associated with the withdrawal and discharge of water would be effectively minimized by the implementation of the mitigation measures outlined in Transco's ECP, Procedures, and other project-specific mitigation plans. In addition, Transco would obtain appropriate National Pollutant Discharge Elimination System discharge permits prior to conducting hydrostatic testing. Transco does not propose to add any chemicals or biocides to the test water. Accidental spills during construction and operations would be prevented or adequately minimized through implementation of Transco's Spill Plan.

Based on the avoidance and minimization measures developed by Transco, including its ECP as well as our recommendations, we conclude that the Project would not have adverse impacts on surface water resources.

5.1.4 Wetlands

No wetlands would be affected by any of the aboveground facilities or contractor yards associated with the Project. The proposed temporary access roads would cross six wetlands; however, Transco would use free-span bridges at temporary access road crossings to minimize wetland impacts.

Construction of the pipeline facilities associated with the Project would affect a total of 46.3 acres of wetlands, including 11.3 acres of forested wetlands, 4.3 acres of scrub-shrub wetlands, and 30.8 acres of emergent wetlands. Of those impacts, 38.0 acres would be temporary and associated with construction of the Project. In emergent wetlands, the impact of construction would be relatively brief because the emergent vegetation would regenerate quickly, typically within 1 to 3 years. In scrub-shrub and forested wetlands, Transco would maintain a 10-foot-wide corridor centered over the pipeline in an herbaceous state and would selectively cut trees within 15 feet of the pipeline centerline The remainder of forested and scrub-shrub vegetation would be allowed to return to preconstruction conditions and would not be affected during operation.

One hundred five of the wetlands crossed by the proposed pipelines in Pennsylvania are classified as exceptional value, with 32 of these containing a forest component. The Project would cross 17 forested wetlands in Pennsylvania that are characteristic of the Hemlock/Mixed Hardwood Palustrine Forest Community type, which the PADCNR identified as a natural or special concern community type. In total, construction would affect about 3.6 acres and operation would permanently affect about 1.8 acre of this community type. No exceptional/designated wetland communities were identified along the Virginia facilities.

Construction and operation-related impacts on wetlands would be mitigated by Transco's compliance with the conditions of the USACE section 401 and 404 permits and by implementing the wetland protection and restoration measures contained in its ECP, including its Procedures. Transco would conduct routine wetland monitoring of all wetlands affected by construction until revegetation is successful and would implement mitigation measures to control invasive species as described in its ECP. Transco would minimize and compensate for effects on the Hemlock/Mixed Hardwood Palustrine Forest Community types in the same manner as for other forested wetlands. Transco is also developing its PRM Plan for off-site mitigation and we are recommending that Transco file its final PRM Plan prior to construction.

Transco requested alternate measures from its Procedures in several areas where it concluded that site-specific conditions do not allow for a 50-foot setback of extra workspace from wetlands, or where a 75-foot-wide right-of-way is insufficient to accommodate wetland construction. Based on our review, we are recommending that, with its Implementation Plan, Transco provide additional justification for the need for the ATWS at several locations.

Based on the avoidance and minimization measures developed by Transco, as well as our recommendations, we conclude that impacts on wetland resources, including exceptional value wetlands, would be effectively minimized or mitigated.

5.1.5 Vegetation

Construction of the Project, including the construction right-of-way, extra workspace, aboveground facilities, contractor yards, and access roads would result in impacts on 3,309.3 acres of vegetated lands. This total includes 1,043.2 acres of upland forest and 11.3 acres of forested wetland. During operations, Transco would mow and maintain a 50-foot-wide permanent right-of-way no more than once every 3 years; however, a 10-foot-wide swath may be mowed more frequently to facilitate routine patrols and emergency access to the pipeline centerline. Operation of the Project would result in impacts on 1,171.9 acres of vegetated lands, including 425.8 acres of upland forest and 6.3 acres of forested wetlands.

The greatest impact on vegetation would be on forested areas because of the time required for tree regrowth back to preconstruction condition. The Project would affect a total of about 1,054.5 acres of upland and wetland forestland during construction, 432.1 acres of which would remain within the Project's operational easement. Construction in forestlands would remove the tree canopy over the width of the construction right-of-way, which would change the structure and local setting of the forest area. The regrowth of mature trees would take years and possibly decades. Moreover, the forestland on the permanent right-of-way would be permanently affected by ongoing vegetation maintenance during operations, which would preclude the re-establishment of trees on the right-of-way.

The Project would not cross any federally owned or protected natural communities, such as designated wilderness areas, wildlife preserves, or national wildlife refuges. In addition, the Project would not cross any natural area preserves nor any vegetation communities of concern in Virginia, Maryland, North Carolina, or South Carolina, nor any Pennsylvania state forest or park-designated "Natural Areas" intended to protect special plant communities. However, the PADCNR recommended that Transco avoid eight natural or special concern community types in the vicinity of the CPL North and CPL South routes in Pennsylvania, including the Calcareous Opening/Cliff Community, Herbaceous Vernal Pond Community, Red Spruce/Mixed Hardwood Palustrine Forest Community, Black Spruce/Tamarack Palustrine Woodland Community, Hemlock/Mixed Hardwood Palustrine Forest Community, Big Bluestem – Indiangrass River Grassland Community, Leatherleaf/Sedge Wetland Community, and Riverside Ice-Scour Community.

The Project would cross 17 forested wetlands in Pennsylvania that potentially qualify as Hemlock/Mixed Hardwood Palustrine Forest Communities, 3.6 acres of which would be affected by construction of the Project and 1.8 acre by operation. Transco would minimize and compensate for effects on these wetlands in the same manner as for other forested wetlands. A potential Herbaceous Vernal Pond Community that contained the endangered northeastern bulrush was avoided by a route alternative and would not be affected by the Project. Several jeweled shooting-stars, a Pennsylvania state-listed threatened species, which may be indicative of a potential Calcareous Opening/Cliff Community were identified along CPL South near MP 99.5; however, the occurrences were determined to be outside the proposed workspace and would not be affected by the Project. None of the other five PADCNR-identified vegetation community types were documented within the project workspaces during field surveys.

The proposed CPL South route crosses the northern edge of the SHEW-CHNI in two locations between MPs 10.4 and 12.3 for a total of 1.5 miles. This route does not cross any areas within the SHEW-CHNI that are designated as Species of Concern Core Habitat. Most of the proposed route within the SHEW-CHNI would cross agricultural land. Transco selected this route as the result of an alternative analysis that showed it would reduce upland forest effects within the Natural Heritage Area by about an acre compared to the originally proposed route.

The Project would cross 44 interior forests along CPL North and South and would affect 262.6 acres of interior forest habitat during construction. About 118.5 acres of the affected interior forest would be permanently eliminated due to Transco's maintenance of the right-of-way during operation of the pipeline facilities. In addition to direct effects on interior forest tracts by the proposed clearing during construction and maintenance operations, indirect effects also would occur on interior forest tracts. Newly created edge habitats would be established by maintenance of the permanent right-of-way, and the indirect impacts could extend for 300 feet on each side (600 feet total) of the new corridor into the remaining interior forest blocks. Transco calculated indirect impacts as a measurement of the acreage 300 feet laterally from the edges of the construction workspaces into interior forests. The Project would indirectly affect 1,307.7 acres of interior forest in this manner. Clearing of interior forest would increase habitat fragmentation (i.e. create edge habitat) in the affected areas, which may benefit or have no effect on some species, but would be detrimental to others. Species that require more than one habitat type or successional stage often benefit from the proximity of two habitat types at edges, particularly birds that utilize scrub-shrub and/or successional forest habitats. However, species that require habitat interiors or larger, contiguous tracts of habitat typically would be negatively affected. Edges create barriers to travel for some wildlife and migratory birds, which may affect movement and, potentially, gene flow.

Transco attempted to avoid and minimize effects on interior forest habitat by routing the pipelines adjacent to existing right-of-way corridors when possible. About 43 percent of CPL North would be collocated with existing pipeline and electric transmission line rights-of-way. About 12 percent of CPL South would be collocated with pipeline and electric transmission line rights-of-way, and 100 percent of the Chapman and Unity Loops would be collocated with the existing Transco Leidy Line system. During pre-filing and prior to the issuance of the draft EIS, Transco examined numerous major route alternatives, minor route alternatives, and route deviations where the amount of forestland or interior forest crossed was one of the major criteria considered in the evaluation of route alternatives, including a quantitative comparison of forestland crossed by the various route alternatives/deviations. After issuance of the draft EIS, Transco incorporated several additional minor reroutes that further reduced the amount of interior forest crossed by 11.9 acres.

Transco is currently working with the FWS to develop a project-specific memorandum of understanding that would specify the voluntary conservation measures that would be provided to offset the removal of upland forest and indirect impacts on interior forest; therefore, we are recommending that, prior to construction, Transco file with the Secretary the memorandum of understanding with the FWS. To further minimize impacts on forested areas (including interior forests) during and after construction of the Project, Transco would implement the measures in its ECP, Plan and Procedures, PRM Plan, and Management Plan.

Transco conducted invasive plant surveys in 2014 and identified multiple invasive species along CPL North, CPL South, Unity Loop, and at the Compressor Station 610 site. Plants of the genus *Rubus* and *Digitaria* were identified at the aboveground facilities in North Carolina, certain species of which are listed as noxious weeds in North Carolina Administrative Code Chapter 48A. In addition, Johnson grass, which is listed as noxious under section 5-462 of the South Carolina Code of Regulations, was identified at aboveground facilities in South Carolina. To minimize the spread of invasive species, Transco would implement measures designed to control invasive plant species during project construction and operation as outlined in its draft Management Plan, which was developed in consultation with the applicable state regulatory agencies.

We received comments on the draft EIS regarding potential impacts of disease spread to forest industries, specifically tree farms, from the construction corridor. To minimize forest disease spread and because noxious weed surveys and appropriate control methods are not final, we are recommending that, prior to construction, Transco file complete results of noxious weed surveys and a final Management Plan revised to include mitigation measures to prevent forest disease spread from the construction corridor. Based on Transco's draft Management Plan and our recommendation, we conclude that the potential spread of noxious or invasive weeds and tree diseases would be effectively minimized or mitigated.

Based on our review of the potential impacts on vegetation, we conclude that the primary impact from construction and operation of the Project would be on forested lands. However, due to the prevalence of forested habitats within the project area, the eventual regrowth of prior forested areas outside of the permanent right-of-way, and Transco's avoidance measures during pipeline routing and alternatives consideration, we conclude that impacts on vegetation, including forested areas, would be reduced to less-than-significant levels. In addition, impacts on forested and non-forested vegetation types, as well as the introduction or spread of noxious weeds or invasive plant species, would be further mitigated through adherence to the measures described in Transco's ECP, Plan and Procedures, PRM Plan, Management Plan, migratory bird provisions, our recommendation, and other mitigation measures described above.

5.1.6 Wildlife and Aquatic Resources

The Project could have both direct and indirect impacts on wildlife species and their habitats. Direct impacts of construction on wildlife include the displacement of wildlife from the right-of-way or work sites into adjacent areas and the potential mortality of some individuals. The cutting, clearing, and/or removal of existing vegetation within the construction work area could also affect wildlife by reducing the amount of available habitat for foraging, breeding, and nesting. However, some species that prefer open land and scrub-shrub habitat would benefit from the permanent or temporary habitat conversion. Some of these effects would be temporary, lasting only while construction is occurring, or short term, lasting no more than a few years until the preconstruction habitat and vegetation type would be reestablished. Other impacts would be longer term such as the re-establishment of forested habitats, which could take several years or decades.

Forest fragmentation would increase in certain locations due to project construction, reducing the amount of habitat available for interior forest species (i.e., movement and dispersal corridors). With habitat conversion and forest fragmentation, there is also a risk of intrusion by invasive or noxious species. Increased predation could also occur during construction and operation of the pipeline due to the removal of vegetation and loss of cover, which would increase the visibility of prey species.

Transco proposed several measures to minimize or avoid impacts on wildlife, including adhering to its ECP, Plan, and Procedures; routing of the pipeline to minimize effects on sensitive areas; and reducing the construction right-of-way through wetlands and interior forests. Due to ongoing concerns regarding potential impacts on and restoration of wildlife habitat in the affected areas, we are recommending that Transco provide documentation of its correspondence with the PGC and PADCNR and any avoidance or mitigation measures developed with these agencies regarding the SGL and Sproul State Forest crossings.

A variety of migratory bird species, including BCCs, are associated with the habitats that would be affected by the Project, primarily in the counties crossed by the CPL North and CPL South routes in Pennsylvania. The clearing of vegetation during the nesting season could have direct impacts on individual migratory birds. Transco would avoid mortalities or injuries of breeding birds and their eggs or young by conducting vegetation clearing and maintenance activities outside of the breeding season to the extent practicable, particularly in key habitat areas. In areas where Transco would clear vegetation during the breeding season, migratory bird nest surveys would be conducted and active nests would be protected until young have fledged or the nest fails.

Transco would also implement the avoidance and minimization measures included in its *Migratory Bird Plan*, developed in coordination with the FWS Pennsylvania ESFO and the PGC, to reduce direct and indirect effects on migratory birds and their habitats. The FWS is in the process of determining a methodology for standardizing the mitigation ratios for effects on interior forest habitat and Transco is continuing to work with the FWS to develop a project-specific memorandum of understanding that would specify the voluntary conservation measures that would be provided to offset the removal of upland forest and indirect impacts on interior forests. Because the project-specific memorandum of understanding has not yet been filed with FERC, we are recommending that Transco file its memorandum of understanding with the FWS prior to construction.

Based on the presence of suitable adjacent habitat available for use and given the impact avoidance, minimization, and mitigation measures proposed by Transco, as well as our recommendations, we conclude that the construction and operation of the Project would not have a significant adverse effect on wildlife. In addition, Transco would minimize effects to the extent possible through adhering to its ECP, Plan, and Procedures; routing of the pipeline to minimize effects on sensitive areas; and reducing the construction right-of-way through wetlands and interior forests.

The Project would cross 73 waterbodies classified a high quality or exceptional value in Pennsylvania and 4 waterbodies classified as Tier II Exceptional Waters in Virginia. There is no federally designated essential fish habitat in the project area. None of the waterbodies that would be affected by the Project contain federally or state-listed fish species, but some may contain federally or state-listed mussels.

In Pennsylvania, the Project would cross 221 waterbodies that may contain sensitive fisheries. These waterbodies are classified as Wild Trout Streams, Class A Wild Trout Streams, or Trout Stocked Streams, or are tributaries to waterbodies with these designations. Transco would cross all of these special concern waterbodies using a dry crossing method (i.e., dam-and-pump, flume, conventional bore, or HDD), which would allow construction under mostly dry conditions, minimizing the potential for downstream sedimentation and turbidity. In Virginia, the Project would cross one waterbody (unnamed tributary to Broad Run) designated as a Stream Conservation Unit, which would be crossed using the dam-and-pump dry crossing method. Transco would further minimize effects on fisheries resources within these waterbodies by adhering to the measures in its ECP and the PFBC's and VDGIF's recommended construction windows to avoid effects on recreational angling and spawning.

Transco would minimize the effects of the Project on aquatic resources through the use of various trenchless or dry crossing methods, construction timing windows, extra workspace restrictions, and restoration procedures. Transco would also implement the measures outlined in its ECP and Procedures to minimize impacts on aquatic resources such as restoring stream beds and banks to preconstruction conditions. Adherence to the ECP would maximize the potential for regrowth of riparian vegetation.

Transco proposes to use a trenchless crossing method (i.e., conventional bore or HDD) at 11 waterbody crossing locations (4 conventional bore crossings of a single waterbody each and 4 HDD crossings, 2 of which would cross multiple waterbodies). These methods would avoid impacts on the streambed, stream banks, and aquatic resources. Transco would use dry crossing methods (flume or dam-and-pump) at 325 crossings to minimize potential sedimentation and turbidity impacts. Transco has indicated that it would adhere to the state-recommended crossing windows.

If blasting is required in or near a stream, Transco would develop a detailed, site-specific blasting plan for that location. Each site-specific blasting plan would include protocols for the protection of fisheries and other aquatic resources. In addition, we are recommending that Transco file a schedule identifying when trenching or blasting would occur within each waterbody greater than 10 feet wide or within any coldwater fishery.

Transco would use surface water and municipal sources of water for hydrostatic testing. Transco proposes to use 13 waterbodies as sources of hydrostatic test water, 3 of which contain sensitive fisheries. Transco would minimize impacts of hydrostatic testing on aquatic resources by adhering to its ECP, conducting activities in accordance with applicable regulatory requirements, fitting intake lines with screens to minimize the entrainment of fish, and regulating withdrawal rates to maintain downstream flow rates. Following the completion of the hydrostatic tests, Transco would discharge the test water into an upland dewatering structure. The discharge rates would be regulated and diffusers or energy dissipation devices would be employed to prevent erosion and streambed scour. No chemicals or additives would be added to the water except where necessary to eradicate non-native aquatic species.

Transco would minimize the potential for spills to affect aquatic resources by implementing the measures in its ECP and Spill Plan. These plans include measures that restrict refueling or other handling of hazardous materials within 100 feet of a waterbody, require the use of secondary containment around all containers and tanks, and require routine inspections of tank and storage areas to reduce the potential for spills or leaks of hazardous materials.

Given the impact avoidance, minimization, and mitigation measures proposed by Transco, including adherence to multiple resource protection plans, as well as our additional recommendations, we conclude that the Project would result in some temporary effects on aquatic resources but these effects would be adequately mitigated.

5.1.7 Threatened, Endangered, and Other Special Status Species

To comply with section 7 of the ESA, we consulted either directly or indirectly (through Transco's informal consultation) with the FWS and state resource agencies regarding the presence of federally listed, proposed for listing, or state-listed species in the project area. Because there are no marine or anadromous habitats within the project area, consultation with NOAA Fisheries is not required for the Project. Based on these consultations, we identified eight federally listed species as potentially occurring in the project area. However, it was subsequently determined that the gray bat, dwarf wedgemussel, dwarf-flowered heartleaf, and harperella would not be affected by construction and operation of the Project. In the draft EIS, we determined that the Project *may affect, but would not likely adversely affect* the Indiana bat and bog turtle and *may affect, and is likely to adversely affect* the northern long-eared bat and northeastern bulrush. We also recommended that Transco file all pending survey results, proposed avoidance or mitigation measures, and copies of agency consultation for these species. Transco filed this information in May 2016. Based on the survey results and Transco's proposed mitigation measures, we have concluded that the Project *may affect, but would not likely adversely affect* the northern long-eared bat and northeastern bulrush. We requested that the FWS consider the EIS, along with various survey reports prepared by Transco, as the BA for the Project in accordance with section 7 of the ESA. However, because we have not completed our consultations with the FWS, we are recommending that Transco not begin construction activities until we receive written comments from the FWS regarding the proposed action; formal consultation with the FWS is completed, if required; and Transco receives written notification from the Director of OEP that construction or use of mitigation may begin.

Of the eight federally listed species, seven are also state-listed species. Five additional state-listed animal species (Allegheny woodrat, eastern small-footed bat, brook floater, bald eagle, and timber rattlesnake) and five state-listed plant species (jeweled shooting-star, American holly, cranefly orchid, puttyroot, and stiff cowbane) may occur in the project area. In the draft EIS, we recommended that Transco complete appropriate surveys and/or consultation with the PGC, PFBC, or VDGIF and file any survey results and avoidance or mitigation measures developed in consultation with the state agencies. Transco filed this information in May 2016. Transco submitted to the PGC the results of its surveys and proposed mitigation measures to protect the Allegheny woodrat and eastern small-footed bat; the PGC approved Transco's proposed mitigation measures for both species on May 27, 2016. Two timber rattlesnake dens were identified in the survey corridor, one that would be avoided by the Chapman Loop and one for which Transco modified the CPL South route to provide a 40-foot buffer between the project workspace and the identified den. Transco agreed to the PFBC's recommendation to retain a PFBC-approved timber rattlesnake biologist during any construction activities conducted between April 15 to October 15.

Two separate cranefly orchid occurrences and one puttyroot occurrence were identified within the proposed workspace for the Project. Transco plans to transplant all individual listed plant species within the workspace into a similar suitable nearby habitat that would not be affected by the Project. Transplanting would occur during the appropriate season with suitable conditions varying by plant species. Transco would also conduct a one-time monitoring event the year following transplant. All of the American holly occurrences were determined to be non-native and to have germinated from cultivated populations in adjacent residential areas and, as a result, they are not considered sensitive. All of the remaining occurrences of rare plant species were determined to be outside the proposed workspace and would not be affected by the Project. The PADCNR concurred with the assessment of impacts on and the mitigation plan for state-listed plant species. In areas where access has not been granted, Transco indicated that it would complete state-listed plant surveys and submit survey results and avoidance and mitigation measures to the PADCNR prior to constructing in these areas. Therefore, we have determined that the Project would avoid adverse impacts on Pennsylvania state-listed plants.

The bald eagle was formerly a federally listed species but was delisted in 2007 due to recovery of the population. Despite the delisting, the species retains federal protection under the Bald and Golden Eagle Protection Act and the MBTA, which prohibit the taking of eagles, their eggs, or their nests. The bald eagle was removed from Maryland's and Virginia's lists of threatened and endangered species in 2010 and 2013, respectively, and its Pennsylvania status was changed from threatened to protected in January 2014. Bald eagles are state-listed as threatened in the Carolinas. Transco reviewed the bald eagle mapping tool and agency correspondence to identify bald eagle nests in the vicinity of the Project and identified two bald eagle nests near the Project in Pennsylvania. A small section of the CPL South route would be within the 0.5-mile blasting buffer zone of one of the bald eagle nests, but Transco indicated it does not anticipate the need to blast in this area. Therefore, the Project would be in compliance with the Bald and Golden Eagle Protection Act and management guidelines and would avoid adverse impacts on nesting bald eagles.

Although no federally listed mussel species are known to occur in the vicinity of the project facilities, the PFBC would require mussel survey and relocation of native mussel species within the Susquehanna River if impacts due to the Project are anticipated. While Transco anticipates avoiding impacts at the Susquehanna River due to the use of the HDD crossing method, Transco conducted baseline mussel surveys in case an alternative crossing method becomes necessary or other unanticipated impacts could occur. No federally or state-listed species were found during these surveys.

The Mainline A and B Replacements would cross tributaries to the main stem of Broad Run, which the VADCR indicated serves as habitat for the state-listed brook floater. A mussel habitat evaluation and freshwater mussel survey of Dawkin's Branch identified suitable habitat within the waterbody but no brook floater or other sensitive mussel species were identified. To avoid potential impacts on the brook floater, Transco would adhere to the VDGIF-recommended timing restrictions for crossing Dawkin's Branch and/or conduct relocation surveys at two sites identified by the VDGIF. With implementation of these avoidance measures and Transco's ECP, Plan and Procedures, and HDD Contingency Plan, which outline BMPs and sediment and erosion control measures to be implemented during construction of the Project, we do not anticipate any significant adverse impacts on the brook floater or any freshwater mussel species of special concern. The PFBC and VDGIF agreed with these findings.

Although a number of other candidate, state-listed, or special concern species were identified as potentially present in the project area, none were detected during surveys and we do not expect any adverse effects given Transco's proposed measures and our recommendations. Based on implementation of these measures and our recommendations, we conclude that impacts on special-status species would be adequately avoided or minimized.

5.1.8 Land Use, Recreation, and Visual Resources

Construction of the Project would affect a total of 3,741.0 acres of land. About 75 percent of this acreage would be utilized for the pipeline facilities, including the construction right-of-way (62 percent) and additional temporary workspace (13 percent). The remaining acreage affected during construction would be associated with contractor yards and staging areas (11 percent), new and modified aboveground facilities (8 percent), and access roads (6 percent). During operation, the new permanent pipeline right-of-way, aboveground facilities, and permanent access roads would newly encumber 1,235.4 acres of land.

Where the pipeline would be installed at the same location as existing pipelines or electric transmission lines, the permanent right-of-way could consist of a portion of the existing, cleared permanent right-of-way and some additional new right-of-way. However, a new 50-foot-wide permanent right-of-way would be required along the non-collocated greenfield segments of CPL North and CPL South, and where CPL North is collocated with Williams (midstream) pipelines and other existing utility rights-of-way. In addition, at MLVs, the permanent right-of-way width would be expanded to 92 feet for greenfield segments to allow for access to and around the MLV during operations. Transco proposes to maintain an additional 25 feet of permanent right-of-way (adjacent to its existing permanent right-of-way) along the Chapman and Unity Loops, and the portions of CPL North that would be collocated with the Transco Leidy Line system.

The land retained as new permanent right-of-way would generally be allowed to revert to its former use, except for forested land. Certain activities, such as the construction of permanent structures or the planting of trees, would be prohibited within the permanent right-of-way. To facilitate pipeline inspection, operation, and maintenance, the entire permanent right-of-way in upland areas would be maintained in an herbaceous/scrub-shrub vegetated state. This maintained right-of-way would be mowed no more than once every 3 years, but a 10-foot-wide strip centered over the pipeline might be mowed annually to facilitate corrosion and other operational surveys.

Transco's proposed construction work area is within 50 feet of 152 residential and commercial structures. Twelve residential or commercial structures (one house [an abandoned hunting cabin], one shed, and two structures for CPL North; three mobile homes, three sheds, and one building for CPL South; and one shed for Unity Loop) are within the proposed construction workspace. Of these structures, five would intersect the pipeline centerline, including a structure, a shed, and an abandoned hunting cabin at about MPs 1.2, 20.0, and M-0071 3.6 of CPL North; a shed at about MP 65.2 of CPL South; and a shed at about MP 126.0 of Unity Loop. Transco has compensated or would compensate the landowners for the relocation or removal of these structures. Transco has developed site-specific residential construction plans for the residential structures within 50 feet of the construction work area. However, because we are recommending Transco incorporate several minor reroutes and to further minimize effects on residences, we are recommending that Transco file a complete set of site-specific residential construction plans and, for all residences located within 10 feet of the construction work area, Transco revise the site-specific residential plans to modify the construction work area so that it is not closer than 10 feet to a residence or provide site-specific justification for the use of the construction workspace, including documentation of landowner or resident concurrence with the plan. In addition, we are recommending that Transco file site-specific plans to minimize effects on one commercial and one residential property, along with documentation of consultation with the landowners.

Eleven planned residential and commercial development projects have been identified within 0.25 mile of the proposed project facilities, including nine planned residential developments, one potential commercial development, and one residential inventory/development. The majority of the developments identified would not be subject to adverse effects because they would be over 500 feet away from the pipeline route and have a sufficient buffer between the development and the pipeline facilities. However, three developments would be directly crossed by the pipeline routes, including Goodleigh Manor residential development (between MPs 26.0 to 26.2 of CPL North), ELRC commercial development (between MPs 45.3 to M-0183 0.6 of CPL South), and Prince William County residential inventory area (REZ1996-0029) (a townhome development crossed between MPs 1,579.2 to 1,579.3 and MPs 1,576.4 to 1,579.6 of the Mainline A and B Replacements). We are recommending that Transco incorporate the Kochan Preferred Alternative 1 into the proposed route, which would minimize impacts on the Goodleigh Manor Subdivision. Transco has been working with the ELRC regarding several possible route deviations across its property; therefore, we are recommending that Transco file the final results of consultations with the landowner/developer of the ELRC commercial and residential development, including any project modifications or mitigation measures Transco would implement to minimize impacts on the development. Because Transco is not proposing to widen its existing permanent right-of-way through the Prince William County residential inventory area, the Project would not result in a significant impact on this development.

Construction of the Project would affect a total of about 1,789.2 acres of agricultural land in Pennsylvania, about 602.9 acres of which would be retained during operation of the Project. Agricultural land in the construction rights-of-way would generally be taken out of production for one growing season and would be restored to previous uses following construction. Transco has developed an Agricultural Plan for the Project, which documents the measures it would follow to minimize and mitigate effects on agricultural lands. In addition, Transco has proposed to provide an agricultural inspector that would be on site to monitor construction activities within agricultural lands and would hire a subject matter expert to provide guidance to ensure these lands are restored to their original uses and crops yields. Agricultural lands would be properly restored using approved, modern mitigation techniques designed to restore the full productive reuse of the agricultural lands, which typically occurs within 3 years. Transco's Agricultural Plan also includes mitigation measures to minimize impacts on and/or meet the needs of specialty agricultural crop areas (i.e., orchards and tree farms), certified organic farms, and no-till farms.

We received a number of comments from landowners with concerns regarding their ability to maintain organic certification during and after construction of the Project through their properties. To ensure that organic certification is protected, we are recommending that, prior to construction, Transco file an organic certification mitigation plan developed in consultation with the PCO to ensure organic certification is maintained on the organic farms crossed by the Project, including specific mitigation measures to be implemented to maintain certification during and after construction of the Project; a plan for addressing complaints from landowners regarding loss of certification during and after construction, including measures to facilitate reinstatement of certification or to compensate the landowner if certification is lost or canceled; and copies of consultations with the PCO.

In general, the effects of the Project on recreational and special interest areas occurring outside of forestland would be temporary and limited to the period of active construction, which typically lasts several weeks or months in any one area. These effects would be minimized by implementing the measures in Transco's ECP, BMPs, and other project-specific construction plans. In addition, Transco would continue to consult with the owners and managing agencies of recreation and special interest areas regarding the need for specific construction mitigation measures. We received comments on the draft EIS from the PADCNR regarding its policies regarding conversion of property interests acquired or developed with federal land and water funds; therefore, we are recommending that Transco file copies of correspondence with the PADCNR confirming all PADCNR-funded properties crossed by the Project have been identified and any change in use or transfer of rights for the PADCNR-funded properties is in compliance with PADCNR's conversion policies.

Transco proposes to cross the Appalachian Trail using the conventional bore method, maintaining trees between the entry and exit sites (a 100-foot forested buffer on either side of the trail), and restoring the trees cleared from workspaces to minimize effects. To further minimize effects on other recreation and special interest areas crossed by the Project, we are recommending that Transco file with its Implementation Plan final site-specific crossing plans for each of the recreation and special interest areas listed as being crossed or otherwise affected in table 4.8.6-1, including site-specific timing restrictions, proposed closure details and notifications, specific safety measures, and other mitigation to be implemented.

The Project would cross a number of areas enrolled in a variety of federal and Commonwealth of Pennsylvania conservation programs including the CRP/CREP, WRP, FRPP, Clean and Green Program, and ASA and agricultural conservation easements. Pipeline construction across CRP/CREP program lands involving herbaceous cover would result in only temporary effects and would not negatively affect program enrollment. Transco has not yet determined where all of the CRP/CREP lands involving tree planting are located, but is working with landowners and the Farm Service Agency to identify these areas and would develop restoration measures that would ensure enrolled properties remain eligible to participate in the programs. One known WRP easement would be near, but not crossed by, the CPL North route so it would not likely be affected. We received a number of comments on the draft EIS regarding local and private conservation easements not identified in table 4.8.6-3, including but not limited to Lancaster Farmland Trust and Lebanon Valley Conservancy easements. Transco provided an updated list of conservation easements crossed by the Project in August 2016. However, to ensure that all conservation easements have been identified prior to construction, we are recommending that Transco file with its Implementation Plan a revised table 4.8.6-3 that includes any newly identified conservation easements and copies of correspondence documenting any mitigation measures developed in consultation with the administering agency(ies). In addition, we are recommending that Transco notify the NRCS 1 week prior to the start of construction across NRCS-held conservation easements to facilitate NRCS monitoring of construction and restoration of disturbed areas within these easements.

The Project would cross 431 tracts enrolled in the Clean and Green Program. Due to the amendments to this program, the construction and operation of Transco's pipeline facilities would not disqualify landowners currently enrolled in the Clean and Green Program from receiving tax benefits, and those tracts enrolled would maintain their eligibility and not be subject to any roll-back taxes despite being transected by the proposed pipeline facilities. However, portions of the West Diamond, North Diamond, and River Road Regulator Station sites; the Zick Meter Station site; and the Compressor Stations 605 and 610 sites are on tracts enrolled in the Clean and Green Program. Although the permanent placement of aboveground facilities on a tract of land would not preclude a landowner's participation in the Clean and Green Program for the entire tract, it would constitute a change in use for land already enrolled in the program and, therefore, the landowner would be liable for roll-back taxes for the portion of the land affected by the aboveground facility. Transco would negotiate compensation of fees or penalties, including roll-back taxes and increased annual taxes, as part of the land purchase or easement agreement if the Project would render the tract or a portion of the tract ineligible for the program.

Construction and operation of the pipeline facilities would not affect the classification of ASA tracts. Transco would restore agricultural properties with conservation easements in accordance with the methods described in its Agricultural Plan.

The Project would cross one waterbody, Tucquan Creek, that is designated as Wild and Scenic by the Pennsylvania Scenic Rivers Act. Transco investigated crossing Tucquan Creek using the conventional bore method; however, after review of the geotechnical testing results Transco determined the method was not feasible. Transco would cross Tucquan Creek using the dam-and-pump crossing method but would reduce the construction right-of-way width to 75 feet. Construction would temporarily affect the visual character at the crossing location, but the effect would be temporary because the crossing would be in an agricultural area, which would be quickly restored following installation of the pipeline. Following construction, land within the permanent right-of-way would be allowed to revert to the pre-existing agricultural use.

Twenty-three waterbody crossings in Pennsylvania would require that Aids to Navigation Plans be submitted to the PFBC as part of the state permitting process. Therefore, we are recommending that Transco file the final PFBC-approved Aids to Navigation Plan for each crossing with its Implementation Plan for the Project.

The Project would cross three Bicycle PA Routes (Routes Y, S, and J-1). Transco is consulting with PennDOT on these BicyclePA routes as part of the road crossing permit process. However, no direct effects on any of the BicyclePA routes would be anticipated because Transco is proposing to cross the bicycle routes and adjacent roadways using the conventional bore crossing method.

One potential railroad bed landfill was identified near CPL South at about MP 66.8. Based on discussions between Transco and the property owner, the site potentially contains tree stumps, tin cans, household wastes, tires, and home appliances buried about 40 feet below the ground surface. If subsurface debris or contamination is encountered, Transco would implement the protocols in its *Unanticipated Discovery of Contamination Plan*. These measures include the suspension of construction activities when suspected contamination is encountered, evacuations if necessary, proper notifications, and follow-up actions as appropriate including mobilization of emergency response personnel and regulatory agency coordination. Transco would manage any excavated subsurface debris or contaminated soil in accordance with applicable state and federal solid waste management regulations.

Visual resources along the proposed pipeline route are a function of geology, climate, and historical processes, and include topographic relief, vegetation, water, wildlife, land use, and human uses and development. A portion of the new, looping, and replacement pipelines (about 27 percent) would be installed within or parallel to existing rights-of-way. As a result, the visual resources along this portion of the Project have been previously affected by other similar activities. Impacts in other areas would be greatest where the pipeline route would parallel or cross roads and the pipeline right-of-way may be seen by passing motorists; from residences where vegetation used for visual screening or for ornamental value is removed; and where the pipeline is routed through forested areas.

After construction, all disturbed areas, including forested areas, would be restored in compliance with Transco's ECP and Plan; federal, state, and local permits; landowner agreements; and easement requirements. Generally this would include seeding the restored areas with grasses and other herbaceous vegetation, after which trees would be allowed to regenerate within the temporary workspaces. The visual effects of construction on forested areas would be permanent on the maintained right-of-way where the regrowth of trees would not be allowed, and would be long term, lasting several years or longer, in the temporary workspaces. The greatest potential visual effect would result from the removal of large specimen trees, but the visual effects of removing smaller trees would even last for several years.

Visual effects are also often associated with recreation areas, trails, and water trails that are valued for their scenic quality. Recreational areas valued for scenic qualities that would be crossed by the pipeline facilities include the Appalachian Trail, Tucquan Creek, Ricketts Glen State Park, Swatara State Park, and Captain John Smith Chesapeake National Historic Trail. Visual impacts on these areas would either be temporary and short term in duration (Tucquan Creek), consistent with existing conditions (Ricketts Glen State Park), or minimized by use of the conventional bore or HDD method (Appalachian Trail and Captain John Smith Chesapeake National Historic Trail). Due to the distance between CPL South and Swatara State Park and because they are separated by a forested area, the pipeline right-of-way would not likely be visible from the park.

Transco has proposed mitigation measures to reduce visual impacts at the new aboveground facilities, including installing perimeter fences, limiting outdoor lighting to the minimum required for security during unmanned nighttime operation, and utilizing directional control or downward-facing lighting at the main gates, yards, and building entry and exit doors. Additionally, the proposed communication towers could affect the viewshed. In most cases, existing forested areas would provide natural visual screening or the tower would be sited adjacent to an existing industrial facility (i.e., would be consistent with the existing viewshed). To minimize visual effects, the communication towers would not be lighted. In the draft EIS, we recommended that Transco file a detailed description of several communication towers, an assessment of the visual effects that would result from construction of the two new communication towers (at CS-MLV-08 and CS-MLV-09) proposed in its July 21, 2015 supplemental filing, and an assessment of landowner comments received regarding the design and visual screening at Compressor Station 610. Transco provided this information in June 2016.

With adherence to Transco's proposed impact avoidance, minimization, and mitigation plans, and our recommendations, we conclude that overall impacts on land use and visual resources would be adequately minimized.

5.1.9 Socioeconomics

Construction of the Project would not have a significant adverse effect on local populations, housing, employment, or the provision of community services. There would be temporary increases in traffic levels due to the commuting of the construction workforce to the project area as well as the movement of construction vehicles and delivery of equipment and materials to the construction right-of-way. To address and mitigate traffic impacts related to in-street construction, Transco developed a *Traffic and Transportation Management Plan*.

We received comments concerning the potential effect of the Project on property values, mortgages, and property insurance. We are not aware of any studies indicating that property values would be adversely affected by the presence of a natural gas pipeline; however, no study can predict specific circumstances for any given property and the presence of a natural gas pipeline could influence a potential buyer's decision to purchase a property. We have not been able to document any specific trends regarding adverse effects of pipelines on mortgages or the ability of landowners to obtain mortgages for similar projects. In addition, we have no insurance industry data to suggest that the Project would adversely affect homeowners' insurance rates, the ability to acquire a new homeowner's insurance policy, or that insurance policies would be discontinued due to the presence of a natural gas pipeline on a property. However, to address any potential insurance-related issues, we are recommending that Transco file reports describing any documented complaints from a homeowner that a homeowner's insurance policy was cancelled, voided, or amended due directly to the grant of the pipeline right-of-way or installation of the pipeline and/or that the premium for the homeowner's insurance increased materially and directly as a result of the grant of the pipeline right-of-way or installation of the pipeline, as well as how Transco has mitigated the impact.

We received comments on the draft EIS regarding the party responsible for paying property taxes for the pipeline easement and/or potential effects of the Project on property taxes. Property taxes for a parcel of land are generally based on the actual use of the land. If the landowner feels that the presence of the pipeline easement reduces the value of their land, resulting in an overpayment of property taxes, the landowner may appeal the issue of the assessment and subsequent property taxation to the local property taxation agency.

We received several comments on the draft EIS regarding potential health effects of the Project, specifically on environmental justice communities and children. The primary health issues related to the Project would be the risk associated with an unanticipated pipeline or compressor station failure. Section 4.12 discusses the localized risks to public safety that could result from a pipeline failure and describes how applicable safety regulations and standards would minimize the potential for these risks. Because the Project would generally traverse sparsely populated areas, the number of persons who would be at risk of injury due to a pipeline failure would be low; and there is no evidence that such risks would be disproportionately borne by any age group or racial, ethnic, or socioeconomic group. Based on our research and analysis, there is no evidence that the Project would result in disproportionately high and adverse health or environmental effects on children, the elderly, sensitive populations, or minority or low-income communities.

The long-term socioeconomic effect of the Project is likely to be beneficial, based on the increase in tax revenues that would accrue in the counties affected by the Project. Based on the analysis presented, we conclude that the Project would not have a significant adverse effect on the socioeconomic conditions of the project area.

5.1.10 Cultural Resources

Transco conducted archival research and archaeological and architectural resource surveys for the Pennsylvania and Virginia portions of the Project to identify historic aboveground resources and locations for additional subsurface testing in areas with potential for precontact and historic archaeological sites. No surveys were conducted in Maryland, North Carolina, and South Carolina because the Project is limited to existing facilities in these states. Transco identified 440 architectural resources and 149 archaeological resources (including 22 precontact sites, 27 historic sites, 24 multicomponent sites, and 76 precontact and historic isolated finds) within the area of direct impact for the proposed pipeline facilities in Pennsylvania. The Pennsylvania SHPO considered that 415 of the architectural resources were ineligible and 24 were eligible for the NRHP. The Pennsylvania SHPO has not provided comments on the NRHP eligibility of one architectural resource site. Of the eligible sites, the Pennsylvania SHPO made a recommendation of no adverse effect for nine resources and a recommendation of adverse effect for two resources, including the Nesbitt Estate Rural Historic District and the Pedrick Farm. The Pennsylvania SHPO's comments of effect are pending for 13 sites. Of the 149 archaeological sites, the Pennsylvania SHPO approved the treatment plan for 3 sites, and considered that 134 sites are not eligible for the NRHP and 5 sites require additional testing for the NRHP and would be avoided. Transco identified two additional sites as not eligible but the Pennsylvania SHPO has not provided comments on their eligibility. Four additional sites were not formally evaluated for their NRHP eligibility because they would not be affected during construction. One site is listed on the NRHP but would be avoided by HDD.

The archaeological and architectural surveys in Virginia did not identify any new resources. One lithic artifact was recovered from a disturbed context within a previously recorded precontact archaeological site. The site is not recommended as eligible.

We consulted and Transco conducted outreach with 21 federally recognized tribes and 3 tribes not federally recognized, as well as several other non-governmental organizations, local historical societies, museums, historic preservation and heritage organizations, conservation districts, and other potential interested parties to provide them an opportunity to comment on the proposed projects. Several tribes and organizations requested additional consultation or information, and the Delaware Nation requested mitigation of sites that cannot be avoided by the Project in Lancaster County, Pennsylvania. The Reading Company Technical and Historical Society requested that railroad structures associated with the Reading Railroad be preserved; Transco confirmed that railroad structures crossed by the Project would be avoided through use of the bore crossing method.

To ensure that our responsibilities under section 106 of the NHPA are met, we are recommending that Transco not begin construction until any additional required surveys are completed, survey reports and treatment plans (if necessary) have been reviewed by the appropriate parties, and we provide written notification to proceed. The studies and impact avoidance, minimization, and measures proposed by Transco, and our recommendation, would ensure that any adverse effects on historic properties would be appropriately mitigated.

5.1.11 Air Quality and Noise

Air Quality

Air quality impacts associated with construction of the Project would include emissions from fossil-fueled construction equipment and fugitive dust. Such air quality impacts would generally be temporary and localized, and are not expected to cause or contribute to a violation of applicable air quality standards. Local emissions may be elevated, and nearby residents may notice elevated levels of fugitive dust, but these would not be significant. Operation of the Project would result in air emissions from stationary equipment (e.g., compressor stations, emergency generators, meter stations), including emissions of NO_X, CO, particulate matter, SO_2, VOCs, GHGs (including fugitive methane), and HAPs. Emissions from the new aboveground facilities and modifications to existing facilities, including the proposed meter and regulator stations, would not have a significant impact on local or regional air quality.

Based on Transco's September 2016 revised construction emission estimates, which compressed the construction schedule for the Project to one year (2017), the 2017 NO_X construction emissions for Lancaster County, Pennsylvania would exceed the General Conformity applicability threshold. All other emissions generated during all years of construction would not exceed the General Conformity applicability thresholds. We developed a draft General Conformity Determination for the Project and issued it for public comment on November 3, 2016. Transco has committed to using ERCs to demonstrate conformity and is currently working with the PADEP and the EPA to verify the amount of ERCs required and the location from which the ERCs must be taken to offset the 2017 NO_X construction emissions for Lancaster County. Correspondence with the PADEP has indicated that the use of ERCs is an acceptable method for demonstrating compliance with the Pennsylvania State Implementation Plan and that sufficient NO_X ERCs are available. Therefore, we conclude that the portions of the Project to which General Conformity would apply would conform to the Pennsylvania State Implementation Plan. However, to allow us to prepare a final General Conformity Determination, we are recommending that, Transco file proof of purchase or transfer of NO_X ERCs to offset the estimated 2017 NO_X construction emissions for Lancaster County that exceed General Conformity thresholds, and confirmation from the PADEP that the ERCs will conform with the Pennsylvania State Implementation Plan.

The estimated NO_X construction emissions for Lebanon County, Pennsylvania do not exceed the General Conformity applicability threshold. However, if significant changes occur to construction activities, the potential may exist for exceeding the General Conformity applicability threshold for NO_X emissions in Lebanon County. Therefore, we are recommending that, prior to construction, Transco file a Construction Emission Plan identifying how Transco would track its construction schedule for each component of the Project within the Lebanon County $PM_{2.5}$ Nonattainment Area and ensure that construction emissions of NO_X would remain below the General Conformity applicability threshold. If a change in the construction schedule or Project results in emissions of NO_X greater than the General Conformity applicability threshold of 100 tpy, Transco should provide and document all mitigation measures it would implement to comply with the General Conformity regulations at 40 CFR 93.158.

Compressor Stations 517 and 520 are existing major sources based on potential emissions of NO_X and/or CO; however, the estimated emission increases due to the compressor station modifications would be below all PSD SER thresholds. Therefore, the emission increases at Compressor Stations 517 and 520 are not subject to PSD permitting requirements but are subject to NNSR requirements. The modifications to Compressor Station 190 would result in an exceedance of the NO_X SER threshold; however, the NO_X emissions are not subject to the MDE's NNSR requirement. Transco completed a "pollution control project" that consisted of a modification to the turbine burners at Compressor Station 190 resulting in emission reductions that offset and netted out the emission increases from the proposed modification. Therefore, the modifications to Compressor Station 190 would not be subject to NNSR or PSD.

Compressor Stations 605 and 610 would be equipped with electric motor-driven compressors, natural gas-fired emergency generators, and building heating and ventilation equipment. The modifications would not be expected to result in significant air emissions.

FERC staff conducted a supplemental modeling analysis for Compressor Stations 517, 520, and 190 to present potential impacts associated with the operation of the existing emission sources at these stations, along with the proposed new sources, including monitored background. Based on this analysis, the existing sources at Compressor Stations 517, 520, and 190 are shown to be in compliance with the NAAQS for all pollutants, with the exception of the one-hour NO_2 standard at Compressor Stations 517 and 520. Based on the modeling analysis, modeled concentrations for one-hour NO_2 for existing sources at Compressor Stations 517 and 520 have the potential to exceed the NAAQS during some operating scenarios and meteorological conditions. However, the new emission sources associated with the Project would not incrementally contribute to the potential exceedance of the one-hour NO_2 standard. The potential exceedances in the model are based on existing equipment and would not be caused or significantly contributed to by the Project. To ensure that the operation of Compressor Stations 517, 520, and 190 do not result in a violation of the NAAQS, we are recommending that Transco continue to operate the air quality monitoring stations at Compressor Stations 517, 520, and 190 for a period of 3 years after the newly modified facilities begin operation. In the event that the air quality monitoring shows a violation of the NAAQS, we are recommending that Transco immediately contact the state air quality agency to report the violation and establish a plan of action to correct the violation in accordance with the terms of the facility air permit and applicable state law.

We received a comment on the draft EIS regarding additional diesel emission control measures for new construction equipment. To ensure that diesel emissions are minimized to the extent practicable, we are recommending that, prior to construction, Transco review the Northeast Diesel Collaborative's recommendations for reducing diesel emissions from new on- and off-road construction equipment and indicate what measures it would implement in its Implementation Plan.

With this additional data, our recommendations, and the continued monitoring at the compressor stations, we conclude that operational emissions would not have a significant impact on local or regional air quality.

Noise

Noise would be generated during construction of the pipeline and aboveground facilities. Construction noise associated with the pipeline would be spread over the length of the pipeline route and would not be concentrated at any one location for an extended period of time, except at the proposed HDD sites. Construction noise associated with the installation of the compressor, metering, and regulator stations would be concentrated in the vicinity of each site and would extend for several months, but would vary depending on the specific activities taking place at any given time. To ensure that the noise levels during operation of the compressor stations and meter and regulator stations meet the FERC 55-dBA L_{dn} sound criterion, we are recommending that Transco file noise surveys at full load conditions and install additional noise controls if the levels are exceeded.

Mitigated noise levels attributable to the CPL North and CPL South Susquehanna River and CPL South Conestoga River HDDs are anticipated to be below the FERC 55-dBA L_{dn} sound criterion at all NSAs within a 0.5-mile radius of the HDD entry and exit points. However, to ensure that noise levels would be adequately reduced to below 55 dBA at the nearest NSAs during drilling activities at the CPL North Susquehanna River and CPL South Conestoga River HDDs, we are recommending that Transco file in its weekly construction status reports the noise measurements from the nearest NSA for the CPL North Susquehanna River HDD entry site and the CPL South Conestoga River HDD entry and exit sites, obtained at the start of drilling operations; any noise mitigation that Transco implemented at the start of drilling operations; and any additional mitigation measures that Transco would implement if the initial noise measurements exceed an L_{dn} of 55 dBA at the nearest NSA. Overnight construction, if necessary, is not expected to create significant impacts on surrounding NSAs. Transco indicated that the owners of the properties at the nearby NSAs would be notified in advance of planned nighttime construction activities, advising them that noise-generating equipment may be operated during nighttime hours. However, if the noise levels cannot be reduced to target levels, Transco has committed to providing temporary housing or equivalent monetary compensation to the occupants of affected NSAs until the construction activities are completed.

In August 2016, Transco incorporated the CPL South I-80/Little Fishing Creek HDD into the CPL South route. Because ambient sound measurements for the I-80/Little Fishing Creek HDD sites and noise assessments are still pending, we are recommending that, prior to construction at the CPL South I-80/Little Fishing Creek HDD, Transco file the results of the noise impact assessment for the nearest NSAs within a 0.5-mile radius of the HDD entry and exit points. If the results of the noise impact assessment indicate that the estimated noise attributable to HDD equipment operations would exceed FERC's noise level criterion of 55 dBA L_{dn} at any of the NSAs, we are recommending that Transco provide additional information on the mitigation measures, such as sound barriers, that would be implemented to reduce noise levels below 55 dBA.

The Project would likely require blasting in some areas of the proposed route to dislodge bedrock resulting in potential noise and vibration impacts. Transco's Blasting Plan includes mitigation measures related to blasting activity. Blasting would be conducted in accordance with applicable agency regulations, including advance public notification and mitigation measures as necessary.

If blow-off valves are to be used during planned maintenance, Transco would affix a silencer to the blow-off valve to minimize noise impacts. Maintenance blowdown events would typically occur only during daytime hours and Transco plans to notify all landowners in the immediate area. Due to the infrequency and short duration of the blowdown events, noise impacts are expected to be minimal.

Based on the analyses conducted, the proposed mitigation measures, and our recommendations, we concluded that construction and operation of the Project would not result in significant noise impacts on residents and the surrounding environment.

Given adherence to Transco's proposed measures as well as our additional recommendations, we conclude that potential air and noise-related impacts associated with the Project would be adequately minimized or mitigated.

5.1.12 Safety and Reliability

The pipeline and aboveground facilities associated with the Project would be designed, constructed, operated, and maintained to meet the DOT Minimum Federal Safety Standards in 49 CFR 192 and other applicable federal and state regulations. These regulations include specifications for material selection and qualification; minimum design requirements; and protection of the pipeline from internal, external, and atmospheric corrosion. Several commenters expressed concern about how the pipeline would be maintained over time and the long-term safety of operations. The DOT rules require regular inspection and maintenance, including repairs as necessary, to ensure the pipeline has adequate strength to transport the natural gas safely. Further, although regulations requiring remote control shut-off valves have not yet gone into effect and would apply to pipelines built in the future, Transco committed to the use of remote control shut-off valves for the proposed pipelines.

We received comments expressing concern about the safety of bidirectional flow. The DOT's Advisory Bulletin ADB 2014-04, issued September 18, 2014, advises all operators to refer to *Guidance for Pipeline Flow Reversals, Product Changes, and Conversion to Service*. Transco has developed specific engineering controls to safely implement bidirectional flow in compliance with the DOT's pipeline safety standards in 49 CFR 191 and 192 for stations and pipeline segments involved with flow reversals.

We received several comments about the potential effects of a pipeline rupture and natural gas ignition (the area of potential effect is sometimes referred to as the potential impact radius), including potential effects on vulnerable populations (e.g., children, the elderly, or the infirm). While a pipeline rupture does not necessarily ignite, the DOT does publish 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. Transco routed the pipeline to minimize risks to local residents and vulnerable locations/populations (e.g., hospitals, prisons, schools, daycare facilities, retirement or assisted-living facilities) and would follow federal safety standards for pipeline class locations based on population density. The DOT regulations are designed to ensure adequate safety measures are implemented to protect all populations. Because the proposed route has changed in several locations, we recommended in the draft EIS that Transco provide a revised table of class locations based on these route changes. Transco provided this information in June 2016.

We received comments from residents who were concerned about constructing new structures or residences within an HCA and if there are any construction guidelines. There are no restrictions for building within an HCA; the area would be assessed during pipeline inspections and could be reclassified based on the type of structures built. Setback restrictions for new buildings and structures would be based on the terms of the pipeline easement. Some residents were concerned about collocated pipelines on their property increasing the potential impact radius. Based on the construction and design methods of pipelines collocated within a shared right-of-way, it is unlikely that one pipeline failure would cause the adjacent pipeline to also fail.

We conclude that Transco's implementation of the above measures would ensure compliance with the DOT's regulations regarding public safety and the integrity of the proposed facilities.

5.1.13 Cumulative Impacts

Three types of projects (past, present, and reasonably foreseeable projects) could potentially contribute to a cumulative impact when considered with the Project. These projects include Marcellus Shale development (wells and gathering systems); FERC-jurisdictional natural gas pipelines; other natural gas facilities that are not under the Commission's jurisdiction; and other actions including electric transmission and generation projects, transportation projects, and residential and commercial developments. The ROI or geographic scope for cumulative impacts varied depending on the resource being discussed. Specifically, we included:

- proximal Marcellus Shale development (wells and gathering systems);
- FERC-jurisdictional natural gas pipelines;
- other natural gas facilities that are not under the Commission's jurisdiction (non-jurisdictional project-related facilities); and
- other actions including electric transmission and generation projects, transportation projects, and residential and commercial developments.

We received comments concerning the development of natural gas reserves in the Marcellus Shale and possible indirect effects of shale gas development that would be both causally related to and a reasonably foreseeable consequence of the Project. With respect to causation, NEPA requires a reasonably close causal relationship between the environmental effect and the alleged cause in order to make an agency responsible for a particular effect under NEPA. NEPA requires reasonable forecasting, but an agency is not required to engage in speculative analysis or to do the impractical, if not enough information is available to permit meaningful consideration. Development of the Marcellus Shale natural gas resource is not the subject of the EIS nor is the issue directly related to the Project. Production and gathering activities, and the pipelines and facilities used for these activities, are not regulated by FERC but are overseen by the affected region's state and local agencies with jurisdiction over the management and extraction of the Marcellus Shale gas resource. FERC's jurisdiction is further restricted to facilities used for the transportation of natural gas in interstate commerce, and does not typically extend to facilities used for intrastate transportation.

We also received several comments about potential cumulative impacts relative to safety between the Project and collocated pipelines. Based on the construction and design methods of pipelines collocated within a shared right-of-way and adherence to DOT safety regulations, it is unlikely that one pipeline failure would cause the adjacent pipeline to also fail. As previously described, the Project would be designed and constructed in accordance with or in exceedance of the DOT's Minimum Federal Safety Standards and to meet requirements established for protection of metallic facilities from external, internal, and atmospheric corrosion.

A majority of the impacts associated with the Project in combination with other projects such as residential developments, wind farms, utility lines, and transportation projects, would be temporary and relatively minor overall, and we included recommendations in the EIS to further reduce the environmental impacts associated with the Project, as identified in section 5.2. However, some long-term cumulative impacts would occur on wetland and forested vegetation and associated wildlife habitats. Some long-term cumulative benefits to the community would be realized from the increased tax revenues. Short-term cumulative benefits would also be realized through jobs and wages and purchases of goods and materials. Emissions associated with the Project would contribute to cumulative air quality impacts. There is also the potential, however, that the Project would contribute to a cumulative improvement in regional air quality if a portion of the natural gas associated with the Project displaces the use of other more polluting fossil fuels. With implementation of specialized construction techniques, the relatively short construction timeframe in any one location, and carefully developed resource protection and mitigation plans designed to minimize and control environmental impacts for the Project as a whole, we conclude that the cumulative impacts associated with the Project, when combined with other known or reasonably foreseeable projects, would be effectively limited.

5.1.14 Alternatives

As an alternative to the proposed action, we evaluated the no-action alternative, system alternatives, route alternatives, minor route variations, and aboveground facility site alternatives. While the no-action alternative would eliminate the short- and long-term environmental impacts identified in the EIS, the stated objectives of Transco's proposal would not be met.

Our analysis of system alternatives included an evaluation of whether existing or proposed natural gas pipeline systems could meet Transco's objectives while offering an environmental advantage. There is no available capacity for existing pipeline systems to transport the required volumes of natural gas to the range of delivery points proposed by Transco. Moreover, with the exception of Tennessee Gas Pipeline, none of these existing pipeline systems are in close proximity to the production areas of northern Pennsylvania. We determined that the existing systems in the area of the Project would require significant expansions, which would result in environmental impacts similar to or greater than the Project. The proposed PennEast Project, if modified, could provide additional volumes of natural gas into Transco's mainline system near Pennington, New Jersey. However, it would need to be expanded to provide additional capacity and reach the delivery points required by project shippers, which would result in much greater environmental impact than the Project. Consequently, there are no practicable existing or proposed system alternatives that are environmentally preferable to the Project.

We evaluated an alternative, the Transco System Alternative, that would avoid a greenfield pipeline alignment by siting the proposed facilities adjacent to Transco's existing Mainline and Leidy pipelines. While the Transco System Alternative would be collocated with Transco's existing pipelines for about 91 percent of its length, it would be about 50 miles longer and affect 605 more acres of land during construction than the Project. In addition, collocation would not be feasible in certain areas due to the amount of commercial, industrial, and residential development that has occurred adjacent to Transco's existing rights-of-way. Based on our analyses, we conclude that the Transco System Alternative would not be preferable to the Project.

We evaluated five major route alternatives to the proposed pipeline routes. Because none of these would offer major environmental advantages over the proposed pipeline route, we eliminated them from further consideration. During the development phase of the Project, Transco incorporated an alternative pipeline loop route, the Chapman Loop, which was environmentally preferable to the originally proposed Grugan Loop. We evaluated 30 minor route alternatives that were identified by Transco or suggested by landowners, municipalities, and other stakeholders. We are recommending that Transco incorporate four of these minor alternatives into the proposed route.

During the pre-filing period, Transco incorporated 52 route variations into the proposed route to avoid or reduce effects on environmental or other resources, resolve engineering or constructability issues, or address stakeholder concerns. As part of Transco's application or in its supplemental filings, Transco identified an additional 81 route variations, 80 of which have been incorporated into its proposed route. We have reviewed the route variations and agree with Transco's conclusions regarding incorporation of the 80 route variations into the proposed route. In the draft EIS, we recommended that Transco file additional information on several route alternatives and deviations, including an alternative to avoid impacts on Dr. Quodomine's equine facility (Alternative 24C) and a route deviation identified by Neil Bushong. Transco incorporated CPL North Alternative 5 and CPL South Alternative 22 and minor realignments of Alternative 24C and the Neil Bushong Deviation into the proposed route. We are further recommending that Transco incorporate the Byron Reroute between MPs 23.3 and 24.1, Route Deviation M-0431 between MPs M-0423 2.8 and M-0423 3.0, the Kochan Preferred Alternative 1 between MPs M-0142 0.1 and M-0142 0.4, the Sharon and Russel Olt Option 2 Alternative, and an adjustment to the workspace associated with Route Deviation M-0209. Because the proposed valve site and permanent access road associated with Alternative 24D would take agricultural land out of production and to address landowner concerns, we are recommending that Transco review and incorporate either the Option A, B, or C valve site location for Alternative 24D. In addition, we are recommending that, if Transco is unable to secure the necessary easement on tract PA-LA-137 B.000 along the proposed route, Transco incorporate the Conestoga River Alternative.

Transco proposes to construct two new compressor stations, Compressor Stations 605 and 610, in Wyoming and Columbia Counties, Pennsylvania. We reviewed the locations of the proposed aboveground facilities to determine whether environmental impacts would be reduced or mitigated by the use of alternative facility sites. Transco identified seven potential locations for Compressor Station 605 and six potential locations for Compressor Station 610. We agree with Transco's conclusion that the alternative sites would not be preferable or provide a significant environmental advantage over the currently proposed Compressor Station 605 and 610 sites. We did not receive any requests to evaluate specific sites for alternative compressor station locations.

Construction of the new M&R stations and modifications to the existing compressor and M&R stations would primarily occur within or directly adjacent to existing facility sites and either no new permanent land would be required or no sensitive resources we be affected; therefore, no alternative sites were identified or evaluated for the existing compressor stations and new and modified M&R stations.

5.2 FERC STAFF'S RECOMMENDED MITIGATION

If the Commission authorizes the Project, we are recommending that the following measures be included as specific conditions in the Commission's Order. We conclude that these measures would further mitigate the environmental impacts associated with the construction and operation of the Project.

1. Transco shall follow the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests) and as identified in the EIS, unless modified by the Order. Transco must:

    a. request any modification to these procedures, measures, or conditions in a filing with the Secretary;

    b. justify each modification relative to site-specific conditions;

    c. explain how that modification provides an equal or greater level of environmental protection than the original measure; and

    d. receive approval in writing from the Director of OEP **before using that modification**.

2. The Director of OEP 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**, Transco shall file an affirmative statement with the Secretary, certified by a senior company official, that all company personnel, EIs, and contractor personnel will be informed of the EIs' 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 location(s) shall be as shown in the EIS, as supplemented by filed alignment sheets. **As soon as they are available, and before the start of construction**, Transco shall file with the Secretary any revised detailed survey alignment 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.

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

5. Transco shall file with the Secretary detailed alignment 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 Transco's 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**, Transco shall file an Implementation Plan with the Secretary for review and written approval by the Director of OEP. Transco must file revisions to the plan as schedules change. The plan shall identify:

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

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

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

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

e. the location and dates of the environmental compliance training and instructions Transco will give to all personnel involved with construction and restoration (initial and refresher training as the Project progresses and personnel change), with the opportunity for OEP staff to participate in the training session(s);

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

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

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

   i. the completion of all required surveys and reports;
   ii. the environmental compliance training of on-site personnel;
   iii. the start of construction; and
   iv. the start and completion of restoration.

7. Transco shall employ a team of EIs (i.e., two or more or as may be established by the Director of OEP) per construction spread. The EI(s) shall be:

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

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

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

   d. a full-time position, separate from all other activity inspectors;

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

   f. responsible for maintaining status reports.

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

   a. an update on Transco's efforts to obtain the necessary federal and state authorizations;

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

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

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

   e. the effectiveness of all corrective actions implemented;

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

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

9. Transco shall develop and implement an environmental complaint resolution procedure. The procedure shall provide landowners with clear and simple directions for identifying and resolving their environmental mitigation problems/concerns during construction of the Project and restoration of the right-of-way. **Prior to construction**, Transco shall mail the complaint procedures to each landowner whose property would be crossed by the Project.

   a. In its letter to affected landowners, Transco shall:

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

      ii. instruct the landowners that if they are not satisfied with the response, they should call Transco's Hotline; the letter should indicate how soon to expect a response; and

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

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

      i. the identity of the caller and date of the call;

      ii. the location by milepost and identification number from the authorized alignment sheet(s) of the affected property;

      iii. a description of the problem/concern; and

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

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

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

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

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

b. identifying which of the Certificate conditions Transco has complied with or will comply with. This statement shall also identify any areas affected by the Project where compliance measures were not properly implemented, if not previously identified in filed status reports, and the reason for noncompliance.

13. **Prior to construction**, Transco shall file with the Secretary a revised alignment sheet that incorporates the Kochan Preferred Alternative 1 between MPs M-0142 0.1 and M-0142 0.4 into the proposed route. (*Section 3*.3.2)

14. **Prior to construction**, Transco shall file with the Secretary a revised alignment sheet that incorporates the Byron Reroute along CPL North between MPs 23.3 and 24.1 into the proposed route. *(Section 3.3.2)*

15. **Prior to construction across the Byron property**, Transco shall develop and file with the Secretary, for review and written approval by the Director of OEP, a schedule for construction and restoration activities on the Byron property that minimizes conflict with the planned public use of the property. Transco shall develop the restoration activities in consultation with the Byrons. *(Section 3.3.2)*

16. **Prior to construction**, Transco shall file with the Secretary a revised alignment sheet that incorporates the revised Route Deviation M-0431 between MPs M-0423 2.8 and M-0423 3.0 into the proposed route. *(Section 3.3.2)*

17. **Prior to construction**, Transco shall file with the Secretary a revised alignment sheet that incorporates the Option A, B, or C valve site location for Alternative 24D. *(Section 3.3.2)*

18. **With its Implementation Plan**, Transco shall file documentation that it has acquired the necessary easement on tract PA-LA-137_B.000 along the proposed route. In the event that Transco is unsuccessful in acquiring the necessary easement, Transco shall incorporate the Conestoga River Alternative into the proposed route. *(Section 3.3.2)*

19. **Prior to construction**, Transco shall file with the Secretary a revised alignment sheet that incorporates the Sharon and Russel Olt Option 2 Alternative between MPs 66.9 and M-0196 0.2 into the proposed route. *(Section 3.3.2)*

20. **Prior to construction**, Transco shall file with the Secretary a revised alignment sheet that adjusts the construction workspace associated with Route Deviation M-0209 to abut Mr. Goehring's western property boundary. *(Section 3.3.3)*

21. **With its Implementation Plan**, Transco shall file with the Secretary, for review and written approval by the Director of OEP, a final *Abandoned Mine Investigation and Mitigation Plan*. The final plan shall include the results of all AML investigations, the results of secondary investigations to further characterize potential mine-related features, and site-specific mitigation and monitoring measures Transco will implement when crossing AML lands, including measures to manage and dispose of contaminated groundwater. *(Section 4.1.7)*

22. **With its Implementation Plan**, Transco shall file with the Secretary, for review and written approval by the Director of OEP, a final *Karst Investigation and Mitigation Plan*. The final plan shall include results of missing karst survey areas and any additional karst features identified through examination of the 1937 to 1942 aerial photography, 2014 LiDAR imagery, and 1999 color infrared imagery. *(Section 4.1.7)*

23. **With its Implementation Plan**, Transco shall file with the Secretary, for review and written approval by the Director of OEP, a Mine Fire Plan that:

    a. identifies methods and surveys completed to define the locations of existing mine fires near the Project and the depth and extent of coal seams that could pose a risk to the project facilities;

    b. identifies any mitigation measures that Transco will implement to protect the integrity of the pipeline from underground mine fires during the lifetime operation of the Project; and

    c. provides for revisions to the pipeline route if it is found that pipeline integrity could be compromised anytime during the lifetime operation of the Project due to the current and future predicted location of the mine fires. *(Section 4.1.7)*

24. **Prior to construction**, Transco shall file with the Secretary, for review and written approval by the Director of OEP, a revised table 4.3.1-2 that includes an updated list of water wells and springs within 150 feet of construction workspaces based on completed surveys. This table shall indicate any water wells and springs that are within 500 feet of construction workspaces in areas of known karst. *(Section 4.3.1.4)*

25. **Prior to construction**, Transco shall file with the Secretary, for review and written approval by the Director of OEP, a *Well and Spring Monitoring Plan* for the pre- and post-construction monitoring of well yield and water quality of wells within 150 feet of the construction workspace and, in areas of known karst terrain, of wells within 500 feet of the construction workspace. **Within 30 days of placing the project facilities in service**, Transco shall file with the Secretary a report describing any complaints it received regarding water well yield or quality, the results of any water quality or yield testing performed, and how each complaint was resolved. *(Section 4.3.1.7)*

26. **Prior to construction**, Transco shall file with the Secretary, for review and written approval by the Director of OEP, a notification plan developed in consultation with surface water intake operators. The notification plan shall identify the specific points of contact and procedures that Transco will implement in the event of an inadvertent release of hazardous materials within 3 miles upstream of a surface water intake or within Zone A source water protection areas. *(Section 4.3.2.6)*

27. **Prior to construction**, Transco shall file with the Secretary, and provide to other applicable agencies, a schedule identifying when trenching or blasting will occur within each waterbody greater than 10 feet wide, or within any coldwater fishery. Transco shall revise the schedule as necessary to provide **at least 14 days advance notice**. Changes within this last 14-day period must provide for **at least 48 hours advance notice**. *(Section 4.3.2.6)*

28. **In the event that the HDD of the CPL North Susquehanna River, CPL South Susquehanna River, Conestoga River, or I-80/Little Fishing Creek fails,** Transco shall file with the Secretary, for review and written approval by the Director of OEP, final site-specific crossing plans concurrent with its application to the USACE for an alternative crossing method. These plans shall include scaled drawings identifying all areas that will be disturbed by construction and a description of the mitigation measures Transco will implement to minimize effects on water quality and recreational boating. In addition, a scour analysis shall be conducted for each crossing and filed concurrently with the site-specific crossing plan. *(Section 4.3.2.6)*

29. **With its Implementation Plan**, Transco shall file with the Secretary additional justification for the ATWS associated with the waterbodies identified in bold in table K-5 in appendix K of the EIS. *(Section 4.3.2.6)*

30. **With its Implementation Plan**, Transco shall file with the Secretary additional justification for the ATWS associated with the wetlands identified in bold in table L-2 in appendix L of the EIS. *(Section 4.4.5)*

31. **Prior to construction**, Transco shall file with the Secretary a final copy of the PRM Plan, including any comments and required approvals from the USACE and the PADEP. The plan shall designate wetland seed mixes to be used and which agency recommended them. *(Section 4.4.6)*

32. **Prior to construction**, Transco shall file with the Secretary, for review and written approval by the Director of OEP, complete results of noxious weed surveys and a final Management Plan. The final Management Plan shall be revised to include mitigation measures to prevent forest disease spread from the construction corridor. *(Section 4.5.4)*

33. **Prior to construction of project facilities in Pennsylvania**, Transco shall file with the Secretary all documentation of its correspondence with the PGC and the PADCNR and any avoidance or mitigation measures developed with these agencies regarding the SGL and Sproul State Forest crossings. *(Section 4.6.1.2)*

34. **With its Implementation Plan**, Transco shall file with the Secretary, for review and written approval by the Director of OEP, its memorandum of understanding with the FWS regarding the voluntary conservation measures that Transco will provide to offset the removal of upland forest and indirect impacts on interior forests. *(Section 4.6.1.3)*

35. Transco shall not begin construction activities **until**:

    a. the FERC staff receives written comments from the FWS regarding the proposed action;

    b. the FERC staff completes formal consultation with the FWS, if required; and

    c. Transco has received written notification from the Director of OEP that construction or use of mitigation may begin. *(Section 4.7.2.5)*

36. **With its Implementation Plan**, Transco shall file with the Secretary, for review and written approval by the Director of OEP, a complete set of site-specific residential construction plans for all project facilities. For all residences located within 10 feet of the construction work area, the plans shall be revised to either: 1) modify the construction work area so that it is not closer than 10 feet to a residence, or 2) provide site-specific justification, including documentation of landowner or resident concurrence with the plan, for the use of any construction workspace within 10 feet of a residence. *(Section 4.8.3.1)*

37. **Prior to construction across the commercial property at 1010 Susquehannock Drive near CPL South MPs 2.0 and 2.1**, Transco shall file with the Secretary, for review and approval by the Director of OEP, a site-specific plan for minimizing impacts on the commercial structures, stormwater management facilities, and planned future warehouse expansion on the property, including documentation of consultation with the owner. *(Section 4.8.3.1)*

38. **Prior to construction across the Justin and Susan Cappiello property**, Transco shall file with the Secretary, for review and written approval by the Director of OEP, a site-specific plan for minimizing construction impacts on the Cappiello's newly constructed barn including documentation of consultation with the landowner. *(Section 4.8.3.1)*

39. **With its Implementation Plan**, Transco shall file with the Secretary the final results of consultations with the landowner/developer of the ELRC commercial and residential development, including any project modifications or mitigation measures Transco will implement to minimize impacts on the ELRC development. *(Section 4.8.3.2)*

40. **Prior to construction across the McCallum property**, Transco shall file with the Secretary, for review and written approval by the Director of OEP, a plan to minimize impacts on the market garden and previously unidentified greenhouse structure. *(Section 4.8.4)*

41. **Prior to construction**, Transco shall file with the Secretary, for review and written approval by the Director of OEP, an organic certification mitigation plan developed in consultation with the PCO to ensure organic certification is maintained on the organic farms crossed by the Project. The plan shall include:

    a. specific mitigation measures to be implemented to maintain certification during and after construction of the Project;

    b. a plan for addressing complaints from landowners regarding loss of certification during and after construction, including measures to facilitate reinstatement of certification or to compensate the landowner if certification is lost or canceled; and

    c. copies of consultations with the PCO. *(Section 4.8.4.1)*

42. **With its Implementation Plan**, Transco shall file copies of correspondence with the PADCNR confirming all PADCNR-funded properties crossed by the Project have been identified and any change in use or transfer of rights for the PADCNR-funded properties is in compliance with PADCNR's conversion policies. *(Section 4.8.6.1)*

43. **With its Implementation Plan**, Transco shall file with the Secretary final site-specific crossing plans for each of the recreation and special interest areas listed as being crossed or otherwise affected in table 4.8.6-1. The site-specific crossing plans shall include, as applicable:

    a. site-specific timing restrictions;

    b. proposed closure details and notifications (e.g., reroutes, signage, public notices);

    c. specific safety measures; and/or

    d. other mitigation Transco will implement to minimize effects on the recreation areas and their users during construction and operation of the Project.

    In addition, the site-specific crossing plan for SGL 206 shall include specific safety measures Transco will implement during work activities in the vicinity of the on-site shooting range. *(Section 4.8.6.1)*

44. Transco shall notify the NRCS **at least 1 week prior to the start of construction activities within each NRCS-held easement** to facilitate NRCS monitoring of construction and restoration of disturbed areas within the NRCS-held easements. The NRCS notifications shall be documented in Transco's **weekly** status reports. *(Section 4.8.6.2)*

45. **With its Implementation Plan**, Transco shall file with the Secretary a revised table 4.8.6-3 that includes any newly identified conservation easements including copies of correspondence documenting any mitigation measures Transco will implement based on its consultation with the administering agency(ies). *(Section 4.8.6.2)*

46. **Prior to construction**, Transco shall file with the Secretary copies of the Aids to Navigation Plans, approved by the PFBC, for each of the waterbody crossings listed in table 4.8.6-4. *(Section 4.8.6.3)*

47. Transco shall file with the Secretary reports describing any documented complaints from a homeowner that a homeowner's insurance policy was cancelled, voided, or amended due directly to the grant of the pipeline right-of-way or installation of the pipeline and/or that the premium for the homeowner's insurance increased materially and directly as a result of the grant of the pipeline right-of-way or installation of the pipeline. The reports shall also identify how Transco has mitigated the impact. **During construction**, these reports shall be included in Transco's **weekly** status reports (see recommendation 8) and in **quarterly** reports for a **2-year period** following in-service of the Project. *(Section 4.9.6)*

48. Transco shall not begin construction of facilities in Pennsylvania or use of staging, storage, or temporary work areas and new or to-be-improved access roads **until**:

    a. Transco completes the remaining cultural resources surveys and files with the Secretary all remaining cultural resources survey and evaluation reports, any necessary avoidance or treatment plans that outline measures to avoid, reduce, and/or mitigate, effects on historic properties, and the Pennsylvania SHPO's comments on the reports and plans;

    b. Transco completes the remaining geomorphological investigation of the west bank of Swatara Creek and files the report with the Secretary;

    c. the ACHP is provided an opportunity to comment on the undertaking if historic properties would be adversely affected; and

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

    All material filed with the Secretary containing **location, character, and ownership information** about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: "**CONTAINS PRIVILEGED INFORMATION – DO NOT RELEASE.**" *(Section 4.10.5)*

49. Transco shall file with the Secretary, for review and written approval by the Director of OEP, proof of purchase or transfer of NO_X ERCs to offset the estimated 2017 NO_X construction emissions for Lancaster County, Pennsylvania that exceed General Conformity thresholds, and confirmation from the PADEP that the ERCs conform with the Pennsylvania State Implementation Plan. Transco shall file the requested information in order for staff to complete the final General Conformity Determination. *(Section 4.11.1.2)*

50. **Prior to construction**, Transco shall file with the Secretary, for review and written approval by the Director of OEP, a Construction Emission Plan identifying how Transco would track its construction schedule for each component of the Project within the Lebanon County $PM_{2.5}$ Nonattainment Area and ensure that construction emissions of NO_X would remain below the

General Conformity applicability threshold. If a change in the construction schedule or Project results in emissions of NO_X greater than the General Conformity applicability threshold of 100 tpy, Transco shall provide and document all mitigation measures it will implement to comply with the General Conformity regulations at 40 CFR 93.158. *(Section 4.11.1.2)*

51. Transco shall review the Northeast Diesel Collaborative's recommendations for reducing diesel emissions from new on- and off-road construction equipment and indicate **in the Project's Implementation Plan** what measures it would implement. *(Section 4.11.1.3)*

52. Transco shall continue to operate the existing air quality monitors at Compressor Stations 517, 520, and 190 for CO_2 NO_2, PM_{10}, $PM_{2.5}$, and SO_2 **for a period of 3 years after the newly modified facilities begin operation**. Transco shall file **quarterly** air quality monitoring reports with the Secretary. In the event that the air quality monitoring shows a violation of the NAAQS, Transco shall immediately contact the state air quality agency to report the violation and establish a plan of action to correct the violation in accordance with the terms of the facility air permit and applicable state law. *(Section 4.11.1.3)*

53. **Prior to construction at the CPL South I-80/Little Fishing Creek HDD at MP M-0423 3.3**, Transco shall file with the Secretary, for review and written approval by the Director of OEP, the results of the noise impact assessment for the nearest NSAs within a 0.5-mile radius of the HDD entry and exit points. If the results of the noise impact assessment indicate that the estimated noise attributable to HDD equipment operations would exceed FERC's noise level criterion of 55 dBA L_{dn} at any of the NSAs, Transco shall provide additional information on the mitigation measures, such as sound barriers, that will be implemented to reduce noise levels below 55 dBA. *(Section 4.11.2.2)*

54. Transco shall file **in its weekly construction status reports** the following information for the CPL North Susquehanna River HDD entry site and the CPL South Conestoga River HDD entry and exit sites:

    a. the noise measurements from the nearest NSA for the CPL North Susquehanna River HDD entry site and the CPL South Conestoga River HDD entry and exit sites, obtained at the start of drilling operations;

    b. any noise mitigation that Transco implemented at the start of drilling operations; and

    c. any additional mitigation measures that Transco will implement if the initial noise measurements exceed an L_{dn} of 55 dBA at the nearest NSA. *(Section 4.11.2.3)*

55. Transco shall file a noise survey with the Secretary **no later than 60 days** after placing the authorized units at Compressor Stations 517 and 190 in service. If a full load condition noise survey is not possible, Transco shall provide an interim survey at the maximum possible horsepower load and provide the full load survey **within 6 months**. If the noise attributable to the operation of all of the equipment at Compressor Stations 517 and 190 under interim or full horsepower load conditions exceeds an L_{dn} of 55 dBA at any nearby NSAs, Transco shall file a report on what changes are needed and shall install the additional noise controls to meet the level **within 1 year** of the in-service date. Transco shall confirm compliance with the above requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. *(Section 4.11.2.3)*

56. Transco shall conduct a noise survey at Compressor Station 520 to verify that the noise from all the equipment operated at full capacity does not exceed the previously existing noise levels that are at or above an L_{dn} of 55 dBA at the nearby NSAs. The results of this noise survey shall be filed with the Secretary **no later than 60 days** after placing the modified units in service. If any of these noise levels are exceeded, Transco shall, **within 1 year** of the in-service date, implement additional noise control measures to reduce the operating noise level at the NSAs to at or below the previously existing noise level. Transco shall confirm compliance with this requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. *(Section 4.11.2.3)*

57. Transco shall file a noise survey with the Secretary **no later than 60 days** after placing Compressor Stations 605 and 610 in service. If a full load condition noise survey is not possible, Transco shall provide an interim survey at the maximum possible horsepower load and provide the full load survey **within 6 months**. If the noise attributable to the operation of all of the equipment at Compressor Stations 605 and 610 under interim or full horsepower load conditions exceeds an L_{dn} of 55 dBA at any nearby NSAs, Transco shall file a report on what changes are needed and shall install the additional noise controls to meet the level **within 1 year** of the in-service date. Transco shall confirm compliance with the above requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. *(Section 4.11.2.3)*

APPENDIX A

DISTRIBUTION LIST

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DISTRIBUTION LIST

Federal Government Agencies

Council on Environmental Quality, Edward Boling, DC
Council on Environmental Quality, Manisha Patel, DC
Office of Federal Programs, Advisory Council on Historic Preservation, Charlene D. Vaughn, DC
Senate Energy and Natural Resources Committee, Lisa Murkowski, DC
U.S. Army Corps of Engineers – Baltimore District, Mike Dombroskie, PA
U.S. Army Corps of Engineers – Huntington District, WV
U.S. Army Corps of Engineers – Norfolk District, Tom Walker, VA
U.S. Army Corps of Engineers – Pittsburgh District, PA
U.S. Army Corps of Engineers – State College Field Office, Mike Dombroskie, PA
U.S. Army Corps of Engineers – Wilmington District, NC
U.S. Army Corps of Engineers- Norfolk District, VA
U.S. Army Corps of Engineers, Planning and Policy Division, John Furry, DC
U.S. Department of Agriculture, Farm Service Agency, Conservation and Environmental Program Division, Nell Fuller, DC
U.S. Department of Agriculture, Natural Resources Conservation Service, Andree Duvarney, DC
U.S. Department of Agriculture, U.S. Forest Service – Ecosystem Management Coordination, Joe Carbone, DC
U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Ocean and Costal Resource Management, Kerry Kehoe, MD
U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Steve Kokkinakis, MD
U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Steve Leathery, MD
U.S. Department of Energy, John Anderson, DC
U.S. Department of Energy, Office of Environmental Management, Mark Whitney, DC
U.S. Department of Energy, Office of National Environmental Policy Act Policy and Compliance, Carol M. Borgstrom, DC
U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Environmental Health, Sharunda Buchanan, GA
U.S. Department of Health and Human Services, Edward Pfister, DC
U.S. Department of Homeland Security, U.S. Customs and Border Protection Christopher Oh, DC
U.S. Department of Housing and Urban Development, Office of Environment and Energy, Danielle Schopp, DC
U.S. Department of Justice, Environment, and Natural Resources Division, Beverly Li, DC
U.S. Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, Alexander Yuan, DC
U.S. Department of the Interior, Bureau of Indian Affairs, Pamela Snyder-Osmun
U.S. Department of the Interior, Bureau of Indian Affairs, Terry L. McClung
U.S. Department of the Interior, Bureau of Land Management, Kerry Rogers, DC
U.S. Department of the Interior, Bureau of Ocean Energy Management, James F. Bennett, VA
U.S. Department of the Interior, Bureau of Safety and Environmental Enforcement, Charles B. Barbee, VA
U.S. Department of the Interior, Director, DC
U.S. Department of the Interior, National Park Service- Northwest Region, Maryanne Gerbauckas, PA
U.S. Department of the Interior, National Park Service, Appalachian National Scenic Trail, Michele Kuna, PA
U.S. Department of the Interior, National Park Service, Patrick Walsh, CO
U.S. Department of the Interior, Office of Environmental Policy and Compliance, Lindy Nelson, PA
U.S. Department of the Interior, U.S. Fish and Wildlife Service – Pennsylvania Field Office, Pamela Shellenberger, PA
U.S. Department of the Interior, U.S. Fish and Wildlife Service – Asheville Field Office, Mark Cantrell, NC

Federal Government Agencies (cont'd)

U.S. Department of the Interior, U.S. Fish and Wildlife Service – Chesapeake Bay Field Office, Genevieve Larouche, MD
U.S. Department of the Interior, U.S. Fish and Wildlife Service – Raleigh Field Office, John Hammond, NC
U.S. Department of the Interior, U.S. Fish and Wildlife Service – Pennsylvania Field Office, Pamela Shellenberger, PA
U.S. Department of the Interior, U.S. Fish and Wildlife Service, Erin Rivenbark, GA
U.S. Department of the Interior, U.S. Fish and Wildlife Service, Virginia Ecological Services Field Office, VA
U.S. Department of Transportation, Office of Assistant Secretary For Transportation Policy, Camille Mittelholtz, DC
U.S. Department of Transportation, Office of Assistant Secretary For Transportation Policy, Helen Serassio, DC
U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration Magdy El-Sibaie, DC
U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Jeffrey Wiese, DC
U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety, Karen Lynch, DC
U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Sherri Pappas, DC
U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety, Kenneth Y. Lee, DC
U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety, Bryn Karaus, DC
U.S. Department of Transportation, Surface Transportation Board, Victoria Rutson, DC
U.S. Environmental Protection Agency, Cliff Rader, DC
U.S. Environmental Protection Agency, Cynthia Giles, DC
U.S. Environmental Protection Agency, Jerome Blackman, DC
U.S. Environmental Protection Agency, Kevin Magerr, PA
U.S. Environmental Protection Agency, Region 3, Office of Environmental Programs, Alaina McCurdy, PA
U.S. Environmental Protection Agency, Region 3, Office of Environmental Programs, Jeffery D. Lapp, PA
U.S. Environmental Protection Agency, Region 3, Shawn M. Garvin, PA
U.S. Environmental Protection Agency, Region 4, National Environmental Policy Act Program Office, Heinz Mueller, GA
U.S. Environmental Protection Agency, Region 4, National Environmental Policy Act Program Office, Heinz Mueller, GA
U.S. Environmental Protection Agency, Susan E. Bromm, DC
U.S. Geological Survey, Esther Eng, VA
United States of America, DC
United States of America, PA
United States of America, VA

Federal Senators and Representatives

U.S. House of Representatives, Representative Dutch Ruppersberger, DC
U.S. House of Representatives, Representative Elijah E. Cummings, DC
U.S. House of Representatives, Representative Glenn Thompson, DC
U.S. House of Representatives, Representative Joseph R. Pitts, DC
U.S. House of Representatives, Representative Lou Barletta, DC
U.S. House of Representatives, Representative Matthew Cartwright, DC
U.S. House of Representatives, Representative Robert Hurt DC
U.S. House of Representatives, Representative Robert J. Witman, DC
U.S. House of Representatives, Representative Tom Marino, DC
U.S. Senate, Senator Barbara A. Mikulski, DC
U.S. Senate, Senator Benjamin L. Cardin, DC
U.S. Senate, Senator Johnny Isakson, DC
U.S. Senate, Senator Kay R. Hagan, DC
U.S. Senate, Senator Mark R. Warner, DC
U.S. Senate, Senator Pat Toomey, DC
U.S. Senate, Senator Richard Burr, DC
U.S. Senate, Senator Robert P. Casey, DC
U.S. Senate, Senator Saxby Chambliss, DC
U.S. Senate, Senator Tim Kaine, DC

State Senators and Representatives

Georgia House of Representatives, District 10, Paul C. Broun, GA
Maryland House of Delegates, District 9a, Member, Trent Kittleman, MD
Maryland House of Delegates, District 9a, Member, Warren E. Miller, MD
Maryland House of Delegates, District 9b, Member, Bob Flanagan, MD
Maryland House of Delegates, District 9b, Member, Susan W. Krebs, MD
Maryland State Senate, District 9, Senator Allan H. Kittleman, MD
Maryland State Senate, District 9, Senator Gail H. Bates, MD
Pennsylvania House of Representatives, District 100, Representative Bryan Cutler, PA
Pennsylvania House of Representatives, District 101, Representative Mauree Gingrich, PA
Pennsylvania House of Representatives, District 102, Representative Rosemarie Swanger, PA
Pennsylvania House of Representatives, District 102, Representative Russ Diamond, PA
Pennsylvania House of Representatives, District 104, Representative Sue Helm, PA
Pennsylvania House of Representatives, District 107, Representative Kurt A. Masser, PA
Pennsylvania House of Representatives, District 109, Representative David R. Millard, PA
Pennsylvania House of Representatives, District 111, Representative Sandra Major, PA
Pennsylvania House of Representatives, District 114, Representative Sid Michaels Kavulich, PA
Pennsylvania House of Representatives, District 117, Representative Karen Boback, PA
Pennsylvania House of Representatives, District 125, Representative Mike Tobash, PA
Pennsylvania House of Representatives, District 140, Representative John T. Galloway, PA
Pennsylvania House of Representatives, District 15, Representative Charles Dent, DC
Pennsylvania House of Representatives, District 37, Representative Mindy Fee, PA
Pennsylvania House of Representatives, District 41, Representative Brett R. Miller, PA
Pennsylvania House of Representatives, District 76, Representative Michael K. Hanna Sr., PA
Pennsylvania House of Representatives, District 84, Representative Garth D. Everett, PA
Pennsylvania House of Representatives, District 94, Representative Stan Saylor, PA
Pennsylvania House of Representatives, District 98, Representative David S. Hickernell, PA
Pennsylvania State Senate, District 10, Senator Charles McLihnney, Jr., PA
Pennsylvania State Senate, District 13, Senator Lloyd K. Smucker, PA
Pennsylvania State Senate, District 20, Senator Lisa Baker, PA
Pennsylvania State Senate, District 22, Senator John P. Blake, PA
Pennsylvania State Senate, District 25, Senator Joseph Scarnati III, PA
Pennsylvania State Senate, District 27, Senator John R. Gordner, PA
Pennsylvania State Senate, District 29, Senator David G. Argall, PA
Pennsylvania State Senate, District 29, Senator Gene Yaw, PA
Pennsylvania State Senate, District 35, Senator John N. Wozniak, PA
Pennsylvania State Senate, District 36, Senator Mike Brubaker, PA
Pennsylvania State Senate, District 36, Senator Ryan P. Aument, PA
Pennsylvania State Senate, District 48, Senator Mike Folmer, PA
Virginia House of Delegates, District 13, Member Robert G. Marshall, Esquire, VA
Virginia House of Delegates, District 50, Member Jackson H. Miller, VA
Virginia House of Delegates, District 59, Member Matthew C. Fariss, VA
Virginia State Senate, District 13, Senator Richard H. Black, VA

State Senators and Representatives (cont'd)

Virginia State Senate, District 29, Former Senator Charles J. Colgan, VA

Virginia State Senate, District 5, Senator Thomas Garrett, Jr., VA

State Government Agencies

Commonwealth of Pennsylvania Fish Commission, PA

Commonwealth of Pennsylvania State Game Land Commission Appalachian Trail, PA

Commonwealth of Pennsylvania, Department of General Services, PA

Commonwealth of Pennsylvania, Pennsylvania Game Commission, PA

Commonwealth of Pennsylvania, PA

Commonwealth of Virginia, Department of Transportation, Aubrey Layne, Jr., VA

Commonwealth of Virginia, VA

Former Energy Executive for Former Governor Corbett, Patrick Henderson, PA

Georgia Department of Natural Resources, Wildlife Resources Division, Anna Yellin, GA

Maryland Department of Natural Resources, Maryland Natural Heritage Program Consultation, Lori Byrne, MD

Maryland Department of the Environment, Water Management Administration, Andi Cunabaugh, MD

Maryland Department of the Environment, Water Management Administration, Amanda Sigillito, MD

North Carolina Department of Wildlife Resources Commission, North Carolina Natural Heritage Program Consultation, Misty Buchanan, NC

Office of the Governor Energy Executive, Patrick Henderson, PA

Pennsylvania Department of Community and Economic Development, C. Alan Walker, PA

Pennsylvania Department of Conservation and Natural Resources, Ellen Ferretti, PA

Pennsylvania Department of Environmental Protection Programs, Dana Aunkst, PA

Pennsylvania Department of Environmental Protection Water Management, Kelly Heffner, PA

Pennsylvania Department of Environmental Protection, Administration and Management, Jeff Logan, PA

Pennsylvania Department of Environmental Protection, Ann Roda, PA

Pennsylvania Department of Environmental Protection, Bureau of Air Quality, Krishan Ramamurthy, PA

Pennsylvania Department of Environmental Protection, Bureau of Water Stand, John (Jack) Kraeuter, PA

Pennsylvania Department of Environmental Protection, Bureau of Water Stand, Ron Furlan, PA

Pennsylvania Department of Environmental Protection, Christopher Abruzzo, PA

Pennsylvania Department of Environmental Protection, Marcus Kohl, PA

Pennsylvania Department of Environmental Protection, North-Central Region, John Twardowski, PA

Pennsylvania Department of Environmental Protection, Northeast Region, Brian Mackowski, PA

Pennsylvania Department of Environmental Protection, South-Central Region, Lynn Langer, PA

Pennsylvania Department of Environmental Resources, Division of State Forest, PA

Pennsylvania Department of Environmental Resources, PA

Pennsylvania Department of Planning and Development, Robert G. Templeton, PA

Pennsylvania Department of Public Safety, Richard Knecht, PA

Pennsylvania Department of Transportation, PA

Pennsylvania Fish and Boat Commission, Chris Urban, PA

Pennsylvania Fish and Boat Commission, Rebecca Bowen, PA

Pennsylvania Game Commission, John Taucher, PA

Pennsylvania Historical and Museum Commission, Bureau For Historic Preservation, Doug Mclearen, PA

Pennsylvania Natural Heritage Program, Chris Uban, PA

Pennsylvania Natural Heritage Program, Emilee Boyer, PA

Pennsylvania Natural Heritage Program, Greg Podniesinski, PA

State Government Agencies (cont'd)

Pennsylvania Natural Heritage Program, Kathy Gipe, PA
Pennsylvania Natural Heritage Program, Tracey Librandi Mumma, PA
Pennsylvania Organization of Watersheds and Rivers, PA
Pennsylvania Power and Light Company, Real Estate Taxes, PA
Pennsylvania Public Utility Commission, Gladys M. Brown, PA
Pennsylvania Public Utility Commission, James H. Cawley, PA
Pennsylvania Public Utility Commission, John F. Coleman, Jr., PA
Pennsylvania Public Utility Commission, Robert F. Powelson, PA
Pennsylvania Public Utility Commission, Pamela A. Witmer, PA
Swatara State Park, PA
The Secretary of Housing and Urban Development, VA
Virginia Department of Agriculture and Consumer Services, VA
Virginia Department of Conservation and Recreation, Alli Baird, VA
Virginia Department of Conservation and Recreation, Virginia Natural Heritage Program Consultation, Tom Smith, VA
Virginia Department of Conservation and Recreation, VA
Virginia Department of Environmental Quality, Northern Regional Office, Bryant Thomas, VA
Virginia Department of Environmental Quality, Northern Regional Office, Trisha Beasley, VA
Virginia Department of Environmental Quality, VA
Virginia Department of Game and Inland Fisheries, VA

Local Government Agencies

Annville Township Board of Supervisors, Rex A. Moore, PA
Annville Township Commissioners, Allen R. Yingst, PA
Annville Township Commissioners, James W. Scott, PA
Annville Township Commissioners, Richard F. Charles, PA
Annville Township Commissioners, Thomas R. Embich, PA
Annville Township Emergency Management, Gerald McAteer, PA
Annville Township Fire Department, Paul Longenecker, PA
Annville Township Planning Commission, Anthony Perrotto, PA
Annville Township Planning Commission, Gordon C. Kirkessner, Jr., PA
Annville Township Police Department, Bernard Dugan, PA
Annville Township, Nicholas T. Yingst, PA
Annville Township, Tanya Richter, PA
Annville Township, Timothy D. Sheffey, PA
Appomattox County Board of Supervisors, Ronald C. Spiggle, VA
Appomattox County Emergency Management, Aileen Ferguson, VA
Appomattox County Sheriff's Office, Barry E. Letterman, VA
Appomattox River Soil and Water Conservation District, VA
Arcadia-Reedy Creek-Hampton Volunteer Fire and Rescue Department, NC
Beaver Township Volunteer Fire Company, PA
Bellgrove Fire Company, PA
Benton Borough Board of Supervisors, Edwin Hartman, PA
Benton Borough Council, Dan Hartman, PA
Benton Borough Council, George Remphrey Jr., PA
Benton Borough Council, Jan Jankowski, PA
Benton Borough Council, O. Grant Little, PA
Benton Borough Council, Richard Scavone, PA
Benton Borough Emergency Management, Dan Jankowski, PA
Benton Borough Fire Department, Wilson Lynn, PA
Benton Borough Police Department, Jimmie L. Hill, PA
Benton Borough Public Safety, William Yanchick, PA
Benton Borough, Jan Swan, PA
Benton Borough, P. Jeffrey Hill, Esquire, PA
Benton Fire Department, Ed Musser, PA
Benton Police Department, PA
Benton Township Board of Supervisors, Gerald Houseweart, PA
Benton Township Board of Supervisors, Terri Adams, PA

Local Government Agencies (cont'd)

Benton Township Board of Supervisors, William (Woody) Ertwine, PA
Benton Township Emergency Management, Walter R. Gordon, Jr., PA
Benton Township Planning and Zoning, Edwin Kocher, PA
Benton Township Planning Commission, Pat Stemrick, PA
Benton Township, Elwood R. Harding, Jr., Esquire, PA
Bloomsburg Fire Department, PA
Blue Rock Fire Rescue, Rob Muschlitz, PA
Brentsville District Supervisor, Wally Covington III, VA
Brentsville District, Old Manassas Courthouse, VA
Buckhall Volunteer Fire Department – Station 11, Anthony Cooch, VA
Buckhall Volunteer Fire Department – Station 16, Art Jordan, VA
Buckhall Volunteer Fire Department – Station 6, Shane Wood, VA
Buckhall Volunteer Fire Department – Station 7, Walter Davis, VA
Buckhall Volunteer Fire Department – Station 8, Jerry Dean, VA
Buckhorn Community Volunteer Fire Company No. 1, PA
Catawissa Hose Company 1, Donald Traugh, PA
Catawissa Police Department, Anthony Kopitsky, PA
Cemetery of Township of Nicholson, Secretary Joann Ritter, PA
Chapman Township Board of Supervisors, George R. Machak, PA
Chapman Township Board of Supervisors, Greg Werts, PA
Chapman Township Board of Supervisors, Tim L. Horner, PA
Chapman Township Fire Department, John Tarantella, PA
Chapman Township Volunteer Fire Company 1, PA
Chapman Township, Frank Miceli, PA
Chapman Township, James Weaver, PA
Chesapeake Bay Program, MD
Citizen's Fire House Station 45, Matt Fausey, PA
City of Danielsville Police Department, GA
City of Danielsville, Jamie Spurlin, GA
City of Danielsville, Jon Hendrix, GA
City of Danielsville, Michael Widerman, GA
City of Danielsville, Tim Stamps, GA
City of Danielsville, Todd Higdon, GA
City of Lancaster, Charlotte Katzenmoyer, Director of Public Works, PA
Cleveland and Franklin Townships Emergency Management, Allen L. Breach, PA
Cleveland County Commissioners, Eddie Holbrook, NC
Cleveland County Commissioners, Jason Falls, NC
Cleveland County Commissioners, Johnny Hutchins, NC
Cleveland County Commissioners, Ronald J. Hawkins, NC
Cleveland County Commissioners, Susan K. Allen, NC
Cleveland County Emergency Management, Dewey Cook, NC
Cleveland County Sheriff's Office, Alan Norman, NC
Cleveland County Volunteer Fire Department, NC
Cleveland Township Board of Supervisors, Henry Doraski, PA
Cleveland Township Board of Supervisors, Lamar Kerstetter, PA
Cleveland Township Board of Supervisors, Troy Litwhiler, PA
Cleveland Township Planning Commission, Linda Edwards, PA
Cleveland Township Planning Commission, Marianne Zenyuch, PA
Cleveland Township, Edward C. Greco, Esquire, PA
Cleveland Township, Lamar J. Molick, PA
Clinton and Overfield Township, George Dougherty, PA
Clinton County Commissioners, Amy Dicello, PA
Clinton County Commissioners, Jeffrey A. Snyder, PA
Clinton County Commissioners, Joel Long, PA
Clinton County Commissioners, Robert B. Pete Smeltz, Jr., PA
Clinton County Conservancy, Michael Singer, PA
Clinton County Conservation District, Rebecca Dunlap, PA

<u>Local Government Agencies (cont'd)</u>

Clinton County Conservation District, Robbie Fulton, PA
Clinton County Emergency Management, Kevin Fanning, PA
Clinton County Planning and Zoning, Timothy Holladay, PA
Clinton County Planning Commission, Dave Glessner, PA
Clinton County Planning Commission, Terry Murty, PA
Clinton County, Charles Ankney, PA
Clinton County, Elizabeth J. Whitty, PA
Clinton County, Larry Coploff, PA
Clinton Township Board of Supervisors, Donald C. Chamberlain, PA
Clinton Township Board of Supervisors, Edward J. Boyd, PA
Clinton Township Board of Supervisors, Harry Colvin, PA
Clinton Township Board of Supervisors, James H. Halstead, PA
Clinton Township Board of Supervisors, Kathy B. Allen, PA
Clinton Township Board of Supervisors, Paul Corby, PA
Clinton Township Emergency Management, Donald Chamberlin, PA
Clinton Township Planning Commission, James Davis, PA
Coal Township Board of Supervisors, Craig Fetterman, PA
Coal Township Commissioners, Bernard Rumberger, PA
Coal Township Commissioners, Gene Welsh, PA
Coal Township Commissioners, George Zalar, PA
Coal Township Commissioners, Paul Leshinskie, PA
Coal Township Emergency Management, Mark Cupp, PA
Coal Township Fire Department, Russell Feese, PA
Coal Township Planning Commission, Thomas Eckman, PA
Coal Township Planning Commission, William Rickert, PA
Coal Township Police Department, William Carpenter, PA
Coal Township, Robert M. Slaby Jr., PA
Coal Township, Vincent Rovito, Esquire, PA
Columbia Conservation District, Maryruth Wagner, PA
Columbia County Commissioners, Chris E. Young, PA
Columbia County Commissioners, David M. Kovach, PA
Columbia County Commissioners, Gail Kipp, PA
Columbia County Commissioners, Richard C. Ridgway, PA
Columbia County Emergency Management, Michelle Frye, PA
Columbia County Office of Planning and Development, Caroline Creasy, PA
Columbia County Office of Planning and Development, Robert Aungst, PA
Columbia County Planning and Zoning, Robert Aungst, PA
Columbia County Planning Commission, Cardine Creesey, PA
Columbia County Planning Commission, William Brobst, PA
Columbia County, Barry Trauelpiece, PA
Columbia County, Fairmount Township, Anthony McDonald, Esquire, PA
Columbia County, Nanny Corbin, PA
Columbia County, Timothy Chamberlain, PA
Columbia Fish and Game Association, PA
Columbia Fish and Game Association, Sam Weigard, PA
Conestoga and Drumore Townships, James H. Thomas, Esquire, PA
Conestoga Area Historical Society, Kenneth M. Hoak, PA
Conestoga Township Board of Supervisors, Craig C. Eshleman, PA
Conestoga Township Board of Supervisors, John Berry, PA
Conestoga Township Board of Supervisors, Steven R. Charles, Sr., PA
Conestoga Township Emergency Management, John Michener, PA
Conestoga Township Fire Department, Larry Frankford, Jr., PA
Conestoga Township Planning Commission, Andrea Berry, PA
Conestoga Township Planning Commission, Wesley Bruckno, PA
Conestoga Township, Southern Regional Police Department, John Fiorill, PA

Local Government Agencies (cont'd)

County Commissioners of Northumberland, PA
County of Lebanon, Chief Clerk Jamie Wolgemuth, PA
County of Luzerne, C. David Pedri, PA
County of Luzerne, Robert C. Lawton, PA
County of Northumberland, Commonwealth of Pennsylvania, PA
Dallas Borough Board of Supervisors, Lee Eckert, PA
Dallas Borough Council, Charles Youngman, PA
Dallas Borough Council, Christopher Matus, PA
Dallas Borough Council, John Appel, PA
Dallas Borough Council, Robert Edgerton, Jr., PA
Dallas Borough Fire Department / Emergency Management, Harry Vivian, PA
Dallas Borough Planning Commission, Barbara King, PA
Dallas Borough Planning Commission, Frank Rollman, PA
Dallas Borough Police Department, James Drury, PA
Dallas Borough, Jeffrey Malak, Esquire, PA
Dallas Borough, Timothy J. Carroll, PA
Dallas Borough, Tracey M. Carr, PA
Dallas Fire and Ambulance, PA
Dallas Township Board of Supervisors, Elizabeth A. Martin, PA
Dallas Township Board of Supervisors, Frank E. Wagner, PA
Dallas Township Board of Supervisors, Liz Martin, PA
Dallas Township Board of Supervisors, William J. Grant, PA
Dallas Township Emergency Management, Alan Pugh, PA
Dallas Township Fire Department and Planning Commission, Jack Dodson, PA
Dallas Township Fire Department, Harry Vivian, PA
Dallas Township Planning Commission, Tammy L. Miller, PA
Dallas Township Police Department, Robert G. Jolley, PA
Dallas Township Public Safety, Martin K. Barry, PA
Dallas Township, Carl M. Alder, PA
Dallas Township, Frank Vagner, PA
Dallas Township, PA
Dallas Township, Thomas P. Brennan, PA
Danielsville Community Volunteer Fire Department, GA
Davidson County Board of Commissioners, Billy Joe Kepley, NC
Davidson County Board of Commissioners, Don Truell, NC
Davidson County Board of Commissioners, Fred McClure, NC
Davidson County Board of Commissioners, Larry Potts, NC
Davidson County Board of Commissioners, Sam Watford, NC
Davidson County Board of Commissioners, Steve Jarvis, NC
Davidson County Board of Commissioners, Todd Yates, NC
Davidson County Department of Emergency Services, Alton Hanes, NC
Davidson County Fire Marshal's Office, Danny Ward, NC
Davidson County Office of The County Attorney, Charles E. Frye, III, NC
Davidson County Sheriff's Office, David Grice, NC
Davidson County, Robert Hyatt, NC
Delta-Cardiff Volunteer Fire Company, Jeff Griffith, PA
Dimock Township Emergency Management Coordinator, Mark Wood, PA
Drumore Township Board of Supervisors, Dwight R. Eshleman, PA
Drumore Township Board of Supervisors, James L. Tollinger, PA
Drumore Township Board of Supervisors, Kolin D. McCauley, PA
Drumore Township Emergency Management, David A. Jackson, Sr., PA
Drumore Township Planning Commission, Ann Zemsky, PA
Drumore Township Planning Commission, David Nichols, PA
East Cameron Township Board of Supervisors, Lambert Haupt, PA
East Cameron Township Board of Supervisors, Norman A. Foura, PA
East Cameron Township Board of Supervisors, Wayne Kahler, PA
East Cameron Township Emergency Management, Wayne Kahler, PA

Local Government Agencies (cont'd)

East Cameron Township Fire Department, James Reed Jr., PA
East Cameron Township, Wiest, Muolo, Noon and Sweinhart, PA
East Donegal Township Board of Supervisors, Allen D. Esbenshade, PA
East Donegal Township Board of Supervisors, Dennis J. Drager, PA
East Donegal Township Board of Supervisors, John Murphy, Jr., PA
East Donegal Township Emergency Management, Scott Kingsboro, PA
East Donegal Township Fire Department, Adam Kosheba, PA
East Donegal Township Planning Commission, Charles Engle, PA
East Donegal Township Planning Commission, Jeffrey L. Butler, PA
East Donegal Township Police Department, Charles E. Haugh, PA
East Donegal Township, Bradford J. Harris, PA
East Hanover Township Board of Supervisors, Dennis Grubb, PA
East Hanover Township Board of Supervisors, Edward L. Heagy, PA
East Hanover Township Board of Supervisors, Matthew Hetrick, PA
East Hanover Township Emergency Management, Daryl Emrich, PA
East Hanover Township Fire Department, Ono Fire Company, Roger Funck, PA
East Hanover Township Planning Commission, Gerald Long, PA
East Hanover Township Planning Commission, Scott Gamber, PA
East Hanover Township, Howard Lerch, PA
East Hanover Township, Samuel G. Weiss, Jr., PA
Eastern Pennsylvania Coalition for Abandoned Mine Reclamation, Robert Hughes, PA
Eaton Township Board of Supervisors, Kenneth White, PA
Eaton Township Board of Supervisors, Paul Rowker, PA
Eaton Township Board of Supervisors, Randy Ehrenzeller, PA
Eaton Township Emergency Management, Paul Rowker, PA
Eaton Township Planning Commission, Paul Binner, PA
Eaton Township Planning Commission, Walter Dana, PA
Eaton Tunkannhok / Northumberland, Kenny White, PA
Eldred Township Board of Supervisors, Daniel Dietrich, PA
Eldred Township Board of Supervisors, Howard Knerr, PA
Eldred Township Board of Supervisors, Randy L. Young, PA
Eldred Township Board of Supervisors, Samuel R. Zimmerman, PA
Eldred Township Emergency Management, Matthew Belding, PA
Eldred Township Fire Department, Randy Zartman, PA
Eldred Township, Pfeiffer, Brown and Dinicola, PA
Elizabethtown Fire Department / Friendship Fire and Hose Company, Jason Bock, PA
Ellicott City Fire Department Station 2, Scott Wood, MD
Ellicott City Volunteer Firemen's Association, Inc., MD
Elysburg Fire Department, Eric Haupt, PA
Espy Fire Company 1, PA
Evergreen Volunteer Fire Department, Station 15, Kerrie Logsdon, VA
Fairmount Township Board of Supervisors, David Keller, PA
Fairmount Township Board of Supervisors, Larry Dohl, PA
Fairmount Township Board of Supervisors, Lyle Harvey, PA
Fairmount Township Commissioners, Dave Keller, PA
Fairmount Township Emergency Management, David Keller, PA
Fairmount Township Volunteer Fire and Ambulance Company, PA
Falls Township Board of Supervisors, Eugene J. Dziak Jr., PA
Falls Township Board of Supervisors, Levi Bonnice, PA
Falls Township Board of Supervisors, Robert Kenia, PA
Falls Township Emergency Management, Eugene Dziak, PA
Falls Township Planning Commission, Kevin Slowey, PA

Local Government Agencies (cont'd)

Falls Township Planning Commission, Willard Sickles, PA
Falls Township, Anthony P. Litwin, Esquire, PA
Falls Township, Richard Dixon, PA
Fernville Volunteer Fire Company, PA
Fishing Creek Watershed Association (Columbia Co.), PA
Fort Indiantown Gap Fire Department, PA
Frailey Township Board of Supervisors, Donald Allar, PA
Frailey Township Board of Supervisors, Jack Barnhart, PA
Frailey Township Board of Supervisors, Keith Allar, PA
Frailey Township Fire Department and Emergency Management, Edward Kimmel, PA
Frailey Township, Derenzo and Zerbe, PA
Franklin Township Board of Supervisors, Aaron Ritter, PA
Franklin Township Board of Supervisors, David McDonald, PA
Franklin Township Board of Supervisors, Dorrance H. Berger, PA
Franklin Township Board of Supervisors, Edwin F. Lease, PA
Franklin Township Board of Supervisors, Matthew Bloom, PA
Franklin Township Board of Supervisors, Victor L. Marquardt, PA
Franklin Township Emergency Management, Steve Rogers, PA
Franklin Township Planning Commission, Gregory Inns, PA
Franklin Township Planning Commission, Raine Ohnmeiss, PA
Franklin Township Planning Commission, Ronald Rohrbach, PA
Franklin Township Planning Commission, Wayne Arthur, PA
Franklin Township Police Department, Leo Sokoloski, PA
Franklin Township Volunteer Fire Company, PA
Franklin Township, J. David Smith, Esquire, PA
Franklin Township, Michael Gregorowicz, Esquire, PA
Fulton Township Board of Supervisors, Scott N. Osborne, PA
Fulton Township Board of Supervisors, Michael M. Church, PA
Fulton Township Board of Supervisors, William H. Taylor, PA
Gainesville District Office, Pete Candland, VA
Goodwill Fire Company, Glenn Miller, PA
Greenpoint Fire Company, PA
Greenwood Township Board of Supervisors, Barry Rider, PA
Greenwood Township Board of Supervisors, Joseph Farr, PA
Greenwood Township Board of Supervisors, Keith Bangs, PA
Greenwood Township Emergency Management, Jermey Reese, PA
Greenwood Township Planning Commission, Edward Houseknecht, PA
Greenwood Township Planning Commission, Joseph Farr, PA
Greenwood Township Police Department, Jonathan Swank, PA
Greenwood Township, Michael Smith, Esquire, PA
Hallstead Fire, Bob Thatcher, Sr., PA
Harford Fire/EMS, Rhonda Smith, PA
Harry S. Smith Fire Department of Kunkle, PA
Harvey's Lake Fire and Ambulance Company, John Martinson, PA
Hegins Township Board of Supervisors, Brad Carl, PA
Hegins Township Board of Supervisors, Michael Begis, PA
Hegins Township Emergency Management, Dan Wagner, PA
Hegins Township Fire Department, Ty Leitzel, PA
Hegins Township Planning Commission, Ken Smeltz, PA
Hegins Township Planning Commission, Rick Lettich, PA
Hegins Township Police Department, Steven S. Lohr, PA
Hemlock Township Board of Supervisors, Albert Hunsinger, Jr., PA
Hemlock Township Board of Supervisors, Dan Carr, PA
Hemlock Township Board of Supervisors, David E. Bardo, PA
Hemlock Township Board of Supervisors, Frederick J. Klinger, PA

Local Government Agencies (cont'd)

Hemlock Township Board of Supervisors, Mark Morrow, PA
Hemlock Township Emergency Management, Scott Traugh, PA
Hemlock Township Fire Department, Kenneth Wenner, Jr., PA
Hemlock Township Planning and Zoning / Planning Commission, Renee Moist, PA
Hemlock Township Planning Commission, Jay Fritz, Jr., PA
Hemlock Township Police Department, Michael D. Vandine, PA
Hemlock Township, Barry A. Lewis, PA
Hemlock Township, Stephanie Dunn Haney, PA
Highville Fire Company, PA
Hop Bottom Hose Co., Carol Ainey, PA
Hop Bottom Hose Co., Jody Nowalk, PA
Hop Bottom Hose Co., Mike Karanak, PA
Hop Bottom Hose Co., Pete Mecca, PA
Howard County Council, Courtney Watson, MD
Howard County Council, Greg Fox, MD
Howard County Department of Fire and Rescue Services, William F. Goodard, MD
Howard County Office of Emergency Management, Ryan Miller, MD
Howard County Planning Board, Jach Tzuker, MD
Howard County Police Department, William J. McMahon, MD
Howard County Sheriff's Office, James F. Fitzgerald, MD
Howard County Soil Conservation, MD
Howard County, Ken Ulman, MD
Hughesville Fire Department, Steven Stiger, PA
Independent Hose Company of Jersey Shore, PA
Iredell County Board of Commissioners, David A. Boone, NC
Iredell County Board of Commissioners, Kenneth M. Robertson, Jr., NC
Iredell County Board of Commissioners, Marvin Norman, NC
Iredell County Board of Commissioners, Renee C. Griffith, NC
Iredell County Board of Commissioners, Stephen D. Johnson, NC
Iredell County Emergency Management, David Martin, NC
Iredell County Sheriff's Office, Phillip H. Redmond, NC
Jackson and North Annville Townships, Paul Bametzreider, Esquire, PA
Jackson and Sugarloaf Townships, Kim Hill, Esquire, PA
Jackson Township Board of Supervisors, Clayton Emery, PA
Jackson Township Board of Supervisors, Clyde E. Deck, PA
Jackson Township Board of Supervisors, Dean O. Moyer, PA
Jackson Township Board of Supervisors, Gregory D. Remley, Jr., PA
Jackson Township Board of Supervisors, Ronald Robbins, PA
Jackson Township Board of Supervisors, Thomas Houtz, PA
Jackson Township Emergency Management, Allen Kintzer, PA
Jackson Township Emergency Management, James Albertson, PA
Jackson Township Fire Department / Kutztown Fire Company, Tim Behm, PA
Jackson Township Planning Commission, Bruce Anderson, PA
Jackson Township Volunteer Fire Department, PA
Jordan Township Board of Supervisors, Dale L. Stackhouse, PA
Jordan Township Board of Supervisors, Melvin E. Swisher, Jr., PA
Jordan Township Board of Supervisors, Planning Commission, Robert L. Puderbach, PA
Jordan Township Emergency Management, Vera Doughty, PA
Jordan Township, J. Howard Langdon, Esquire, PA
Jr Davis Fire Company, Cindy Ann Blaine, PA
Keystone Hook and Ladder # 1, Jake Belleman, PA
Kunkle Fire and Ambulance, Jack Dodson, PA
Kunkle Fire Company, PA
Lairdsville Community Fire Company, PA
Lake Silkworth Volunteer Fire Department, Donna Chamberlain, PA
Lake Township Board of Supervisors, Lonnie Piatt, PA
Lake Township Board of Supervisors, Robert Pace, PA
Lake Township Board of Supervisors, Robert W. Grey, Sr., PA

Local Government Agencies (cont'd)

Lake Township Emergency Management, Dennis Dobinick, PA
Lake Township Police Department, PA
Lake Township, Mark McNealis, Esquire, PA
Lake Winola Fire Company No. 1 Inc., Marty Bonifanti, PA
Lancaster Area Sewer Auth, PA
Lancaster Conservation District, Donald McNutt, PA
Lancaster County Commissioners, Andrea McCue, PA
Lancaster County Commissioners, Craig Lehman, PA
Lancaster County Commissioners, Dennis P. Stuckey, PA
Lancaster County Commissioners, Scott F. Martin, PA
Lancaster County Conservancy, Kate Gonick, PA
Lancaster County Conservancy, Kathie Shirk Gonick, PA
Lancaster County Conservancy, Mike Burcin, PA
Lancaster County Conservancy, PA
Lancaster County Democratic Committee, Jen Porter, PA
Lancaster County Emergency Management, Randall S. Gockley, PA
Lancaster County Planning and Zoning, James R. Cowhey, Aicp, PA
Lancaster County Planning Commission, Dennis Groff, PA
Lancaster County Planning Commission, Leo Lutz, PA
Lancaster County, Crystal Clark, Esquire, PA
Lancaster County, Mark Reese, PA
Lancaster Public Library, Mountville Branch, PA
Lawn Fire Co, PA
Lebanon Conservation District, Lynette Gelsinger, PA
Lebanon County Commissioners, Jamie A. Wolgemuth, PA
Lebanon County Commissioners, Jo Ellen Litz, PA
Lebanon County Commissioners, Robert J. Phillips, PA
Lebanon County Commissioners, William E. Ames, PA
Lebanon County Emergency Management, John Wilson, PA
Lebanon County Planning and Zoning, Kristopher Troup, PA
Lebanon County Sheriff's Office, Michael Deleo, PA
Lebanon County, Bruce Klingler, PA
Lehman Township Board of Supervisors, Douglas W. Ide, PA
Lehman Township Board of Supervisors, Planning Commission, David H. Sutton, PA
Lehman Township Board of Supervisors, Raymond Iwanowski, PA
Lehman Township Emergency Management, James Welby, PA
Lehman Township Fire Department, William Hagenbaugh, PA
Lehman Township Planning Commission, Marian Deangelis, PA
Lehman Township Police Department, Howard Kocher, PA
Lehman Township Volunteer Fire Company Inc., PA
Lehman Township, M. John Haley, Esquire, PA
Lenox Township Board of Supervisors, Fred Benson, PA
Lenox Township Board of Supervisors, James Taylor, PA
Lenox Township Board of Supervisors, Leonard Wheatley, PA
Lenox Township Emergency Management, Leonard Wheatley, PA
Lickdale Community Fire Company, PA
Little Conestoga Watershed Alliance, Matthew Kofroth, PA
Luzerne Conservation District, Josh Longmore, PA
Luzerne County Commissioners, Edward A. Brominski, PA
Luzerne County Commissioners, Elaine Madden Curry, PA
Luzerne County Commissioners, Eugene Kelleher, PA
Luzerne County Commissioners, Harry Haas, PA
Luzerne County Commissioners, James Bobeck, PA
Luzerne County Commissioners, Linda McClosky Houck, PA
Luzerne County Commissioners, Rick Morelli, PA

Local Government Agencies (cont'd)

Luzerne County Commissioners, Rick Williams, PA
Luzerne County Commissioners, Stephen A. Urban, PA
Luzerne County Commissioners, Stephen J. Urban, PA
Luzerne County Commissioners, Timothy McGinley, PA
Luzerne County Emergency Management, Stephen Bekanich, PA
Luzerne County Planning Commission / Planning and Zoning, Adrian Merolli, PA
Luzerne County, Brian Herber, PA
Luzerne County, C. David Pedri, PA
Luzerne County, Robert C. Lawton, PA
Luzerne County, Thomas A. Pribula, PA
Luzerne County, Vito J. Deluca, PA
Lycoming Conservation District, Mark Davidson, PA
Lycoming County Commissioners, Ann Gehret, PA
Lycoming County Commissioners, Ernest P. Larson, PA
Lycoming County Commissioners, Jeff C. Wheeland, PA
Lycoming County Commissioners, Tony R. Mussare, PA
Lycoming County Emergency Management, John D. Yingling, PA
Lycoming County Planning and Zoning, Kurt Hausammann Jr., PA
Lycoming County Planning Commission, Christopher Keiser, PA
Lycoming County Planning Commission, George Logue, Jr., PA
Lycoming County, Ann Gegret, PA
Lycoming County, Mark R. Lusk, PA
Madison County Board of Supervisors, Anthony Dove, GA
Madison County Board of Supervisors, District 2, Dewitt "Pete" Bond, GA
Madison County Board of Supervisors, Rhonda S. Wooten, GA
Madison County Sherrif's Office, Kip C. Thomas, GA
Main Township Volunteer Fire Company, PA
Manor Township Board of Supervisors, Amber Green, PA
Manor Township Board of Supervisors, Brandon C. Clark, PA
Manor Township Board of Supervisors, George Mann, PA
Manor Township Board of Supervisors, Jay C. Breneman, PA
Manor Township Board of Supervisors, John D. Wenzell, PA
Manor Township Emergency Management, Duane Hagelgans, PA
Manor Township Planning Commission, Jay Provanzo, PA
Manor Township Police Department, Todd Graeff, PA
Manor Township, Barry L. Smith, PA
Manor Township, Thomas L. Goodman, PA
Martic Township Board of Supervisors, Beth Birchall, PA
Martic Township Board of Supervisors, Carl T. Drexel, PA
Martic Township Board of Supervisors, Duane Sellers, PA
Martic Township Board of Supervisors, Richard C. Drumm, Jr., PA
Martic Township Board of Supervisors, Thomas (Ted) Irwin, PA
Martic Township Emergency Management, Tony Williams, Sr., PA
Martic Township Planning Commission, Chris High, PA
Martic Township Planning Commission, Jon Kloppmann, PA
Martic Township, PA
Mifflin Township Board of Supervisors, Donald D. Murray, PA
Mifflin Township Board of Supervisors, Kevin L. Griffith, PA
Mifflin Township Board of Supervisors, Robert A. Paucke, PA
Mifflin Township Emergency Management, Adam Ross, PA
Monroe Township, Anthony P. Litwin, PA
Monroe Township, Arlene Traver, PA
Monroe Township, Charles Wright, PA
Monroe Township, Nile Lee Clark, PA
Monroe Township, Steven Traver, PA
Monroe Township, Walter Derhammer Sr., PA
Monroe Township, Walter Derhammer, PA
Monroe Township, William Patton, PA
Montour Township Board of Supervisors, Gerald Powers, PA
Montour Township Board of Supervisors, Joseph Mullen, PA

Local Government Agencies (cont'd)

Montour Township Board of Supervisors, Lori Carl, PA
Montour Township Emergency Management, Joseph Yeager, PA
Montour Township Fire Department, Brian Fosse, PA
Montour Township Planning Commission, Linda Woodward, PA
Montour Township Planning Commission, Tracy May, PA
Montour Township Police Department, Terry Eckart, PA
Montour Township, Brad Pater, PA
Montour Township, Richard Roberts, Esquire, PA
Montour Township, Terry Eckard, PA
Mount Joy Borough Authority, Joseph M. Ardini, PA
Mount Joy Borough Authority, Scott M. Hershey, PA
Mount Joy Borough, John D. Leaman, PA
Mount Joy Borough, Joseph A. Ardini, PA
Mount Joy Borough, Scott M. Hershey, PA
Mount Joy Township Board of Supervisors, David W. Sweigart, III, PA
Mount Joy Township Board of Supervisors, Debra E. Dupler, PA
Mount Joy Township Board of Supervisors, Gerald F. Becker, PA
Mount Joy Township Board of Supervisors, Gerald G. Cole, PA
Mount Joy Township Board of Supervisors, Lisa S. Heilner, PA
Mount Joy Township Emergency Management, Warren G. Mueller, Jr., PA
Mount Joy Township Forest Fire Company, PA
Mount Joy Township Planning Commission, John W. Dice, PA
Mount Joy Township Planning Commission, Mahlon R. Fuller, PA
Mount Joy Township, Morgan, Hallgren, Crosswell and Kane, Pc, PA
Mount Joy Township, Mike Skelly, PA
Mount Joy Township, Stephen A. Gault, PA
Mount Pleasant Township Board of Supervisors, John Gordner, PA
Mount Pleasant Township Board of Supervisors, Tammy (Boz) Robbins, PA
Mount Pleasant Township Board of Supervisors, Tod D. Fenstermacher, PA
Mount Pleasant Township Emergency Management, Robert Black, PA
Mount Pleasant Township Planning Commission, Coralee Kindt, PA
Mount Pleasant Township Planning Commission, Gary Sitler, PA
Mount Pleasant Township, C. Cleveland Hummel, Esquire, PA
Mount Pleasant Township, Carl Shaner, PA
Mount Pleasant Township, Donald B. Brown, PA
Mount Pleasant Township, Jim Faus, PA
Mount Pleasant Township, John R. Gordner, PA
Mount Pleasant Township, Len Hornberger, PA
Mount Pleasant Township, Marie Hornberger, PA
Mount Pleasant Township, Nelson Sherman, PA
Mount Pleasant Township, Sadi Jenstermach, PA
Nicholson Borough, Anne Marie Aylesworth, PA
Nicholson Township Board of Supervisors, Joann Ritter, PA
Nicholson Township Board of Supervisors, Victor Choplosky, PA
Nicholson Township Board of Supervisors, William O. Smith, PA
Nicholson Township Board of Supervisors, William Smith, PA
Nicholson Township Emergency Management, Ron Wood, PA
Nicholson Township, Victor Chollocky, PA
Nicholson, Eaton, Tunkhannock, Lenox, and Clinton Townships, Anthony P. Litwin III, Esquire, PA
Nippenose Valley Volunteer Fire Department, PA
Nokesville Volunteer Fire and Rescue Department, Brian Hickerson, VA
North Annville Township Board of Supervisors, Adam D. Wolfe, PA
North Annville Township Board of Supervisors, Brent Kaylor, PA
North Annville Township Board of Supervisors, Planning Commission, Randall Leisure, PA
North Annville Township Emergency Management, William Johnson, PA
North Annville Township Fire Department, Mark J. Blauch, PA
North Annville Township Planning Commission, Clyde Meyer, PA

Local Government Agencies (cont'd)

North Annville Township Police Department, L. Randall Gingrich, PA
Northern Lebanon School District, PA
Northern Swatara Creek Watershed Assn., Robert Evanchalk, PA
Northmoreland Township, Anthony P. Litwin, Esquire, PA
Northmoreland Township, Clinton Kyttle, PA
Northmoreland Township, James Ryttle, PA
Northmoreland Township, Judy Rusinko, PA
Northmoreland Township, Paul Gates, PA
Northmoreland Township, Terrence Fisher, PA
Northmoreland Township, William Wagner, PA
Northumberland Conservation District, Judy Becker, PA
Northumberland County Commissioners, Christiano Julius, PA
Northumberland County Commissioners, Gary L. Steffen, PA
Northumberland County Commissioners, Granklin Red Ash, PA
Northumberland County Commissioners, James J. McHale, PA
Northumberland County Commissioners, Richard J. Shoch, PA
Northumberland County Commissioners, Robert J. Leeser, PA
Northumberland County Commissioners, Stephen Bridy, PA
Northumberland County Commissioners, Vinny Clausi, PA
Northumberland County Conservation District, Judy Becker, PA
Northumberland County Conservation District, Michael McCleary, PA
Northumberland County Emergency Management, Stephen Jeffery, PA
Northumberland County Planning and Zoning, Patrick Mack, PA
Northumberland County Planning Commission, Edward Hovenstine, PA
Northumberland County Planning Commission, Mike Brinkash, PA
Northumberland County, Chad Reiner, PA
Northumberland County, Frank W. Garrigan, Esquire, PA
Northumberland County, Justin Dunkelberger, PA
Northwest Regional Police, Mark E. Mayberry, PA
Octorara Creek Watershed Assn, PA
Ono Fire Company, PA
Orange Township Board of Supervisors, Calvin Fox, PA
Orange Township Board of Supervisors, John Long, PA
Orange Township Board of Supervisors, Steven Hoffman, PA
Orange Township Emergency Management, Richard Megargell, PA
Orange Township Planning Commission, John Graybert, PA
Orange Township, Caroline Creasey, PA
Orange Township, Erica Burkhart, PA
Orange Township, Hummel and Lewis, PA
Overfield Township, Gerry Fritsch, PA
Overfield Township, John Manglnuiti, PA
Overfield Township, Susan Smith, PA
Penn and Mifflin Townships; Lycoming County, J. David Smith, PA
Penn Township Board of Supervisors, Charles Zook, PA
Penn Township Board of Supervisors, Daniel Dorman, PA
Penn Township Board of Supervisors, Keith Shaner, PA
Penn Township Emergency Management, Bryan Boyer, PA
Pennsylvania State Police Department Headquarters, PA
Pennsylvania State Police, PA
Pennsylvania State Police, Frank S. Balchane, PA
Pennsylvania State Police, William P. White, PA
Perserverance Fire Company, PA
Pine Grove Board of Supervisors, Diane D. Tobin, PA
Pine Grove Hose Hook and Ladder Fire Company 1, PA
Pine Grove North End Fire Company, PA
Pine Grove Township Board of Supervisors, Bruce J. Kosack, PA
Pine Grove Township Board of Supervisors, Diane D. Tobin, PA
Pine Grove Township Board of Supervisors, Jeffery Zimmerman, PA
Pine Grove Township Emergency Management, Bobby Milligan, PA
Pine Grove Township Fire Department / Ravine Fire Company 1, Greg Pijar, PA

Local Government Agencies (cont'd)

Pine Grove Township Planning Commission, Cynthia Hummel, PA
Pine Grove Township Planning Commission, Frank Fox, PA
Pine Grove Township, Gino Dinicola, PA
Pine Grove Township, Kathy Ferguson, PA
Poplar Springs Fire Department, Ron Nordenbrock, SC
Porter Township Board of Supervisors, Bill Schaeffer, PA
Porter Township Board of Supervisors, Jeffrey Daub, PA
Porter Township Board of Supervisors, William Schaeffer, PA
Porter Township Emergency Management, Dave Koppenhaver, PA
Porter Township, James P. Diehl, PA
Prince William County Attorney, Angela Lemmon Horan, VA
Prince William County Authority Park, Debbie Andrew, VA
Prince William County Authority Park, Jose R. Calero Velez, VA
Prince William County Board of Supervisors, VA
Prince William County Board of Supervisors, Corey A. Stewart, VA
Prince William County Board of Supervisors, Pete Candland, VA
Prince William County Board of Supervisors, Wally Covington, VA
Prince William County Department of Fire and Rescue – Station 24, Kevin McGee, VA
Prince William County Fire Marshall/S Office and Emergency Management, Lance McClintock, VA
Prince William County Fire Marshall/S Office and Emergency Management, Curt Brodie, VA
Prince William County Planning Commission, Ray Utz, VA
Prince William County Planning Commission, Teresa Taylor, VA
Prince William County Police Department, Stephan M. Hudson, VA
Prince William County School Board, VA
Prince William County, Melissa S. Peacor, VA
Prince William County, Tracy Gordon, VA
Prince William Soil and Water Conservation District, VA
PWC Board of County Supervisors, VA
Quittapahilla Watershed Association, David Lasky, PA
Quittapahilla Watershed Association, Michael Schroeder, PA
Ralpho Fire Company 1, PA
Ralpho Township Board of Supervisors, Blaine P. Madara, PA
Ralpho Township Board of Supervisors, Daniel T. Williams, PA
Ralpho Township Board of Supervisors, Stephen A. Major, PA
Ralpho Township Board of Supervisors, Vincent P. Daubert, PA
Ralpho Township Board of Supervisors, William L. Wetzel, II, PA
Ralpho Township Emergency Coordinator, Donald J. Spotts, PA
Ralpho Township Fire Department, Dennis W. Kroh, PA
Ralpho Township Planning and Zoning, Daniel T. Williams, PA
Ralpho Township Planning Commission, Harvey Boyer, PA
Ralpho Township Police Department, Stuart Appel, PA
Ralpho Township Public Safety, Vincent P. Daubert, PA
Ralpho Township, Joseph J. Springer, PA
Ralpho Township, Schlesinger and Kerstetter, PA
Rapho Fire Company 1, PA
Rapho Township, Darwin Nissley, PA
Rapho Township, Duane R. Martin, PA
Rapho Township, Jay Gainer, PA
Rapho Township, Jere Swarr, PA
Rapho Township, Joseph Stauffer, PA
Rapho Township, Lori Shenk, PA
Rapho Township, Lowell B. Fry, PA
Rapho Township, Sara Gibson, PA
Rapho Township, Stephen Kraybil, PA
Rawlinsville Volunteer Fire Company, Carl Strickler, PA
Rheems Fire Department, PA
Robert Fulton Volunteer Fire Company, Tracy L. Tomlinson, PA
Rockingham County, Robert Cardwell, NC
Rockingham County Board of Commissioners, Craig Travis, NC
Rockingham County Board of Commissioners, Keith Duncan, NC

Local Government Agencies (cont'd)

Rockingham County Board of Commissioners, Keith Mabe, NC
Rockingham County Board of Commissioners, Mark Richardson, NC
Rockingham County Board of Commissioners, Pamela McLain, NC
Rockingham County Board of Commissioners, Zane Cardwell, NC
Rockingham County Conservation District, J. Kevin Moore, NC
Rockingham County Office of Emergency Management, Johnny Bowles, NC
Rockingham County Sheriff's Department, Sam Page, NC
Rockingham County Sheriff's Department, Sam Pass, NC
Rockingham County, NC
Ross Township Board of Supervisors, David A. Williams, PA
Ross Township Board of Supervisors, Stanford E. Davis, PA
Ross Township Board of Supervisors, William Ferrey, Jr., PA
Ross Township Emergency Management, Stanford Davis, PA
Ross Township Fire Department, Daniel E. Rood, PA
Ross Township Municipal Officials, Dave Williams, PA
Ross Township Police Department, PA
Ross Township, David R. Lipka, Esquire, PA
Ross Township, Terry Davis, PA
Schuylkill Conservation District, Elizabeth Hinkel, PA
Schuylkill County Commissioners, Darlene Laughlin, PA
Schuylkill County Commissioners, Frank J. Staudenmeier, PA
Schuylkill County Commissioners, Gary J. Hess, PA
Schuylkill County Commissioners, George F. Halcovage, Jr., PA
Schuylkill County Emergency Management, John M. Matz, PA
Schuylkill County Planning and Zoning, Susan Smith, PA
Schuylkill County Planning Commission, Gary Bender, PA
Schuylkill County Planning Commission, James Setlock, PA
Schuylkill County, Al Marshall, Esquire, PA
Schuylkill County, Joseph Groody, PA
Schuylkill County, Mark Scarbinsky, PA
Shamokin Fire Bureau, PA
Shavertown Volunteer Fire Department, PA
Snake Creek Fire, Bob Chiarella, PA
Snake Creek Fire, Donald Gilbert, PA
Snake Creek Fire, William Darrow Sr., PA
Soil and Water Conservation District, Ray Warriner, PA
Solicitor, David R. Warner, PA
South Annville Township Board of Supervisors, Chester G. Horst, PA
South Annville Township Board of Supervisors, Dale Hoover, PA
South Annville Township Board of Supervisors, Donald H. Umberger, PA
South Annville Township Emergency Management, John Breive, PA
South Annville Township Planning Commission, Gordon Sheetz, PA
South Annville Township Planning Commission, Peter Gluszko, PA
South Annville Township Police Department, Ben Sutcliffe, PA
South Annville Township, Dale G. Hoover, PA
South Annville Township, Donald Umberger, PA
South Londonderry Township Board of Supervisors, Cliff Orley, PA
South Londonderry Township Board of Supervisors, Doug Cheyney, PA
South Londonderry Township Board of Supervisors, Rugh Henderson, PA
South Londonderry Township Emergency Management, John Breive, PA
South Londonderry Township Planning Commission, Dennis Hauenstein, PA
South Londonderry Township Police Department, William Reigle, PA
South Londonderry Township, David Warner, Jr., PA
South Londonderry Township, Thomas Ernharth, PA
South Londonderry, Cliff Orley, PA
South Londonderry, Douglas Cheyney, PA
South Londonderry, Rugh Henderson, PA
South Londonderry, Scott Galbraith, PA
Spartanburg Conservation District, Bryan Johnson, SC

Local Government Agencies (cont'd)

Spartanburg County Council, Jeffrey A. Horton, SC
Spartanburg County Council, Michael D. Brown, SC
Spartanburg County Council, Roger Nutt, SC
Spartanburg County Office of Emergency Management, Doug Bryson, SC
Spartanburg County Sheriff's Office, Chuck Wright, SC
Spartanburg County, 7th Circuit, Barry Barnette, SC
Suedburg Community Fire Company, PA
Sugarloaf Township Board of Supervisors, Edward C. Sidinger, III, PA
Sugarloaf Township Board of Supervisors, Jerry E. Laubach, PA
Sugarloaf Township Board of Supervisors, Randy Swisher, PA
Sugarloaf Township Emergency Management, Edward Sidinger, PA
Sugarloaf Township Fire Department / North Mountain Volunteer Fire Company, Mike Schumacher, PA
Sugarloaf Township Planning Commission, Dolly Hollinger, PA
Sugarloaf Township Planning Commission, Edward Sidinger, PA
Sugarloaf Township, Terri Adams, PA
Susquehanna Conservation District, Jim Garner, PA
Susquehanna County Commissioners, Alan M. Hall, PA
Susquehanna County Commissioners, Constance Hitchcock, PA
Susquehanna County Commissioners, Maryann Warren, PA
Susquehanna County Commissioners, Michael Giangrieco, PA
Susquehanna County Department of Planning and Development, Robert G. Templeton, PA
Susquehanna County Ema Ops/Training, Bob Thatcher, Jr., PA
Susquehanna County Ema Ops/Training, Stephen Paul, PA
Susquehanna County Emergency Management Agency, Paul Johnson, PA
Susquehanna County Emergency Management, Robert Stoud, PA
Susquehanna County Planning Commission, Robert Templeton, PA
Susquehanna County Sheriff's Department, Briana Hollenbeck, PA
Susquehanna County Soil and Water Conservation District, Ray Warriner, PA
Susquehanna County, Lance Benedict, PA
Susquehanna County, RS Stoud, PA
Susquehanna County, Thomas F. Meagher III, PA
Sweet Valley Volunteer Fire Company, PA
The School District of Lancaster, PA
Town of Cleveland, NC
Town of Davidson Board of Commissioners, Brian Jenest, NC
Town of Davidson Board of Commissioners, Jim Fuller, NC
Town of Davidson Board of Commissioners, Rodney Graham, NC
Town of Davidson Board of Commissioners, Stacey Anderson, NC
Town of Davidson Fire Department, Darin Mcintosh, NC
Town of Davidson Police Department, Jeanne A. Miller, NC
Town of Davidson, John Woods, NC
Township of Annville, PA
Township of Annville, Timothy Sheffey, PA
Township of Dallas, PA
Township of East Hanover, PA
Township of Sugarloaf, PA
Tremont Borough Council Members, William Allar, PA
Tremont Township Board of Supervisors, Herman Lengle, PA
Tremont Township Board of Supervisors, John R. Brommer, PA
Tremont Township Board of Supervisors, Lawrence Bender, PA
Tremont Township Emergency Management, Lester L. Kauffman, PA
Tremont Township, Mark Barket, Esquire, PA
Triton Hose Company 1, PA
Trucksville Volunteer Ems Fire and Rescue – Kingston Township Ambulance and Rescue, PA
Tunkhannock Borough Council, Norman Ball, PA
Tunkhannock Township Board of Supervisors, Glenn Shupp, PA

Local Government Agencies (cont'd)

Tunkhannock Township Board of Supervisors, Judy Gingher, PA
Tunkhannock Township Board of Supervisors, Randy L. White, PA
Tunkhannock Township Board of Supervisors, Veto Barziloski Jr., PA
Tunkhannock Township Emergency Management, Randy L. White, PA
Tunkhannock Township Police Department / Emergency Management, Stanley Ely III, PA
Tunkhannock Township Volunteer Fire Company, Joseph Balewski, PA
Union Hose Fire Company, Paul Longenecker, PA
Union Township Board of Supervisors, Dennis Firestone, PA
Union Township Board of Supervisors, Gary R. Longenecker, PA
Union Township Board of Supervisors, Larry R. Wolfe, PA
Union Township Emergency Management, Fire Department, Roy Snyder, PA
Union Township Planning and Zoning, Spitler and Kilgore, PA
Union Township Planning Commission, Elizabeth Freeman, PA
Union Township, Reilly, Wolfson, Sheffey, Schrum and Lundberg Law Offices, PA
Union Township, Renee Lehman, PA
United Fire, Thomas W. Bagel, PA
Unityville Volunteer Fire Company, Tim Mordan, PA
Valley Chemical Fire Company, Mark Sharrow, PA
West Friendship Volunteer Fire Department, Howard (Mickey) Day, MD
West Hempfield Township Fire and Rescue Co, Jason Sauder, PA
West Hempfield Township Board of Supervisors, David M. Dumeyer, PA
West Hempfield Township Board of Supervisors, Edward C. Fisher, PA
West Hempfield Township Board of Supervisors, Frank R. Burkhart, PA
West Hempfield Township Board of Supervisors, Kent Gardner, PA
West Hempfield Township Board of Supervisors, Naomi G. Martin, PA
West Hempfield Township Fire and Rescue Company, Barry Carter, PA
West Hempfield Township Planning Commission, Alice M. Yoder, PA
West Hempfield Township Planning Commission, Ronald K. Beam, PA
West Hempfield Township Police Department / Emergency Management, Mark Pugliese I, PA
West Hempfield Township, Ron L. Yountz, PA
West Hempfield Township, Ron L. Youtz, PA
West Hempfield, Martic, and South Annville Townships, Josele Cleary, Esquire, PA
Wyoming Conservation District, Doug Deutch, PA
Wyoming County Commissioners, Judy Kraft Mead, PA
Wyoming County Commissioners, Ronald P. Williams, PA
Wyoming County Commissioners, Thomas S. Henry, PA
Wyoming County Commissioners, William F. Gaylord, PA
Wyoming County Conservation District, Doug Deutsch, PA
Wyoming County Emergency Management, Eugene Dziak, PA
Wyoming County Planning and Zoning, Nicole Wootten, PA
Wyoming County Planning Commission, Randy Ehrenzeller, PA
Wyoming County Planning Commission, Walter Derhammer, PA
Wyoming County, Edward Sherman, PA
Wyoming County, James Davis, Esquire, PA
Wyoming County, Judy Mead, PA
Wyoming County, Tom Henry, PA

Native American Groups

Absentee Shawnee Tribe of Oklahoma, Governor, George Blanchard, OK
Absentee Shawnee Tribe of Oklahoma, Tribal Historic Preservation Officer, Specialist, Carol Butler, OK
Absentee Shawnee Tribe of Oklahoma, Tribal Historic Preservation Officer, Joseph Blanchard, OK
Cayuga Nation, Chief, William Jacobs, NY

Native American Groups (cont'd)

Delaware Nation, Tribal Historic Preservation Officer, Tamara Francis, OK
Delaware Tribe of Indians, Chief, Paula Pechonick, OK
Delaware Tribe of Indians, Nagpra Contact, Brice Obermeyer, KS
Eastern Shawnee Tribe of Oklahoma, Chief, Glenna Wallace, MO
Eastern Shawnee Tribe of Oklahoma, Cultural Preservation Officer, Robin Dushane, MO
Oneida Nation, Historic Resource Specialist, Jesse Bergevin, NY
Oneida Nation, Nation Representative, Ray Halbritter, NY
Oneida Tribe of Indians of Wisconsin, Tribal Historic Preservation Officer, Corina Mrozinski, WI
Onondaga Indian Nation, Faithkeeper, Tony Gonyea, NY
Saint Regis Mohawk Tribe, Chief, Randy Hart, NY
Saint Regis Mohawk Tribe, Tribal Historic Preservation Officer, Arnold Printup, NY
Seneca Nation of Indians, Tribal Historic Preservation Officer, Melissa Bach, NY
Seneca-Cayuga Tribe of Oklahoma, Chief, Leroy Howard, OK
Seneca-Cayuga Tribe of Oklahoma, Historic Preservation Officer, Paul Barton, OK
Shawnee Tribe, Chairman, Ron Sparkman, OK
Shawnee Tribe, Tribal Historic Preservation Officer, Kim Jumper, OK
Stockbridge Munsee Community of Wisconsin, President, Robert Chicks, WI
Stockbridge Munsee Community of Wisconsin, Tribal Historic Preservation Officer, Sherry White, WI
Stockbridge-Munsee Tribal Historic Preservation, NY
The Delaware Nation, Director, Nekole Alligood, OK
The Nanticoke Lenni-Lenape Tribal Nation, Tribal Chairman, Chief Mark Quiet Hawk Gould, NJ
Tonawanda Seneca Nation, Chief, Darwin Hill, NY
Tuscarora Nation, Chiefs Council, NY

Libraries

Gainsville Neighborhood Library, VA
James V. Brown Library, PA
Lancaster Public Library – Mountville Branch, PA
McNairy Library, PA
Nokesville Neighborhood Library, VA
Osterhout Free Library – Central Branch, PA
Pequea Valley Public Library, PA
Quarryville Library, PA
Ralpho Township Library, PA
Shamokin and Coal Township Public Library, PA
The Milanof-Schock Library, PA
Tunkhannock Public Library, PA

Media

Gainsville Times, VA
Lancaster Newspapers, PA
Lebanon Daily News, PA
Prince William Times, VA
Sun-Gazette, PA
The Citizens' Voice – Luzerne County Newspaper, PA
The News-Item, PA

Companies and Organizations

322 Storage LLC, PA
441 Partners LLC, PA
4P Realty LP Officer Mike Patercian, PA
ABCO, PA
Accokeek, Mattawoman, Piscataway Creeks Communities Council, Inc., John Carroll Holzer, MD
Adams Family Trust, Leroy Adams, Jr/Holly Adams, PA
Adorers of The Blood of Christ, MO
Alabama Gas Corporation, David A. Yonce, MO
Alecxih Realty, PA
Alfred T. Hughes and the Heirs and Devisees of James D. Hughes, Jr., PA
Allegheny Defense Project, Ryan Talbott, OR
Allegheny Defense Project, Ryan Talbott, PA
American Legion Post 910, Adjutant Richard W. Stephen, Jr., PA
Amp Global Strategies, Alan Pugh, PA
Amp Incorporated, PA
Amtrack Tax and Insurance Department, DC
Amtrak Tax & Insurance Dept., Attn: Kate McGrath, PA

Companies and Organizations (cont'd)

Annetta D. Dunkle, As Trustee Under Annetta D. Dunkle Living Trust, NY
Annville Township, Corey Lamoureux, PA
Aqua PA Inc., PA
Arro Consulting, Jimmy L. Dennis, PA
Arro Consulting, Mark Harman, PA
Arro Engineering and Environmental Consultants, Jimmy L. Dennis, L.O., PA
Ashway Farm, PA
Atlanta Gas Light Company, Elizabeth Wade, GA
Atlanta Gas Light Company, Gregory J. Becker, GA
Atmos Energy Marketing LLC, Jeff Perryman, TX
Audubon Pennsylvania, Paul T. Zeph, PA
B. and D. Equity Property Tax, Doris H. Bowman, PA
Back Mountain Recreation, Inc., Executive Director David Sutton, PA
Balch and Bingham LLP, Scott B. Grover, Al
Balco Development, Inc., PA
Barbara A. Stansell Revocable Liv Trust, PA
Barley Farms LP, PA
Beacon Hill Hunting Club, PA
Bear Gap Cottage, LLC, A. Pennsylvania Limited Liability Company, PA
BIF III Holtwood LLC, PA
Bird Hill Farms Inc., FL
Bird Hill Farms, Inc., PA
Bittner Family Limited Partnership, PA
Blood of Christ, MO
Bloomsburg University, Jennifer Haney, PA
Blue Ridge Trout Unlimited, Don Davidson, NC
Borton-Lawson Engineering, Chris McCure, PA
Boys & Girls Club of Lancaster, Inc., PA
Boys and Girls Club, PA
Bridgewater EMC, Douglas Lottern, PA
Bridgewater EMC, Jack Lasher, PA
Brubaker Connaughton Goss and Lucarelli LLC, Angela H. Sanders, PA
Brubaker Connaughton Goss and Lucarelli LLC, Rory O. Connaughton, PA
Bryant's R.V. Showcase, Bradley E. Bryant, PA
Bull Run Plaza LLC, VA
Burma Road Associates, LLC, PA
C. Schatz Primary Residence Protector Trust and John E. Schatz, Jr., Trustee Of the Schatz, PA
Cabot Oil and Gas Corporation, Deidre L. Shearer, TX
Cabot Oil and Gas Corporation, PA
Calpine Energy Services, L.P., Brian Fields, TX
Calpine Energy Services, L.P., Jay Dibble, TX
Calpine Energy Services, L.P., Krystin M. Worsham, TX
Calpine Energy Services, L.P., Sarah G. Novosel, Esquire, DC
Camp Andrews Inc., PA
Canadian Pacific, Director of Engineering Daniel Sabatka, IL
Canadian Pacific, Director of Engineering Daniel Sabatka, MN
Canby Cemetery Association, PA
Canby Lutheran Church, PA
Central Piedmont Group of the NC Chapter of the Sierra Club, David Robinson, NC
Chesapeake Bay Foundation, Harry Campbell, PA
Chesapeake Bay Watershed Initiative, PA
Chevron Natural Gas, A. Division of Chevron USA, Inc., Charles R. Cook, TX
Chevron Texaco Global Gas, A. Division of Chevron USA, Inc., Jeanie J. Myers, TX
Chief Oil and Gas LLC, Andrew E. Levine, TX
Christoper Egolf and Kenneth Scavone, LLC, PA
Citizens For Pennsylvania's Future (Pennfuture), Michael D. Helbing, PA
Clean Air Council, Joseph Otis Minott, Esq., PA
Codorus Chapter of Trout Unlimited, Tom Feninez, PA
Coles Creek Sportsman Club, Inc., PA
Coles Creek Sportsman Club, Richard Wilson, PA
Columbia & Reading Railway Co, PA
Columbia Chapter Trout Unlimited, Samantha Kutskel, PA
Columbia Montour Chamber of Commerce, Fred Gaffney, PA
Commonwealth Telephone Co, PA
Conestoga Area Historical Society, Kenneth M. Hoak, PA
Conestoga Community Group, PA
Conococheague Hmstd Family Trust, PA
Conocophillips Company, Ben J. Schoene, TX
Conocophillips Company, Pete Frost, DC
Conocophillips Company, Stephanie D. Jones, TX

Companies and Organizations (cont'd)

Consolidated Edison Company of New York, Inc., Paul Savage, NY
Consolidated Edison Company of New York, Inc., Scott Butler, NY
Corbett and Shreck, P.C., Matthew M. Schreck, TX
County Commissioners of Northumberland County, PA
Cumberland Valley Chapter Trout Unlimited, Justin Pittman, PA
D and H. Railroad Company, Mary Pitman, MN
D/B/A Shuey Farms, Michael S. Shuey Sr. and Robert D. Shuey, PA
Dale L. Reese and Barbara L. Reese, Trustees of the Dale and Barbara Reese Irrevocable Trust, PA
David L. Reese And Lois M. Reese, Trustees Of The David L. Reese And Lois M, David L. Reese And Lois M. Reese, Trustees Of The David L. Reese And Lois M, PA
Delaware River Keepers, Faith Zerbe, PA
Delaware Riverkeeper Network, Maya K. van Rossum, PA
Delmar R. Zeisloft and James D. Zeisloft and T/A Zeisloft Construction Company, PA
Diocese of Harrisburg, Kevin Shervinskie, PA
Ditzler Farms Inc., PA
DMI International, Terry Rhoton, PA
Doc Fritchey Chapter Trout Unlimited, Ed O'Gorman, PA
Donald Abraczinskas, Jr Et Al, All Partners Trading As ABCO Partnership, PA
Dove Dhristian, PA
Ducks Unlimited, James Meadows, SC
Ducks Unlimited, Madison Chapter, Joseph Presley, WI
Ducks Unlimited, Southern Regional Office, Scott Manley, MS
Ducks Unlimited, NC Western Region, Justin Harris, SC
Duke Energy, John Trimble, NC
Duncan, Weinberg, Genzer and Pembroke, P.C., Kathleen Mazure, DC
Duncan, Weinberg, Genzer and Pembroke, P.C., Natalie M. Karas, DC
Earth Conservancy, PA
East Bloomsburg Properties, FL
Eastern Land and Resources Company, William Kurtz, PA
Eastern Land and Resources Corp, PA
Edward E. Buda and Estate of Eleanor T. Buda – Karen Jackowski, Executrix, PA
Emberclear Reserves Inc., AB
Emberclear Reserves Inc., KS
Emberclear Reserves Inc., PA
Emberclear Reserves, James Palumbo, PA
Empire Columbia LP, PA
Environmental Science and Policy, Emily West, PA
Estate of Erma Miller Deceased, R. Larry Miller, PA
Estate of Veral Grove Rishel, C/O Andrew Pruden, Exector, PA
Exelon Corporation, Carlos Thillet, PA
Exelon Corporation, Christopher Wilson, DC
Exelon Corporation, Lisa Michelle Simpkins, MD
Exelon Corporation, Michael S. Swerling, PA
Exelon Corporation/ Baltimore Gas and Electric Company, Ronald T. Jennings, MD
Exelon Corporation/ Baltimore Gas and Electric Company, Gary E. Guy, MD
Exelon Corporation/ Constellation Energy Commodities Group, Inc., Christopher D. Young, MD
Factoryville Fire Company, PA
Falco Family Trust, PA
Fanhnestock Farms, PA
Farwell Real Estate LLC, PA
Federal National Mortgage Association, PA
Fetterman Ventures, Incorporated, a Pennsylvania Partnership, PA
Finn Gard, LLC., PA
Fisher Associates, Steve Boddecker, NY
Florida Power and Light Company, William Lavarco, DC
Forest Lake Qrs, Sandra Dawson, PA
Forest Lake Vfc, Ronald Dawson, PA
Forry Farms Partnership, PA
Four Star Associates, PA
Fox Harbor Archers Assn, PA
Foxchase Manor LLC, VA
Franklin View Farms, Ruth B. Breneman, PA
Frantz Sbm Partnership and Land Management, LP, PA
Fred J. Smith Living Trust, PA
Friedland Farms LLC, PA
Future Power PA, LLC, Ks
Geisinger System Services, PA
Gene K. Elston Estate, PA
Generation Enterprises LLC, PA

Companies and Organizations (cont'd)

Gerald M. Long Trustee and Judith M. Long Trustee, PA
Gerald M. Long, Trustee, PA
Giacinto, Miller and Foulk, A Partnership; John Giacinto, Richard G. Miller and Joanne Foulk and Theodore Foulk Trust (as successors to Theodore Foulk), PA
Gilberton Coal Co, PA
Glenn O. Hawbaker, Inc., Joseph L. Reignard, PA
Glenn R. Wenger Revocable Living Trust, PA
Groff Tractor & Equipment, Inc., Steve Weikert, PA
Gultch Rattlesnake Hunting Club, Ronald Turner, et al., PA
Harford EMC, Doug Phelps, PA
Harford EMC, Steven Smith, PA
Harford EMC, Wayne Frederick, PA
Harford EMC, William Steven, PA
Hayfield Associates LLC, PA
Heydon Family Trust, PA
Hilltop Hollow Ltd Partnership, PA
Holly House Farm Limited Liability, MD
Hr Weaver Family Realty LP, PA
HUD Inc., PA
Hug Irrevocable Grantor Trust, PA
Husch Blackwell LLP, William F. Demarest, DC
Inflection Energy LLC, Phillip Lord, Co
Inflection Energy LLC, William F. Demarest, Jr., D.C.
Integrity Land, Inc., PA
Internal Union of Operating Engineers, Local, 542, Ed Gillette, PA
IUOE Pipeline Rep, Robert Wilds, PA
IVOE Local 542, Ed Gillette, PA
Izaack Walton League, MD
J. Ivan Hanson, et al., Trustee, PA
J.A. and W.N. Miller Family LP, PA
James and Anna Trotta, Trustees of the Trotta Living Trust, FL
James Hale Steinman Trust, PA
James J. Trotta and Anna M. Trotta, Trustees of the Trotta Living Trust Dated July 23, 1997, FL
James M. McKee and Patricia N. McKee, a Life Estate and Deborah P, PA
James Steven Kreischer Norma J. Kreischer, Widow as To a Life Estate, PA
Jennings, Strouss and Salmon, P.L.C., Joel L. Greene, DC
Jere R. Buch, Executor, Estate of Dorothy G. Buch, PA
John and Hengerer, Kevin M. Sweeney, DC
John Gilbert Leakway and Janice Louise Leakway As Trustees of The Leakway Revocable Living Trust, PA
Joseph Leconte Group of The Sierra Club, Andrew Hunt, GA
Kalterra Properties LLC, PA
Ken-Dra Realty, LLC., PA
Kevin A. Hickman and Kurtis S. Hickman, Co-Trustees Under The Hickman Irrevocable Trust, PA
Key Trucking Inc., PA
Kimmels Coal and Packing, Inc., PA
Kinderhook Farm LP, PA
Kunkle Farms LLC, PA
Kuziak Enterprises, PA
Kwai Sung Chang, Trust, VA
Lackawanna Chapter Trout Unlimited, Gary Smith, PA
Laclede Group, Mark Darrell, MO
Lanc. County Conservancy, Kate Gonrk, PA
Lancaster Against Pipelines, Ann Marie Garti, NY
Lancaster Farmland Trust, Karen Martynick, PA
Landview Properties Inc., PA
Laurene B. Mahon Sep Ira Equity Trust Co., NJ
Law Office of R.R. Feudale, Richard R. Feudale, PA
Law Offices of Carolyn Elefant, PLLC, Alexander J. E. English, MD
Law Offices of William R. Mapes, Jr., William R. Mapes, DC
Lebanon Pipeline Awareness, Ann Pinca, PA
Lebanon Valley College, Don Santostefano, PA
Lebanon Valley College, Karen Feather, PA
Lebanon Valley College, Lewis Evitts Thayne, PA
Lebanon Valley Conservancy, PA
Leep Lucky Gun Club, PA
Lemuel W. Futcher and Judith J. Futcher, Trustees of The Futcher Family Trust, TX
Lickdale Associates LP, Construction Manager, Jeff Camp, PA
Life Ministries, Administrator Daniel M. Beachy, PA
Lloyd Wilson Chapter of Trout Unlimited, Bill Bailey, PA

Companies and Organizations (cont'd)

Loree Associates, PA
LSI, Jared Bedner, PA
LSI, Tom Letcavage, PA
Lucille K. Wenger Revocable Living Trust, PA
Lutheran Camping Corporation of Central Penn, PA
Marcellusgas.Org, PA
Mary Misnik Trust, PA
Mayer Brown LLP, Davis I. Bloom, DC
McCarter and English, LLP, James H. Byrd, DC
McGeary Grain Inc., PA
Meadow View Homeowners Group, Patrick Kesley, PA
Mericle Commercial Real Estate Services, PA
Methodist Church Parsonage, Pastor Nancy Lycett, PA
Metis Nation of The U.S., Dennis One Wolf Kauffman, PA
MFS Inc., PA
MHC TT, Inc., PA
MI Homes of DC LLC, OH
Middle Susquehanna Riverkeeper, Carol Parenzan, PA
Miller Family LP, PA
MJ Real Estate Holdings, LLC, PA
MMR Investments TG LLC, CA
Moore and Van Allen Pllc, James Jeffries, NC
Mosley Family Trust Jennifer R. Delmar, Trustee, PA
Mountain Bridge Trout Unlimited, Simons Welter, SC
Muddy Creek Chapter Trout Unlimited, Fred Hess, PA
Municipal Gas Authority of Georgia, Arthur C. Corbin, GA
Musser Supply Inc., PA
N. Clayton Fetterman and Jessie M. Fetterman, Husband and Wife, Life Estate; and Randall N. Fetterman, Remainderman, PA
Nam Futures, LLC, PA
Nancy Y. Colver Irrevocable Grantor Trust, FL
National Fuel Gas Distribution Corporation, Michael E. Novak, NY
National Fuel Gas Distribution Corporation, Randy Rucinski, NY
National Grid/Keyspan Gas Delivery Companies, Kenneth Maloney, DC
National Trout Unlimited, VA
National Wild Turkey Federation, Pennsylvania State Chapter, Walter Bingaman, PA
Native Preserve and Lands Council, David Jones, PA
Natural Resource Group, LLC, Bart Jensen, MN
Natural Resource Group, LLC, Tina Lyons, MN
Natural Soil Products Holding Co, LLC, NY
Natural Soil Products Holding Co, LLC, PA
Neighborhood Preservation and Community Development Services, Randolph J. Harris, PA
Nelson S. Sherman and Sharon V. Sherman, Trustees of The Sherman Family Trust, PA
New Jersey Natural Gas Company, Doug Rudd, NJ
New Jersey Natural Gas Company, William Scharfenberg, NJ
New Milform EMC, Ken Bondurant, PA
New York State Public Service Commission, Alan T. Michaels, Esquire, NY
New York State Public Service Commission, Cynthia H. McCarran, NY
New York State Public Service Commission, Theodore F. Kelly, Esquire, NY
NFIB, Kevin Shivers, PA
NiSource Corp./Columbia Gas of Virginia, Inc., Kenneth Christman, PA
NiSource Corporate Services Company, Deepak Raval, Oh
NJR Energy Services Company, Ginger Richman, NJ
Norfolk Southern Railway Company, MN
Norfolk Southern Railway Company, VA
Norfolk Southern, PA
North Branch Land Trust, PA
North Carolina Utilities Commission, Jeffery L. Davis, NC
North Carolina Utilities Commission, William Gilmore, NC
North Mountain Club, D. Miner, PA
North Mountain Club, PA
Northcentral Pennsylvania Conservancy, PA
NUCA Pennsylvania, Brenda Reigle, PA
Nucapa, PA
Nygren Irrevocable Grantor Trust, Robert and Ruth E. Nygren Trustee, PA
Nygren Irrevocable Grantor Trust, PA
PP&L Inc., PA
PA Suburban Water Company, PA
Pace Family Trust et al., VA
Pace Family Trust, et al., CA
Paramount Developers, Officer Joseph Prociak, PA

Companies and Organizations (cont'd)

Partnership; Consisting Of John Giacinto, Richard G. Miller and Joanne Foulk and Theodore Foulk, NY
Patrick Industries Inc. Gene Weathersbee, Gm, PA
Patrick Industries Inc., PA
Peco Energy Co Re and Facil N3-3, PA
Penn State Seed Company, Inc., PA
Pennsy Supply Inc., Attn. Dino Faiola, PA
Pennsy Supply Inc., PA
Pennsylvania Audubon Society, PA
Pennsylvania Business Council, Dave W. Patti, PA
Pennsylvania Chamber of Business and Industry, Kevin Sunday, PA
Pennsylvania Ducks Unlimited, J.F. Felchock, PA
Pennsylvania Fish Commission, PA
Pennsylvania Land Trust Association, PA
Pennsylvania Lines LLC C/O Norfolk Southern, Alex Rocca, PA
Pennsylvania Power and Light Company PPL – Real Estate Taxes, PA
Pepper Hamilton LLP, David Tshudy, PA
Pepper Hamilton LLP, Michelle Skjoldal, PA
Philadelphia Gas Works, Gregory Stunder, PA
Philadelphia Gas Works, Joseph F. Stengel, PA
Piedmont Natural Gas Company, Inc., Jane Lewis-Raymond, NC
Piedmont Natural Gas Company, Inc., Michelle R. Mendoza, NC
Pipeline Safety Coalition, Lynda Farrell, PA
Pleasant View Mennonite Church, PA
Plumbers and Pipefitters Local Union # 520, William E. Lovell and Walter W. Walborn, PA
Plumbers and Pipefitters, PA
PP&L Inc., PA
PPL Electric Utilities Corporation, PA
PPL Holtwood LLC, PA
Prologis-A4 PA IV LLC, PA
PSEG Energy Resources and Trade LLC, Cara Lewis, NJ
PSEG Energy Resources and Trade LLC, David F. Caffery, NJ
Public Service Company of North Carolina/ Scana Corporation, Braxton Collins, SC
Puddlefield, Inc., PA
PWH I. LLC, MD
Quarry Edge Properties, LP, PA
R Laverne Miller Trust, R. Larry Miller Trustee, PA
Rabin Chapter of Trout Unlimited, Terry Rivers, GA
Ram of Mcelhattan, LLC A Pennsylvania Limited Liability Company, PA
Range Resources, Appalachia LLC, Elie G. Atme, PA
Range Resources-Appalachia LLC/ Law Office of William R. Mapes, Jr., William Mapes, DC
Rattlesnake Gulch Hunting Club, PA
Rausch Creek Industrial Park, LP, PA
Rausch Creek Land, LP, PA
RCMS Investments, LP, A. Pennsylvania Limited Partnership, PA
Reading Anthracite Company, PA
Reading Blue Mountain & Northern Railroad Company, a Corporation of the Commonwealth of Pennsylvania, PA
Reading Blue Mountain and Northern Railroad Company, PA
Reading R/W Company Inc., PA
Redcay Industrial Development, PA
Reidlers Inc., PA
Renovo Rail Industries, LLC A. Pennsylvania Limited Liability Company, PA
RFDFHF LLC, Dallas, PA
Rhea Baldwin and Thomas F. Edwards, Life Estate, PA
Richard and Gladys Baduini Trust, NJ
Robert P. Mausteller; Mae Mausteller, Trustees of the Mausteller Family Trust, Dated September P, 1998, PA
Rohrer Dairy Farms, PA
Rohrer Properties LP, PA
Rt Env. Services, Gary R. Brown, PA
Ryvamat Inc., PA
Safe Harbor Power Company/BIF III Holtwood LLC (Part of Safe Harbour Park), Boston, MA
Scheler Realty LLC, Fred Scheler, PA
Schultz, Trustees Under The Wayne E. Shultz and Sandra D. Shultz Revocable Trust, PA
Sebastian M. Bonaccorsi Family Trust, Sebastian M. Bonaccorsi, Trustee, PA
Seda-Cog Joint Rail Authority, Mary Pitman, PA
Seedco NP, LLC, PA
Seedco Residential, LLC, PA

Companies and Organizations (cont'd)

Seneca Resources Corporation, Christopher M. Trejchel, PA
Sequent Energy Management, L.P., Russo C., TX
Sequent Energy Management, L.P./ AGL Resources Inc., Kathryn McCoy, TX
Sid Tool Co Inc., NY
Sierra Club of Western North Carolina, Judy Mattox, NC
Sierra Club, Pennsylvania Chapter, Thomas Y. Au, PA
Skupics, LLC, PA
Sonora Farms Partners, PA
South Londonderry Township, Lebanon County, Shawn Arbaugh, PA
Southern Company Services, Inc./ Balch and Bingham LLP, Alan Lovett, Al
Southern Company Services, Inc./ Balch and Bingham LLP, Scott Grover, Al
Southwestern Energy Services Company, LLC, Jason Kurtz, TX
Spiegel and McDiarmid LLP, David Pomper, DC
Spiegel and McDiarmid LLP, Jessica R. Bell, DC
Split Vein Coal Co Inc., PA
Split Vein Coal, C/O Margaret Swank, PA
Stadium Dirt Designs, Inc., PA
Stan Cooper Sr. Chapter of Trout Unlimited, PA
Stanton Gun Club, James Bishop, NJ
Stone Hill Village LLC, PA
Stoner Family Trust, Glenn R. Stoner and Sally A. Stoner, PA
Successor in Interest to the Roaring Creek Water Company, a Pennsylvania Corporation, PA
Sunrise Real Estate Dev LLC, PA
Susquehanna Chapter Trout Unlimited, PA
Susquehanna Coal Company, PA
Susquehanna Gateway Heritage Area, Mark N. Platts, PA
Susquehanna River Wetlands Trust, Donald Horn, Jr., PA
SWN Energy Services Company, LLC, Billy D. Dixon, TX
SWN Energy Services Company, LLC, Jason Kurtz, TX
SWN Energy Services Company, LLC/ Morgan, Lewis and Bockius, LLP, Brett Snyder, DC
Techhope LLC, MD
Teen Challenge Training Center, Reverend Joseph S. Batlock, PA
Teen Challenge Training Center, PA
The Brecht Rohrbach Irrevocable Residential and Income Trust, Estate of George L. Rohrbach, Co-Executors, Kay M. Brecht and Ronald Lee Rohrbach, PA
The Brown Family Trust, DC
The Brown Family Trust, Mericle River Road, LLC, PA
The Brown Family Trust, PA
The Cornell Family Irrevocable Trust Dated April 9, 2015, PA
The Dale and Barbara Reese Irrevocable Trust, PA
The Delaware River Keepers, Faith Zerbe, PA
The Elsie Buyers Viehman Revocable Agreement of Trust, PA
The Estate of Eloise Morris, C/O Paula Weatherill, PA
The Heirs and Devisees of Edward Soja, PA
The Heirs and Devisees of Richard A. Lanning, PA
The Hickman Irrevocable Trust, PA
The John Gilbert Leakway and Janice Louise Leakway Rlt, PA
The Kehler Irrevocable Residential and Income Trust, PA
The Kohr Farm Trust, PA
The Law Offices of Carl Engleman Jr., LLC, Carl J. Engleman, PA
The Law Offices of Carolyn Elefant, Pllc, Carolyn Elefant, DC
The Mahantongo Dutchman, PA
The Marguertie Keller Irrevocable Income Only Trust, PA
The Mausteller Family Trust, PA
The Nancy Y. Colver Irrevocable Trust, FL
The Nature Conservancy Southeast Pennsylvania, PA
The Nature Conservancy, North Carolina Field Office, NC
The Nature Conservancy, Pennsylvania Field Office, PA
The Nature Conservancy, GA
The Nature Conservancy, MD
The Sour Apple Hunting Club, PA
The Wayne M. Fausey and Dorothy L. Fausey Revocable Living Trust, PA
Thomas J. Zagami, P.A., MD
Thousand Trails Inc., Property Tax, PA

Companies and Organizations (cont'd)

Transcontinental Gas Line, MD
Transcontinental Gas Pipe Line Company, LLC, Derrick Hughey, TX
Transcontinental Gas Pipe Line Company, LLC, Ingrid I. Germany, TX
Transcontinental Gas Pipe Line Company, LLC, Judith Neason, DC
Transcontinental Gas Pipe Line Company, LLC, Margaret Rose Camardello, TX
Transcontinental Gas Pipe Line Company, LLC, Marshia M. Younglund, DC
Transcontinental Gas Pipe Line Company, LLC, Stephen Andrew Hatridge, Esquire, TX
Transcontinental Gas Pipe Line Company, LLC, William Hammons, TX
Transcontinental Gas Pipe Line Company, LLC, Scott Turkington, TX
Transcontinental Gas Pipeline Co, VA
TRC, Denise M. Brinley, PA
TRC, Doree Dufresne, CO
Treasured Tyies Miniature Donkeys, Kathy Houck, PA
Trout Unlimited Foothills Chapter, NC
Ugi Corporation, PA
Ugi Distribution Companies, Mark Morrow, PA
Under The Will of Stephen Girard, Deceased, Acting By the Board of Directors of City Trusts, PA
VG Realty LLC, PA
VG Realty LLC, NY
Victory Lakes Community Association, Inc., VA
Village at Greenbriar Inc., Richard Angelico, PA
Virginia Ducks Unlimited, David Adamson, TN
Virginia Electric and Power Co, VA
W. & A. Beinhower Living Trust, PA
Walmart Real Estate Business Trust, AR
Washington Gas Light Company, James Blasiak, VA
Washington Gas Light Company, Rose T. Lennon, DC
Wellington Road Associates, VA
West Creek Rod and Gun Club, Inc., PA
WGL Midstream, Inc., Telemac Chrryssikos, DC
WGL Midstream, Inc./ Capitol Energy Ventures Corporation, Stephen R. Soule, DC
William M. Riggins, Trustee and Margaret H. Riggins, Trustee, DE
Williams Field Services Company, LLC, OK
Williams Field Services Reading and Northern Railroad, PA
Williams Field Services, PA
Williams/Transco, Amanda Herford, TX
Williams/Transco, Anne Allen, TX
WPS Westwood Generation, LLC, PA
Wyoming County Chamber of Commerce, Gina Severcool Suydam, PA
Youth Association of Palmyra C/O World War Association of Palmyra, PA
Ziegler Excavating Inc., PA

Individuals

A. Teresa Perez, PA
Aaron and Leah Duff, PA
Aaron L. Martin, Carroll D. Martin, and John A. Martin, PA
Aaron L. Martin, et al., PA
Aaron L. Stoltzfus, PA
Aaron W., PA
Abby Grehlinger, PA
Abby Hetrick, PA
Abe Amoros-Linna, PA
Abe Harounzadeh, PA
Abigail Graffer, PA
Abram G. Barley Jr., PA
Abram G. Barley, PA
Abram G. Stoltzfoos, PA
Adam Roerig, PA
Adam Slacktish, PA
Adam Thomas Graby, PA
Adam W. Brant, et ux., PA
Adin David Mumma, et al., PA
Adrienne Boullianne, PA
Adrienne Roth, PA
Alan Forney, PA
Alan H. Felty, PA
Alan M. Miller, et al., PA
Alan P. and Mildred Kwiatkowski, PA
Alan P. Kwiatkowski, et ux., PA
Alan Peterson, PA
Alan T. Rosengrant, PA
Alan Weidner, et ux., PA
Albert & Cathy Zick Sr., PA
Albert C. Reinbold, et ux., PA
Albert L. Hunsinger, et ux., PA
Albert N. Shadle, et ux., PA
Albert R. Minnich, PA
Albert T. Breneman, PA
Albert T. Wolfe, et ux., PA
Alberta M. Wolfe, et al., PA
Alean Williams, PA
Alena Clatterbuck, PA
Alex Gamble, PA
Alex J. Farley, PA
Alexander Deppen, PA
Alexander Lotorto, PA
Alfred B. Nunan, NJ
Alfred D. Nagle, PA
Alfred J. Wargo, PA
Alfred T. Hughes, et ux., PA
Alice E. Strauch, PA
Alice J. Beishline, PA

Individuals (cont'd)
Alice M. Linton, PA
Alice M. Mackley, PA
Alice Meckley, PA
Alice Swartz, PA
Alicia Burger-Shirk, PA
Alicia Herr, PA
Alicia Holland, PA
Alison Dryfoos Mazzie, PA
Allen Dohl, PA
Allen L. White, et ux., PA
Allen Lee Cornell, et ux., PA
Allison Dingle, PA
Allison Petryk, PA
Alma Czarnecki, PA
Alta T. Bomberger, PA
Alvin H. Scott Jr., PA
Alvin J. Luchas, PA
Alyce Hope Quinn, FL
Alyce Jae Marks, PA
Amanda Daoro, PA
Amanda Kemp, PA
Amanda L. Fox, PA
Amanda La Benfer, PA
Amanda Richmond, LA
Amie Wolfinger, PA
Ammon K. Stoltzfus and Katie K. Stoltzfus, PA
Ammon Stoltzfus, et ux., PA
Amos B. Zook, et al., PA
Amos F. Frey, Jr., et ux., PA
Amos Forrey Lighty, et al., PA
Amos L. Kutz, et ux., PA
Amy A. Blaski, PA
Amy Fetterolf, PA
Amy J. Butchko, PA
Amy M. McWilliams, PA
Amy R. Bomgardner, PA
Amy S. Robbins, PA
Amy S. Robbins-Gray, et ux., PA
Amy Salansky, et vir, PA
Amy Warnig, PA
Andrea Miotto, PA
Andrew Faist, PA
Andrew Fraunfelter, et ux., PA
Andrew Hess II, MO
Andrew J. Kirchner, et ux., PA
Andrew J. Schmalzried, Jr., PA
Andrew J. Yorks, et al., PA
Andrew M. Zimmerman and Jordan M. Smith, PA
Andrew Paterson, GA
Andrew R. Fabian, PA
Andrew S. Giessinger, et ux., PA
Andrew S. Kusuplos, PA
Andrew Scott McWilliams, PA
Andrew Steransky, et ux., PA
Andrew Yuen, PA
Andy C. Strauch, et ux., PA
Andy Conner, PA
Andy Dynada, PA
Angela M. Cooper, MD
Angela M. Shenk, PA
Angelo Sabatelle, PA
Anita K. Keagy, PA
Ann and Grey Day, PA
Ann C. Johnson, PA
Ann G. Schiel, et al., PA
Ann L. Clark, et ux., PA
Ann Marie Benoski, PA
Ann S. Flory, KS
Ann Simonetti, PA
Anna Dekonty, PA
Anna Kalafut, PA
Anna Mae Esh, PA
Anne Birmingham, et al., MD
Anne M. Kirchner, PA
Anne Sensenig, PA
Anne Wallace-Digarbo, Ph.d., PA
Annette L. Adams, PA
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Anthony J. Leeman, et ux., PA
Anthony J. Wisnosky, et ux., PA
Anthony M. Gilbert, PA
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Anthony Muro, et ux., PA
Anthony N. Gillott, et ux., PA
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Arnold D. Roberts, et ux., PA
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Bruce D. Schwalm, et ux., PA
Bruce E. Beezer, et al., PA
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Bruce K. Vernet, et ux., PA
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Bruce Uhler Jr., PA
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Bruce W. Anderson, et ux., PA
Bruce W. Dolly, et ux., PA
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Bryan Latsch, PA
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Bryan M. Myers, et al., PA
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Christopher Balmoos, et ux., PA
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Christopher Eugene Kovalchick, et al., PA
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Christopher J. Brown, et ux., PA
Christopher J. Warnig, et ux., PA
Christopher LB McWilliams et al., PA
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Christopher Shay, PA
Christopher Troy McCallum, PA
Christopher White, et ux., PA
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Daniel L. Rupp, et al., PA
Daniel Loys Hartman, et ux., PA
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Daniel R. Kutz, et al., PA
Daniel Rupp, et al., PA
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Donald Wademan, et ux., PA
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Donna Berry, PA
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Douglas E. Weaber, et ux., PA
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Douglas M. Wolfgang, PA
Douglas S. Engle, et al., PA
Douglass C. Henry, PA
Dr. Dan Sidelrick, PA
Dr. Barry Bernstein, PA
Drew Powers, PA
Drs. James & Karen Brady, PA
Duane Olexa, PA
Duane S. Bonham, PA
Duanee E. Lehman, et al., PA
Dwayne Riebel Jr., PA
Dwight Forry, PA
E. Jean Witmer and Sharon J. Snyder, PA
Ed and Pam Johnson, PA
Ed Guinther, PA
Ed Padlo, PA
Ed Patchoski, PA
Ed Spotts, PA
Ed Sunhey, PA
Ed Thompson, PA
Edgar R. Womelsdorf, et ux., PA
Edith Ann Keller, et ux., PA
Edith F. Thompson, FL
Edith Hartman Witchey and Robert Witchey, PA
Edith Hartman, et ux., PA
Edmund A. Kodish, PA
Edmund E. Hagan, MD
Edward A. Bisch Jr and Jacqueline Bisch, PA
Edward A. Bisch, et ux., PA
Edward A. Long, et ux., PA
Edward and Judith Linkus, PA
Edward and Mary Steele, PA
Edward and Nancy Long, PA
Edward Baker, et al., PA
Edward Buda, PA
Edward C. Lucas, PA
Edward D. Smith et ux., PA
Edward E. Schopf and C. Annette Schopf, PA
Edward E. Oncay, et ux., PA
Edward E. Rhoat, PA
Edward E. Shadle, et ux., PA
Edward F. Saar, PA
Edward K. Dinkel, PA
Edward K. Walmsley, et ux
Edward L. Heagy, et al., PA
Edward M. Haas, et ux., PA
Edward Oncay, PA
Edward P. Paloskey, Jr. and Stacy J. Paloskey, PA
Edward R. Murach, PA
Edward R. Rhoat, PA
Edward R. Saxton, PA
Edward Soja, PA
Edward T. Maciejewski, PA
Edward W. Rupp, et ux., PA
Edward Washney, PA
Edwin E. Kitzmiller II, PA
Eileen Frank, PA
Eileen Gibson, PA
Eileen Stroup, PA
Elaine Bell Brett, PA

Individuals (cont'd)

Elaine Burg, PA
Elaine Digirolamo, et vir, PA
Elaine I. Kehler, PA
Elaine Lapp Esch, PA
Elaine M. Janiczek, PA
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Eleanor R. Holzhauer, et al., PA
Elene M. Hitz, PA
Elijah Washington, PA
Elisa and Aaron Bello, PA
Elise Kucirka, PA
Elise Salahub, PA
Elizabeth Wargo, PA
Elizabeth Harkins, PA
Elizabeth Joa Haas, PA
Elizabeth Johnston, PA
Elizabeth K. Stoltzfus, PA
Elizabeth P. Lockwood, PA
Elizabeth Pursel, PA
Elizabeth Skrapits, PA
Elizabeth Wargo, et vir, PA
Ellen A. Gladys, PA
Ellen J. King, PA
Ellie Salahub, PA
Elmer H. Wenger, et al., PA
Eloise Morris, et al., PA
Elsie Arnold, PA
Elvin B. Reiff, et al., PA
Elvin H. Mease, et ux., PA
Elvin Martin, PA
Elvin Terry Ditzler, et al., PA
Emanuel Fisher, PA
Emerson C. Douts, et ux., PA
Emily Broich, PA
Emily Gelormini, PA
Emily Gully, TX
Emily Krafjack, PA
Emily Michael, PA
Emily S. West, PA
Emily S. Strausser, TX
Emily Steiner, KS
Emily Von Harten, PA
Emma B. Beachy, PA
Emma Fritz Kile, et al., PA
Emma Oberholtzer, PA
Emogene Kirkpatrick, et al., PA
Emory G. Meyerhoffer, PA
Enrique Batista-Luciano, et al., PA
Ephraim R. Lapp, PA
Epsucheolige L. Hoffman, PA
Eric A. Hanson, et ux., MO
Eric A. Steenburg, et ux., PA
Eric B. Marsh, PA
Eric Hart, PA
Eric L. Landis, et ux., PA
Eric Nodes, PA
Eric Younker, PA
Erika Burkhart, PA
Erika Fitz, PA
Eriyona Weaver, PA
Erla M. Martin, PA
Erma Weaver, PA
Ernest B. Hippenstiel, et ux., PA
Ernest J. Adams, et al., PA
Ernest W. Hedrick, Jr., PA
Estee Lynch, PA
Esther H. Hess, PA
Esther R. Long, PA
Ethan Myer, PA
Eugene A. Parker, et ux., PA
Eugene and Linda Brown, PA
Eugene E. Brown, et ux., PA
Eugene E. Menges, et ux., PA
Eugene F. Gladfelter, PA
Eugene I. Mease, PA
Eugene Jones, PA
Eugene Kemp Frey, et ux., PA
Eugene L. Aleci, PA
Eugene P. Janiczek, et ux., PA
Eva Telesco, PA
Evelyn E. Ralston, et al., PA
Evelyn G. Jerauld, PA
Evelyn Hardie, PA
Evelyn Spencer, PA
Evelyn Vian, PA
F. Leon Zimmerman, PA
Faith J. D'Urgandt, PA
Fannie A. Gochnauer, PA
Fannie L. King, PA
Fausey M. Wayne, et al., PA
Fawn Cotton, PA
Feri and Shirley C. Fester, PA
Fern E. Hartman, et al., PA
Fern M. Ditzler, PA
Fisher McGettigan, PA
Flint W. and Sharon J. Kressler, PA
Florence Brady, et ux., PA
Florence Wolfe, PA
Floyd R. Wertz Jr and Debra A. Wertz, H/W, PA
Folli Sat, PA
Fox Gail, PA
Fran Mannino Corse, PA
Fran Wysocky, PA
Frances G. Gouveia, PA
Frances Gensel, PA
Francis Burr, PA
Francis Deeter, PA
Francis H. Ditzler, Jr., et al., PA
Francis H. Sickler, et ux., PA
Francis Richard Sutton, et ux., PA
Francis W. Ditzler, et al., PA
Francis W. Duplessis, PA
Francis W. Gerrity, PA
Francis X. Bennawit, PA
Frank Bednarek, PA
Frank Billings, et ux., PA
Frank D. Cooper, et al., PA
Frank E. Lashinski, PA
Frank E. Tregan, PA
Frank E. Via, PA
Frank G. Hess, PA
Frank J. Krammes, PA
Frank Kruczek, PA
Frank M. Keller and Norma J. Keller, PA
Frank Nye, PA
Frank S. Dunham, PA
Frank S. Hubler IV, PA
Frank Sherman, et ux., PA
Frank T. Yakupcin, PA
Frank, Janet, and Hughie Curran, PA
Frankie Wilbanks, TN
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Franklin S. Beiishline, et al., PA
Franklin W. Pingley, WV

Individuals (cont'd)
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Fred J. Smith, PA
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Fred Sylvester, PA
Fred W. Allnutt, MD
Frederick A. Snyder, PA
Frederick D. Hess, et al., PA
Frederick E. Ainsworth, et ux., PA
Frederick G. Foster, et ux., PA
Frederick G. Lewert, et al., PA
Frederick H. Mingle et ux., PA
Frederick Marks Jr., PA
Frederick O. Benson Sr., PA
Frederick R. Keiser, et al., PA
Frederick S. Watkins, et al., PA
Frederick W. Weiss, PA
Frederick White, PA
Fredrick and Lorraine Ainsworth, PA
Fredrick O. Benson Sr., PA
G. David Ginder, PA
G. Grant Shultz, et al., PA
G. Lind, PA
G. Nevin Dressler and Deborah L. Dressler, PA
G. Nevin Dressler, et al., PA
G. Robert Wiggins, PA
Gabe Sidonia, PA
Gail Houck, PA
Gail Richert, PA
Gale Hess, PA
Galen R. Kopp, et al., PA
Galen R. Walters, PA
Galen Z. Martin and Luella S. Martin, PA
Galin Z. Martin, et ux., PA
Garry and Bonnie Gross, PA
Garry Archer, GA
Garry L. Geibe, et ux., PA
Garry M. LeFevre, PA
Garry Taroli, PA
Garry W. Burgard et al., PA
Gary A. Lupinski, et al., PA
Gary and Linda Giger, PA
Gary C. Keller and Penny Lee Keller, F/K/A Penny Lee Kreiser, PA
Gary C. Keller, et ux., PA
Gary E. Buck, June Buck, and Donnie E. Buck, PA
Gary E. Buck et al., PA
Gary E. Gross, et ux., PA
Gary Farber, PA
Gary J. Farber, et al., FL
Gary J. McMahon, MD
Gary J. Sagan, et ux., PA
Gary K. Strauch, et al., PA
Gary Longenecker and Kathryn Longenecker, PA
Gary Longenecker, et ux., PA
Gary Marks, et al., PA
Gary P. Cook and Beverley Cook, PA
Gary P. Cook, et al., NJ
Gary P. Leber, NY
Gary P. Mihal, et ux., PA
Gary R. Elb, PA
Gary S. Robson, et ux., PA
Gary William Pencek, PA
Gary Zurin, et al., PA
Gaye Denlinger, PA
Geno Catanzariti, PA
George & Jean Frey, PA
George A. Speck, PA
George and Cathy Hopstetter, PA
George and Jean Amedei, PA
George Broody, PA
George C. Gundrum, et ux., PA
George E. Christianson, PA
George E. Cimochowski, PA
George Fortel Jr., PA
George H. Connor, PA
George H. Zook, PA
George I. Leonovich, et ux., PA
George J. Duffy, PA
George Lioudis, NJ
George M. McAlanis, PA
George Messerschmidt, Jr., PA
George P. Dobrinski, PA
George R. and Donna L. Flick, PA
George R. Fenimore, et ux., PA
George R. Shanahan, PA
George S. Haines, PA
George S. McWilliams and Timothy J. McWilliams and Cindy Kaye McWilliams, PA
George S. Huntzinger, PA
George S. McWilliams, et al., PA
George Vastine, PA
Gerald Arcuri, et al., PA
Gerald Bruce, PA
Gerald E. Schott, et ux., PA
Gerald H. Cohoon, et ux., PA
Gerald H. Lefever, PA
Gerald I. Stover, et ux., PA
Gerald J. Splitt and Barbara M. Splitt and David P. Splitt, PA
Gerald J. Martyniak, et al., PA
Gerald L. Marstell, et ux., PA
Gerald L. Splitt, et ux., PA
Gerald L. Woolcock, et ux., PA
Gerald Lewis, PA
Gerald M. Krzan, PA
Gerald M. Long, et ux., PA
Gerald R. Colvin, PA
Gerald R. Doughty et ux., PA
Geraldine T. Nesbitt, PA
Gerard R. Lockwood, et ux., PA
Gerri Jesse, PA
Gerry Gammache, PA
Gilbert N. Martin, et ux., PA
Gina Gallo, PA
Ginger P. Woolcock, PA
Gladys I. Kohr, PA
Glen L. Ebert, et ux., PA
Glenda and Frank Gehrig, PA
Glenda Broad, PA
Glenn A. Meily, et ux., PA
Glenn A. Nulton, et al., PA

Individuals (cont'd)

Glenn A. Weidler, et al., PA
Glenn C. Keiser et ux., PA
Glenn E. Shelley, et ux., PA
Glenn H. Kneasel, PA
Glenn R. Ament, et ux., PA
Glenn R. Coombe, et ux., PA
Glenn R. Houck, et ux., PA
Gloria Kochan, PA
Goerge Fontenot, PA
Grace Warmingham, PA
Grant Taylor, et ux., PA
Greg and Lois Harris, PA
Greg Geist, PA
Greg Paulson, PA
Greg Szczyrbak, PA
Gregory B. Werni, PA
Gregory Gass, PA
Gregory Hoffer, PA
Gregory J. Long, PA
Gregory J. Santaniello, PA
Gregory W. Inns, PA
Gus Gatanas, et al., NJ
Guy Charles Michalowski Sr., et ux., PA
Guy F. Militello, PA
Gwen Story, PA
Gwenda Lorraine Kurtz, Keith Lamar Kurtz, and Joanna Faith Kurtz, PA
H. Glenn Esbenshade, PA
H. Lorraine Forry, PA
H. Robert Schwartz, et al., PA
H. Dennis Shumaker, PA
Harold Downs, PA
Harold E. Anderson, MD
Harold E. Kile and Anna Marie Kile and Larry C. Murray and Joyce A., PA
Harold E. Flack, et ux., PA
Harold E. Kile, et al., PA
Harold E. Merkey, PA
Harold Flack II, et ux., PA
Harold L. Frey, et ux., PA
Harold W. Cornell, et al., PA
Harry and Joan Freeman, PA
Harry and Linda Snyder, PA
Harry C. Hause, et ux., PA
Harry C. Mathias, Jr., PA
Harry D. Middleton, AK
Harry D. Middleton, UT
Harry E. Martenas and E. Darlene Martenas C/O Phillip and Linda Resseguie, PA
Harry E. Ashelman, et ux., PA
Harry E. Fetterman, PA
Harry E. K. Youtz, et ux., PA
Harry Fithian, et al., PA
Harry Garvin, PA
Harry J. Falco, PA
Harry L. Colvin, et ux., PA
Harry Magee Katerman, PA
Harry O. Martenas, et ux., PA
Harry Robbins, PA
Harry W. Vaow II, et ux., PA
Harvey Hause, et ux., PA
Heather & Rob Petrasek, PA
Heather and Sam Temple, PA
Heather Mack, PA
Heather Taylor, PA
Hector Ralat, PA
Heidi L. Greider, PA
Heidi L. Gordon, PA
Helen A. Boston, PA
Helen A. Frantz, et al., PA
Helen and Clarence Harner, et al., PA
Helen E. Jerauld Mendegro, PA
Helen M. Shadle, PA
Helen M. Smith, PA
Helen M. Nace, PA
Helen McGee, PA
Helen R. Light, PA
Helen S. Shaner, PA
Henry Berger, PA
Henry C. Weaver, et al., PA
Henry F. Sadler, MD
Henry K. and Julie Strzeletz, PA
Henry M. Berger, et ux., PA
Herb Bonnice, PA
Herb Landou, PA
Herbert F. Reinbold, PA
Herman J. Hornberger, et ux., PA
Hershey M. Hershey, PA
Hilary Byerly, PA
Hilda M. Funk, PA
Ho Ching Yung, MD
Hoagland Lynn L. and Carol C, PA
Holly A. Gillott, PA
Holly A. Neville, PA
Holly K. Lightner, PA
Holly L. Plummer, PA
Holly Lambert, PA
Holly Veight, PA
Holly Williams, PA
Howard D. Brochyus, et ux., PA
Howard Hess, et ux., PA
Howard I. Ayers Jr., PA
Howard Jacoby, PA
Howard O. Custer, Jr., et ux., PA
Howard S. Long, et ux., PA
Howard W. Fritz, et al., PA
I. Sulyok, PA
Ian Buser, PA
Ide Elliot, et al., PA
Ik Bee Kim, MD
Ilse M. Ludeweg, PA
Ira F. Nienhueser Jr., PA
Irene and Donald Murphy, PA
Irene Fank, PA
Irene Weaver, PA
Irma Falls, PA
Irvin C. and Joan Martenas, PA
Irvin E. Smith and Sylvia J. Smith, PA
Irvin Low, et ux., PA
Ismael Khan and Lilowty Khan, NY
Ismael Khan, NY
J. A. Walsh, Ireland
J. A. Walsh, PA
J. Anthony Haverstick, et al., PA
J. David Roskos and Joan B. Roskos, PA
J. Earl Breneman, et al., PA
J. Robert Findley, PA
J. White, PA
Jace A. Moore, et ux., PA
Jace B. Moore and Gail A. Moore, PA
Jacelyn Bailey, PA

Individuals (cont'd)
Jack A. Lowery, et al., PA
Jack A. Mihalik, et ux., PA
Jack D. Vandermer, MD
Jack G. Messenger II, PA
Jack H. Hess, PA
Jack L. Newcomer, PA
Jack L. Newcomer, et al., PA
Jack Like Like, PA
Jackie Nachmias, PA
Jaclyn Smith, PA
Jacob H. Breneman, et al., PA
Jacob Stroud, PA
Jacqueline L. Doyle, PA
Jacqueline V. Greenley, PA
Jacquelyn C. Priester, PA
Jacquelyn K. Booth, PA
Jade Carol Mumma, PA
Jai Saudoe, PA
Jamaal Malone, LA
James A. Batton, PA
James and Angela Broscious, PA
James and Deb Keefer, PA
James Brener, PA
James C. and Robin A. Kyttle, PA
James C. Rosenbloom, MD
James C. Wisk, et ux., PA
James Cooper, PA
James D. Deppe, PA
James D. Harkins, PA
James Dewitt, et ux., PA
James E. Hershey and Shirley L. Hershey, PA
James E. Elslager, PA
James E. Hershey, et ux., PA
James E. Labatch, et ux., PA
James E. Plummer, Jr., et al., PA
James E. Rank, PA
James E. Rogers, PA
James E. Rudy, PA
James Eaves, GA
James F. Brosius, PA
James Francis Owens, PA
James G. Day, et al., PA
James G. Trombly, et ux., PA
James H. Breneman, PA
James H. Willman, et ux., PA
James Hoover, PA
James J. H. Kohr, et ux., PA
James J. Oren, VA
James J. Schilling, PA
James J. Smith et ux., PA
James Jenzano, PA
James Judge, PA
James King, PA
James Kosh, Jr., et ux., PA
James L. Dankers, PA
James L. Hepler, et ux., PA
James L. Spangenberg, et ux., PA
James Lenneman, OH
James M. Delp, et ux., PA
James M. McKee et al., PA
James M. Slaymaker, et ux., PA
James McGettigan, PA
James P. Bridy, et al., CA
James P. Hickey, et ux., PA
James Piech, PA
James R. Karr, Jr., PA
James R. Bitzer, et ux., PA
James R. Reisinger, et al., PA
James S. Headley, PA
James S. Lamoreaux, et ux., PA
James Sandoe, PA
James Schlonger, PA
James Shuskie, PA
James Slaymaker, PA
James T. Joline, et ux., PA
James Thiele and Jacklyn Harrison, PA
James Vicendese, Jr., MD
James W. Bunting, et ux., PA
James W. Faus, et ux., PA
James W. Harvey, PA
James W. Hostetter, et al., PA
James Walters, et ux., PA
James Yanaris, PA
Jami S. Studebaker, PA
Jamie Beth Schindler, PA
Jamie J. Spencer, PA
Jamie Nolan et al., PA
Jamie Smith, PA
Jamison E. Sgarlat, PA
Jan and David Smeal, PA
Jan and Robert Dudo, PA
Jan Dehoff, PA
Jan J. Dubbs, PA
Jana Schwartz, PA
Jane A. Smith, PA
Jane C. Maneval, PA
Jane Druce, PA
Jane L. Bleacher, PA
Jane M. Hess, PA
Jane Mensch, PA
Jane Popko, PA
Jane Schale,
Janet A. Fidler, PA
Janet C. Ware, PA
Janet E. Albright, PA
Janet K. and Kevin W. Niemiec, PA
Janet L. Stein, et al., VT
Janet L. Stein, et al., PA
Janet McGowan, PA
Janet P. Lucas et vir, PA
Janet R. Rice, et al., PA
Janet Stackhouse, PA
Janice M. Callahan, PA
Jarrett Ruof, PA
Jasmine Yeager, PA
Jason and Lisa Jeremiah, PA
Jason and Michelle Gordner, PA
Jason B. and Kacey Prichard, PA
Jason Crawford, PA
Jason G. Propst, et ux., PA
Jason Hayes, PA
Jason Itz, AZ
Jason K. Hollinger, et ux., PA
Jason L. Perritt, PA
Jason Lee Kurtz, et al., PA
Jason M. Kehoe, et ux., PA
Jason R. Maciejewski, PA
Jason Robert Maciejewski, PA
Jason Watts, PA
Jay A. Mull and Victoria L. Mull, PA
Jay A. Mull, et ux., PA
Jay and Lois Boll, PA
Jay D. Bomgardner, et ux., PA
Jay Frank Brink, PA
Jay Ivan Newswanger, PA

Individuals (cont'd)

Jay L. Bleacher, et al., PA
Jay L. Hess, PA
Jay M. and Gail J. Elston, PA
Jay M. Smoker, et al., PA
Jay P. Weaver et al., PA
Jay Parrish, PA
Jay R. Kulp, et al., PA
Jay Thomas Frey and Susan Young Frey, PA
Jay Thomas Frey, et ux., PA
Jayme M. Oulton and Keith Oulton, PA
Jayme M. Oulton, et vir, PA
Jean B. Laird, MO
Jean Barbe, LA
Jean Johnson, PA
Jean L. Savidge, PA
Jean M. Bizup, PA
Jean P. Flack, PA
Jean Tosh, PA
Jean W. Kindt, PA
Jean W. Schulze, PA
Jeanene Denlinger, PA
Jeanne A. Williams, PA
Jeanne Sickler, PA
Jeannette Ezzyk, PA
Jeannette Moyer, PA
Jeff and Judy Stoner, PA
Jeff and Valerie Fellenbaum, PA
Jeff B. Ginger, PA
Jeff Eric Miller, et ux., PA
Jeff H. Clark, PA
Jeff Hynick, PA
Jeff Landis, PA
Jeffery G. Mullin, PA
Jeffery Geiser, PA
Jeffery Koller, PA
Jeffrey A. May and Karen J. May, PA
Jeffrey A. and Susan A. Wolfe, PA
Jeffrey A. Hartman, PA
Jeffrey A. Kann, et ux., PA
Jeffrey A. May, et ux., PA
Jeffrey A. Wolfe, et ux., PA
Jeffrey B. Snider, PA
Jeffrey C. Davison, PA
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Jeffrey D. Steckbeck, PA
Jeffrey Foust, PA
Jeffrey H. Mussmon, et ux., PA
Jeffrey Hynick, PA
Jeffrey J. Belch, PA
Jeffrey L. Lefever, et al., PA
Jeffrey M. Delaney, PA
Jeffrey Morgan, et al., PA
Jeffrey R. Parmer, PA
Jeffrey S. Groff, et al., PA
Jeffrey Scott Young, PA
Jeffrey W. Esbin, PA
Jeffrey W. Higgins, et ux., PA
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Jennie LaPointe, PA
Jennifer and Greg Simas, PA
Jennifer and Jason Weikel, PA
Jennifer Berlin, PA
Jennifer Brown, PA
Jennifer Carter, PA
Jennifer Corearan, PA
Jennifer D. Scott, PA
Jennifer Hamilton, PA
Jennifer Karns, et vir, PA
Jennifer L. and William F. Klose III, PA
Jennifer L. Cleary, et ux., PA
Jennifer L. Wyman, PA
Jennifer Michael, PA
Jennifer S. Shadle, et ux., PA
Jennifer Spangler, PA
Jennifer Wentzel, PA
Jere Snyder, PA
Jeremie Detling, WV
Jeremy Balchikonis, PA
Jeremy Guy Walters, et ux., PA
Jeremy L. Gray, PA
Jeremy M. Salsman, PA
Jeremy M. Zimmerman, et ux., PA
Jeri L. Houseknecht, PA
Jerry A. Clark, PA
Jerry A. Wise, et ux., PA
Jerry C. Eckman, PA
Jerry Digan, PA
Jerry Harrison, PA
Jerry L. Lefever, PA
Jerry Lee Miller, PA
Jess W. Oren, III, et al., PA
Jesse A. Long, et al., PA
Jesse J. Baker, PA
Jesse J. Hepler, et ux., PA
Jesse M. Ziegler, et ux., PA
Jessica Albertson, PA
Jessica Bickley, WV
Jessica Fay, PA
Jessica G. Gorman Taylor, PA
Jessica Kelly, PA
Jessica Robenolt, PA
Jill M. Jordan, PA
Jill M. Deihl, PA
Jill Smith, PA
Jillian Ashley Lashmett, PA
Jim P. Greenley, et ux., PA
Jimmy Pearrow, AR
Jo A. Fleming, PA
Jo Ellen Litz, PA
Jo Garvin, PA
Joan A. O'Laughlin, PA
Joan A. Witmer, PA
Joan A. Daro, PA
Joan Byron, PA
Joan Dean, PA
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Joan Foust, PA
Joan Hawkins, PA
Joan Keller, PA
Joan King, PA
Joan M. Fenimore, PA
Joan M. Inman, PA
Joan M. Kay, NY
Joan Pauley, PA
Joan Sickler, PA
Joan Weaber, PA
Joann Atkinson, PA
Joann H. Martin, PA
Joann M. Shelley, PA
Joanna Bladder, PA
Joanna Faith Kurtz, et al., PA
Joanne Callahan, PA
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Individuals (cont'd)

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Joe Leighton, PA
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Joe Shirley, PA
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Joel A. Frey, and Jaclyn L. Frey, PA
Joel King, PA
Joel Pompella, PA
Joel T. Rosengrant, et ux., PA
John & Deb Swanson, PA
John A. III & Sherry Green, PA
John A. Mihalik and Victoria L. Mihalik, PA
John A. Bebey, PA
John A. Colella, PA
John A. Francioni Jr., et ux., PA
John A. Galleazzi, MD
John A. Linton, Jr., et ux., PA
John A. Martin, et ux., PA
John A. Miller, PA
John A. Scaldara, MD
John A. Swingle, PA
John A. Trimble, et al., PA
John Allan, PA
John and Andrea Harrell, PA
John and Andrea W. Harrell, PA
John and Anne Smeltzer, PA
John and Deborah Sowers, PA
John and Jenny Wing, PA
John and Patti Zerbe, PA
John and Sarah Dodson, PA
John B. Butcho, et ux., PA
John B. Roeder, PA
John C. Jenzano, PA
John C. Reeser, et ux., PA
John Carlson, PA
John Clinton Klingerman, PA
John Comella, PA
John Cooper, PA
John Cosgrove, PA
John D. Lahr, PA
John D. Bomgardner, et ux., PA
John D. Flaud, PA
John D. Lahr, PA
John D. Lapp, et ux., PA
John D. Martin, et ux., PA
John D. Rank-Christman, et al., PA
John D. Rebman, PA
John David Estep, et ux., PA
John David Martin, PA
John Dewitt Nicholson, PA
John E. Smith Jr., PA
John E. Berger, PA
John E. Butts, PA
John E. Edwards, PA
John E. Ground, PA
John E. Teahl, et ux., PA
John Evans, PA
John F. and Connie J. Fritz, PA
John Friedberg, PA
John G. Leakway and Stephanie A. Leakway, PA
John G. Teichmoeller, MD
John Gabreski, PA
John Gilbert Leakway, PA
John Ground, PA
John Gurkin, AR
John H. and Beverly Weiss, PA
John H. Frey, et ux., PA
John H. McFalls, PA
John H. Moyer, et ux., PA
John Haldeman, et ux., PA
John Harley, PA
John Henry Lichty, PA
John Herr, PA
John Hudson, OK
John J. Andrewson, et ux., PA
John J. Baker, PA
John J. Garrison Sr., PA
John J. Maciejewski, PA
John J. Scott et ux., PA
John Jenzano, PA
John K. Stoltzfoos and Barbara G. Stoltzfoos, PA
John Kauffman, PA
John Kimmel, et ux., PA
John Knight, AR
John L. Brown, et ux., PA
John L. Hynes, MD
John L. Walker, PA
John Lynch, PA
John M. Rusonis, PA
John M. Burkholder, et ux., PA
John M. Krohn, et ux., PA
John M. Lausch, PA
John M. Reinbold, Jr., et ux., PA
John M. Seidel, et ux., PA
John M. Their, PA
John McGurk, PA
John Mishanski, PA
John Murr, PA
John Oline, PA
John P. Blaski, et ux., PA
John Puskar, PA
John R. Felty, PA
John R. Gerdy and E. Follin Smith, PA
John R. Greenley, et ux., PA
John R. Haldeman, et ux., PA
John R. Holt and Michael E. Wood, PA
John R. Sendy, PA
John R. Stout, NC
John R. Swanson, et ux., PA
John Rehrer, PA
John Roelof Lanting, MD
John Rohrer, PA
John Rossi, PA
John Rupinski, PA
John S. Gladys, et ux., PA
John Salahub, PA
John Sawyer, TX
John Swartz, PA
John T. Gross, PA
John T. Melick, PA
John T. Wiker, PA
John T. Wocniski, PA
John Timothy Gross, PA
John Tloczynski, PA
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John W. Pfeiffer, et ux., PA
John W. Roberts, et ux., PA

Individuals (cont'd)

John Waering, PA
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Jonas W. Cash, MD
Jonathan B. Herschberger, et ux., PA
Jonathan J. Richwine, PA
Jonathan Pompella, PA
Jonathan Poole, PA
Jonathan Seifert, PA
Jonathon Bancroft Colon, PA
Jones Sherry, PA
Jordan A. Waybright, et al., PA
Jose Diaz, PA
Joseph and Becki Brandenburg, PA
Joseph and Deborah Sickler, PA
Joseph Barone, PA
Joseph D. Ritter, PA
Joseph Deleo, PA
Joseph E. Brandenburg, PA
Joseph G. Kappen, PA
Joseph G. Schneiderite Jr., PA
Joseph Guastella, Jr., PA
Joseph J. Maskalis, PA
Joseph Jackson, PA
Joseph Justik, PA
Joseph K. Lahr, PA
Joseph K. Wenson, NJ
Joseph L. Burdge, PA
Joseph M. Briganti, CT
Joseph M. Demeio, et ux., PA
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Joseph M. Wenson, NJ
Joseph M. Zoller, MD
Joseph McAnelly, AR
Joseph Michael Diangelo, MD
Joseph Mislevy, et al., PA
Joseph P. Wallace, CO
Joseph P. Waldman, et ux., PA
Joseph Pinamonti, Jr., et ux., PA
Joseph R. Paterson, PA
Joseph Radick, PA
Joseph S. Kugler, et al., PA
Joseph S. Volz, PA
Joseph Spaltro, NJ
Joseph Tronkowski, PA
Joseph W. Fischer, PA
Joseph Weidow, et ux., PA
Joseph Wieczorek, Jr., PA
Joseph-Celeste Dymond Family Trust, PA
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Josh Graupera, PA
Josh Seeley, PA
Joshua Gerlach, PA
Joshua L. King, PA
Joshua Matulevich, PA
Joshua R. Neece, PA
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Joy and Kaylee Blasick, PA
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Joy Schuler and Brent Schuler, PA
Joy Schuler, et vir, PA
Joyce A. Spencer, PA
Joyce Ann Thrush, PA
Joyce Bennett, PA
Joyce Collins, PA
Joyce Kunkle, PA
Joyce Lane, PA
Joyce T. Colvin, PA
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Judith A. Mihal, PA
Judith A. Smith, PA
Judith F. Evanko, et vir, FL
Judith J. Hoff, et al., PA
Judith Max, PA
Judith Mueller, PA
Judith N. Pencek, PA
Judith Nulton, et al., PA
Judith Rindos, PA
Judith Wienckoski, PA
Judson R. Smales, et ux., PA
Judy A. O'Brien, PA
Judy Davis, PA
Judy Ginter, PA
Judy Hutton, PA
Judy K. Steenburg, PA
Judy Leaman, PA
Judy Zurin, PA
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Julie Brown, PA
Julie E. Diltz, et ux., PA
Julie H. Wademan, PA
Julien Lurowist, PA
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Justin L. Cappiello, et al., PA
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Justin S. Weidler, et ux., PA
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Kailyn Stewart, PA
Kandi Bowers, PA
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Kara Richelle Kimmel, PA
Kara Winter, PA
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Karen Ament, PA
Karen and David Smith, PA
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Karen Brown-Thorn, PA
Karen Dickerson, PA
Karen Hubbard, PA
Karen John, PA
Karen Miller, PA
Karen Oltra, PA
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Karen Wickel, PA
Karl A. Kanode, et ux., PA
Karl H. Perritt et al., PA
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<u>Individuals (cont'd)</u>

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Karl MacDonald, PA
Karl R. Hinkle, PA
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Katelyn Erb, PA
Kathi A. Wodehouse, PA
Kathleen Brader, PA
Kathleen Meade, PA
Kathryn A. Comstock, PA
Kathryn Healery, PA
Kathy A. Meily, PA
Kathy B. Steiner, PA
Kathy Boots, PA
Kathy E. Bowman, PA
Kathy M. Kocher, PA
Kathy Musser, PA
Kathy Pope, PA
Katie Faust, PA
Katie Lee Cross, PA
Kavin E. Shelley, PA
Kay Lahr, PA
Kay Reinfried, PA
Kaye Gilbert, PA
Keeney Jaegen, PA
Keith A. Hansford, MD
Keith A. Harris, et ux., PA
Keith A. Leighow, PA
Keith A. Zimmerman, PA
Keith Alan Hinkle, PA
Keith E. McHenry, PA
Keith Figured, PA
Keith H. Martin, et al., PA
Keith Lamar Kurtz, et ux., PA
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Kendall Dobbins, PA
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Kenneth A. Bond, PA
Kenneth A. Gainer, PA
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Kenneth Alan Eads, MD
Kenneth and Kathy Bond, PA
Kenneth Benjamin Moyer, et al., PA
Kenneth Bond, PA
Kenneth Brown, PA
Kenneth C. Jones, VA
Kenneth D. Stickler, PA
Kenneth E. Decker, et ux., PA
Kenneth Foust, PA
Kenneth Goss, PA
Kenneth J. Scavone, PA
Kenneth J. Werni, PA
Kenneth L. Wisnoskie, PA
Kenneth L. Goss, et ux., PA
Kenneth L. Wenner, et ux., PA
Kenneth Marshman, PA
Kenneth Miller & Belva Miller, PA
Kenneth Miller, et ux., PA
Kenneth P. Shannon, PA
Kenneth S. Kok, et ux., PA
Kenton E. Kreider, PA
Kerek D. Musser, et al., PA
Kerry J. Fritz, et ux., PA
Keturah Bombick, PA
Keven M. Loy, et ux., PA
Kevin Bennett, PA
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Kevin C. Donton, PA
Kevin C. Becraft, MD
Kevin Dembitsky, et ux., PA
Kevin Hurst, PA
Kevin Lynn, PA
Kevin M. Myer, PA
Kevin Mekosh, et al., PA
Kevin Mooney, PA
Kevin R. Norris, PA
Kevin Shelley, PA
Kevin Shivers, PA
Kevin Stackhouse, PA
Kevin Sunday, PA
Kevin T. Zimmerman, PA
Kiertsen Eddinger, PA
Kim and Jon Clemens, PA
Kim Barnes, PA
Kim C. Keefer, PA
Kim D. Williams, et vir, Co
Kim Kann, PA
Kim Lutz, PA
Kim McClure, PA
Kim R. Houseknecht, et al., PA
Kim Rene Dolly, PA
Kimberly A. Hilton, Charles H. Hilton, and Mary M. Hilton, PA
Kimberly D. Reiff, PA
Kimberly Grant, PA
Kimberly J. Falco, PA
Kimberly Kann, PA
Kimberly S. Kann, PA
Kimberly Smith, PA
Kimberly Winder, PA
Kirby L. Swope, PA
Kirk Liddell, PA
Kirk N. Lehman, et ux., PA
Korena Vargo, PA
Kratzner K. Keiser, PA
Krista K. Long, PA
Krista Kutney, et al., PA
Kristen Carpenter, PA
Kristi Cirelli, PA
Kristin Hale, PA
Kristin Isenberg, NY
Kristopher L. Pigarut, PA
Krysti Leigh Bertinelli, PA
Kurtis Downey Sr., PA
Kurtis L. Shaffer and Ginger P. Shaffer, PA
Kyle H. Brightbill, et ux., PA
Kyle P. Kline, PA
Kym Lawler, PA
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L. Lesher, PA
Lamar E. Kanagy, et ux., PA
Lancosky Helga, PA
Laramy Britton, PA
Larree Brown, PA
Larry A. Deer, PA
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Larry D. Hepler et al., PA
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Larry E. Kreiser, et al., PA
Larry G. Puderbach et ux., PA
Larry H. Klinger et ux., PA
Larry L. Keller and Debra M. Keller, PA
Larry L. Shearer, PA
Larry L. Waltz, et al., PA
Larry Lansberry, et al., PA
Larry Loesch, PA
Larry M. Davidhizar, et ux., PA
Larry Martin, PA
Larry R. Kortright, PA
Larry R. Wolfe, et al., PA
Larry Rhodes, TN
Larry W. Fausey, et al., PA
Laszo Varju, NJ
Lauback Karen, PA
Laura A. Banta, PA
Laura Finberg, PA
Laura Kemmick, PA
Laura Lery, PA
Laura Levy, PA
Laura Long, PA
Laura M. Boyles, PA
Laura Newcomer, PA
Laura Sisay, PA
Laura Wagner-Miller, PA
Laura Wilson, PA
Lauren Johnson, PA
Lauren Tstspa, PA
Laurie A. Dekonty, PA
Laurie K. Strauch, PA
Laurie Long, PA
Laurie M. Minto, PA
Laurie Wurster, PA
Lawrence H. Cox, MD
Lawrence L. Strang, MD
Lawrence M. Shaw Jr., et ux., PA
Lawrence M. Shaw, Jr., PA
Lawrence Recla Jr., et al., PA
Lawrence Spadine, PA
Lawrence Thomas, et ux., PA
Leah Brooke Sippel and Erik Wesley Sippel, PA
Leanne Ferree, PA
Leanne Mazurick, PA
Leanne Niedzwiecki, PA
Lee Edward Gearheart, PA
Lee R. Hitz, et ux., PA
Lela M. Forry, PA
Leland C. Sickler, PA
Lelia K. Drake, PA
Lemuel and Judith Futcher, TX
Leni Kerekgyarto, PA
Leo S. Dragon, Jr., PA
Leon Sauder, PA
Leona A. Dobrinski, PA
Leona Bennett, PA
Leonard Beecher, PA
Leonard Browski, PA
Leonard F. Cecco, PA
Leonard R. Beecher, et ux., PA
Leroy Adams, Sr., et ux., PA
Leroy Baker, PA
Leroy O. Hoover and Lorraine M. Hoover, PA
Leroy W. Jordan, et ux., PA
Les Jarrard, PA
Lesley A. Kok, PA
Leslie Derr and Andrea Derr, PA
Leslie W. Black, et ux., PA
Lester and Beatrice Martin, PA
Lester B. Weaver, et al., PA
Lester E. English, PA
Lester G. Oberholtzer, et ux., PA
Leta Jo Kremser, PA
Levi S. Esh, et ux., PA
Lewis Harter, PA
Lewis Wesley Shore, Jr., PA
Lexi Zola, PA
Liam Maloney, PA
Lillian R. Smith, PA
Linda A. Barba, PA
Linda A. Hoy, PA
Linda A. Marstell, PA
Linda Allison, MS
Linda and John Dietrichson, PA
Linda and Tom Shuman, PA
Linda C. L., PA
Linda Dewalt, PA
Linda G. Quodomine, PA
Linda Hafer, PA
Linda Hartung, PA
Linda Hicks, TX
Linda J. Funk, PA
Linda J. Miller, PA
Linda J. Hess, PA
Linda K. Ecker, PA
Linda K. McGettigan, PA
Linda L. Farst, PA
Linda Loretz, MD
Linda M. Mease, PA
Linda McCormick, PA
Linda Mislevy, PA
Linda Pencek, et vir, PA
Linda Pipon, PA
Linda Pyle, PA
Linda Resseguie, PA
Linda S. Gundrum, PA
Linda Snyder, PA
Linda Tomasacci, PA
Lindsey A. Nauman, et al., PA
Lindsey Edgell, PA
Linford Randall, PA
Linnea Miller, PA
Lisa Aichele, PA
Lisa Brown, PA
Lisa Hastings, PA
Lisa J. Dengler, PA
Lisa Keller, PA
Lisa M. Dziabo, PA
Lisa M. Jurgensen, PA
Lisa M. Longenecker, PA
Lisa R. Garrett, PA
Lisa Stickley, PA
Lizzie E. Stoltzfoos, PA
Lloyd E. Kremser, PA
Lois F. Stauder, PA
Lois H. Stredny, PA
Lois J. Balmer, Dale L. Balmer, and Sharon K. Balmer, PA
Lois J. Williams Ide, PA
Lois Stauder, PA
Lola Miller, PA
Lonnie R. Piatt and Deborah L. Kinney Piatt, PA
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Lorraine L. Light, PA
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Lorrie and Bill Bernoski, PA
Louella S. Oberholtzer, PA
Louis F. Foshay, et ux., PA
Louis Spadine, Jr., PA
Louis V. Santoriello, CA
Louise Hostetter, PA
Louise King, PA
Louise McClurg, Oh
Loutrail W. Campbell Sr., PA
Lowell L. Brubaker, et al., PA
Lucas Shultz, PA
Lucas Shultz, PA
Lucille C. Conahan, PA
Lucille J. Shuey, PA
Lucille Ruckle, PA
Lucille S. Mingle, PA
Lucy Shumaker, PA
Luella W. Jardine, et al., VA
Luis A. Vargas, et ux., PA
Luke and Leslie Bunting, PA
Luke Cohan, PA
Luke Vastine, PA
Lulu Kman, NY
Lura Wasileslu Good, PA
Lycholaj, Daniel E., PA
Lydell E. Nolt, PA
Lydia A. Lewis, PA
Lynda Heffernan, FL
Lynda Like, et al., PA
Lynda Liste, PA
Lynette Degeorge, PA
Lynette Faye Kosh, PA
Lynette Fisk, PA
Lynn C. Appelman, PA
Lynn Evans, PA
Lynn L. Hoagland, et al., PA
Lynn N. Bender, PA
M. Chris Collins, PA
M. Hippey, PA
M. L., PA
M.F. Kelley Jr et ux., PA
Madeline G. Snyder, PA
Madison Shiner, PA
Mae Diehl and Lynn M. Diehl & Sherry M. Adams, PA
Mae Diehl, et al., PA
Magda Stephens, et al., NJ
Malcolm Parry, et ux., PA
Malene A. Carr, PA
Malinda Clatterbuck, PA
Malinda Clattetuck, PA
Malinda E. Lapp, PA
Mandy R. Morgan, PA
Marc Regula, PA
Marchel Robin Wilson, MD
Marci Murdock,
Marci Webber, PA
Marcia J. Klinger et ux., PA
Marcia Stober, PA
Marcie Natale, PA
Marcus Adams, PA
Marcus C. Jurgenson, et ux., PA
Marcus Casaldi, PA
Marcus Jurgensen, PA
Marcy Perry, PA
Margaret A. Spiese, PA
Margaret Carden, PA
Margaret English, WV
Margaret Hall, PA
Margaret Hiltz, PA
Margaret Justick, PA
Margaret Lynch, TX
Margaret Manzer, et vir, PA
Margaret R. Brown, PA
Margaret Vrona, PA
Margaret Woodcock, PA
Margo A. Oncay, PA
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Marian A. Brandt, PA
Marian J. Lehman, PA
Marian M. Spangler, PA
Marianna Sokol, PA
Marianne Freeman, et ux., PA
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Marie Fetterolf, PA
Marie S. Hornberger, PA
Marie Snavely, PA
Marilyn Murphy, PA
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Marion Menapace, PA
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Mark A. Dimock, PA
Mark Alan Deitzler, et ux., PA
Mark and Jeffrey Leventhall, PA
Mark Atlee, PA
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Mark C. Carr, et ux., PA
Mark C. Kohreherr, et ux., PA
Mark C. Sitler, PA
Mark Clatterbuck, PA
Mark Conforth And Carolyn Conforth, PA
Mark Conforth, et ux., PA
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Mark Gerrish and Melodee Gerrish, PA
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Mark Hayes, SC
Mark Heuer, PA
Mark Hinkley, et al., PA
Mark Hirschman, PA
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Mark J. Vincent, PA
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Martha F. Herr, et al., PA
Martha M. Kutz, PA
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Martin C. Reed, PA
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Marvin Seward, et ux., PA
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Mary G. Whitman and Neil G. Reeb, PA
Mary G. Whitman, et al., PA
Mary Glazier, PA
Mary Gummerson, PA
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Mary Jane Kreisler, PA
Mary Jean Miller, PA
Mary Jo Baloga, et al., PA
Mary Kathryn Estep, PA
Mary Kathryn Keller, PA
Mary Kay Briganti, et al., CT
Mary L. Thomas, PA
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Mary Ruth Gertz, PA
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Matthew A. Keperling, et al., PA
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Matthew Deihl, PA
Matthew Hiltz, et ux., PA
Matthew J. Deantonio, PA
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Matthew J. Heisler et ux., PA
Matthew J. McCrone, et ux., PA
Matthew R. Smith, PA
Matthew R. Collura, et ux., PA
Matthew Thomes, PA
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Maureen Gettle, PA
Maureen Stanton, PA
Maureen Zukowski, PA
Max R. Robbins et ux., PA
Meade G. Peters, et al., PA
Megan Detter, PA
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Megan Mohr, PA
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Melvin R. Caldwell, et al., PA
Melvin R. Weaver, et al., PA
Menno B. Stoltzfus, et ux., PA
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Merle W. Martin, et al., PA
Merrill Dan Borntrager, PA
Merritt S. Saxe, et ux., PA
Mervia Smoker, PA
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Mervin D. Shenk, et ux., PA
Mervin H. Breneman, PA
Mervin R. Smoker, et ux., PA
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Michael A. Bressi, et ux., PA
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Michael E. Houseknecht et ux., PA
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Michael King, PA
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Michael L. Rudy, PA
Michael Longfoot, PA
Michael M. Simko, PA
Michael Manganella, et ux., PA
Michael Martin, PA
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Monty D. Hittle, et al., PA
Morgan Abele, PA
Moriajeanne Fitzgerald, PA
Myra Ober, PA
Myrl L. Hershey, PA
Myrl L. Troutman, et ux., PA
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N. Clayton Fetterman, et al., PA
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Nancy Blechschmidt, PA
Nancy E. Lawrence, PA
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Nancy E. Jeffries, PA
Nancy Haas, PA
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Nancy J. Kulp, PA
Nancy Jeffriesdo, PA
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Nancy M. Jaslar, PA
Nancy M. Starr, PA
Nancy P. Haudenschield, PA
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Nathalie Guibord, PA
Nathan D. Roberts, PA
Nathan S. and Tina M. Wiggins, PA
Ned Lurowist, PA
Neil & Yvonne Young, PA
Neil Bushong, et ux., PA
Neil G. Reeb, et al., PA
Neil R. Bushong, et ux., PA
Neil R. Wingenroth, PA
Neil Ward, PA
Nelson and Sharon Sherman, PA
Nelson Benn, PA
Nelson J. Ashburner, PA
Nelson L. Fahnestock, et al., PA
Nelson Martin, et ux., PA
Nelson N. Weaver, et al., PA
Nelson W. Martin and Velma W. Martin, PA
Nicholas A. Snavely, et ux., PA
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Paul J. and Linda Littleford, PA
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Paul Joseph Hansen, PA
Paul K. Harnish, et ux., PA
Paul Kettering, PA
Paul L. Carl, PA
Paul L. Luttrell, et ux., PA
Paul L. Stutzman, Jr., et al., PA
Paul M. Fahnestock, et al., PA
Paul M. Weaver, PA
Paul Metzloff, PA
Paul N. Newcomer, et al., PA
Paul Petkavich, PA
Paul R. Carr, et ux., PA
Paul R. Henning, PA
Paul Rowlands, et ux., PA
Paul Salansky, et ux., PA
Paul Slifco, PA
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Paul V. Nissley, et ux., PA
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Peggy Teitsworth, PA
Peggy Wenger, PA
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Peter Doyle, et ux., PA
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Peter J. Brandner, et ux., NJ
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Philip O. Shank, et al., PA
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Rachelle Rogers, et vir, PA
Ralph and Janet Reedy, PA
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Ralph E. Green, et al., PA
Ralph F. Marks et al., PA
Ralph Freed, PA
Ralph Henry Maurer, et ux., PA
Ralph J. Casaldi, et ux., PA
Ralph Mark Hulder, PA
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Ralston and Jane Pennington and Keith W. Pennington and Doris Hartzell and Robert A. Hartzell, PA
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Randall Walsh, PA
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Raymond H. Perritt, et al., PA
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Raymond Jackloski Jr., PA
Raymond Kutz, PA
Raymond Mohler, PA
Raymond Oscar Fisher, et ux., PA
Raymond S. Mohler, et ux., PA
Raymond Tenasco, PA
Raymond Victor Miller, PA
Raymond Vreeland, PA
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<u>Individuals (cont'd)</u>

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Rebecca Pawlik, PA
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Renee Didrio, PA
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Reuben H. Wenger, et ux., PA
Rex Rathbun, PA
Rex T. Mohr, PA
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Richard A. Conner, et ux., PA
Richard A. Ivey, et ux., PA
Richard A. Kroh, et ux., PA
Richard A. Rarba, et ux., PA
Richard and Cynthia Moses, PA
Richard and Kristen Angelicola, et ux., PA
Richard B. Drager, PA
Richard Bechetti, et ux., PA
Richard Blouch, PA
Richard Burroughs, VA
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Richard E. Weeks, et ux., PA
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Richard J. Dabulis, et ux., PA
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Richard J. Withelder, et ux., PA
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Richard L. Custer et al., PA
Richard L. Fetterman, et al., PA
Richard L. Gearhart, PA
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Richard L. Mitchell, et ux., NJ
Richard M. Davis, et ux., PA
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Richard Roberts, PA
Richard Rupert et al., PA
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Richard Tregidgo, PA
Richard Vreeland, et al., PA
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Robert A. Puchalski, PA
Robert A. Shebelsky, et ux., PA
Robert A. Sowers, et al., PA
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Robert and Carolyn Kilgour, PA
Robert and Denise Jordan, PA
Robert and Jo A. Wright, PA
Robert and Melanie Engelhardt and Sharon Hopping, PA
Robert and Susan Stanski, PA
Robert B. Barton, IV, PA
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Robert B. Weinstock, et al., PA
Robert Balsbaugh, PA
Robert Barna, PA
Robert Brown, PA
Robert C. Boyles, et ux., PA
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Robert Derhammer, et ux., PA
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Robert E. McMaster et al., PA
Robert Edwards, PA
Robert F. Cross, et al., PA
Robert G. Adams et ux., PA
Robert G. Ryan, et ux., PA
Robert G. Witmer, PA
Robert Gordon, et ux., PA
Robert H. Twiss, PA
Robert H. Fruit, et ux., PA
Robert H. Harbaugh, et al., PA
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Robert M. Adams, PA
Robert M. Chaney, PA
Robert M. Kalinoski, PA
Robert M. Wisdo, et ux., PA
Robert Matthews, PA
Robert Matylewicz, et ux., PA
Robert Mazzerle, et ux., PA
Robert N. Brandt, et ux., PA
Robert N. Rishel, et ux., PA
Robert Neuhauser, PA
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Robert O. Tyler, et al., PA
Robert Olson, PA
Robert Oltra, PA
Robert P. Burke and Laura Leah S. Burke, PA
Robert P. Donough, PA
Robert R. Rogers, PA
Robert R. Houser et ux., PA
Robert S. Kunkle, PA
Robert Shultz Jr., et al., PA
Robert Slick, PA
Robert T. Kay, et ux., NY
Robert Todd Wolfe and Deborah K. Wolfe, PA
Robert Vian, PA
Robert W. Callahan, Jr., et ux., PA
Robert W. Leventhall, PA
Robert W. Webber, PA
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Robin & Ray McCourt, PA
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Ronald B. Whitesell, et ux., PA
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Ronald E. Mansell, et ux., PA
Ronald E. Roye, et ux., PA
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Ronald Mutkus, PA
Ronald P. Wert et ux., PA
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Ronald R. Hileman and Shirley J. Hileman, PA
Ronald R. Schamber, PA
Ronald Whitesell and Sandra Whitesell, PA
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Rose Marie Fisher, PA
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Steve Bergdoll, PA
Steve Erdly, PA
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Susan Petokas, PA
Susan Pinamonti, PA
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Susan Reinhart, PA
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Tammy Finley, MS
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Tammy Jean Kline, PA
Tammy Jo Rhodes, PA
Tammy Kline, et vir, PA
Tammy Murphy, PA
Tammy Samsel, PA
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Terrie McAndrew, PA
Terry Barker, PA
Terry Brow, PA
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Thomas E. Nauman, et ux., PA
Thomas E. Rhone, et ux., PA
Thomas E. Smith, et ux., PA
Thomas F. Edwards, et al., PA
Thomas F. Leibel, PA
Thomas F. Minnich, PA
Thomas F. Nikolaus, PA
Thomas F. Zimmerman, PA
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Thomas J. Carricato Jr., PA
Thomas J. Ware, et ux., PA
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Timothy L. Bahner, PA
Timothy L. Spiese, PA
Timothy Lawrence, PA
Timothy M. Captain, et ux., NJ
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Tina Kistler, PA
Tina M. Volz, PA
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Tobin A. Shank, PA
Todd Ament, PA
Todd R. Schwalm, PA
Todd R. Singley, et ux., PA
Todd W. Studebaker, et ux., PA
Tom and Mary Gummerson, PA
Tom Barnand, PA
Tom Campbell, PA
Tom Doughton, PA
Tom Droege, PA
Tom Seltzer, PA
Tom Torres, PA
Tommy D. Bonham And Becky S. Bonham, PA
Tommy Jones, TX
Toni McGrath, PA
Tony Crocamo, PA
Tonya Marie Moyer, PA
Torie L. Houseknecht, PA
Torrance R. Gensel, et ux., PA
Townsend F. Hug, PA
Tracey L. Ziegler, PA
Tracey Rohrer McVey, PA
Tracy G. Beck, et ux., PA
Tracy L. Ferrick, PA
Tracy L. Heagy, PA
Tracy Niedzwiecki, et ux., PA
Trenton A. Miller, PA
Trish Hafer, PA
Troy D. Shepro, PA
Troy H. Knerr, PA
Trudy M. Ashelman, PA
Turner L. Newburn, et ux., PA
Twila M. Kreider, PA
Tyler E. Ernst, et al., PA
Tyler Homrich, PA
Tyler Lanning, et al., PA
Tyler M. Peregrin, PA
Tyler Wallace, AR
Tyrone Baccile II, NY
Valerie Coulson, PA
Valerie Hendrickson, et al., PA
Valerie L. Miller, PA
Velma L. Metzler, PA
Vera and Verner Lewis, PA
Vera Keagy, PA
Vernon Piersol, PA
Vernon W. Heisey, et al., PA
Veronica Keed, PA
Veronica Shevock, et al., MD
Veto Barrloski, PA
Vicki Bennick, PA
Vicki L. Grove, PA
Victor C. Choplosky, PA
Victor G. Pursel, et ux., PA
Victor L. Boers, et ux., PA
Victor Nestico, PA
Victoria E. Taylor, PA
Victoria Jones, PA

Individuals (cont'd)
Victoria S. Reeves, et ux., FL
Vincent J. Masco, PA
Virginia Hildebrand, PA
Virginia J. Vernet, PA
Vito Pilosi Jr., PA
Voilet Kozubal, et vir, PA
Von L. and Helen Mcgee, PA
Vreeland Vreeland, et al., PA
W. Andrew Stover, PA
W. D., PA
W. Harry Schaffer, PA
W. Pursel, PA
W.S. Robert Shaw, PA
Wade P. Frantz, PA
Walt Kochew, PA
Walter and Robyn Kochan, PA
Walter E. Carpenter And Marcia E. Carpenter, PA
Walter E. Minto, et ux., PA
Walter G. Heck, PA
Walter Harris Howell Jr., PA
Walter Mackiw, PA
Walter Mikus, et ux., PA
Walter R. Lindenmuth, et ux., PA
Walter S. Woznicki, PA
Walter V., PA
Walter W. Kochan and Robyn Sterling Kochan, PA
Warren N. Reiff, et ux., PA
Wayne Bizup, et ux., NJ
Wayne Bizup, et ux., PA
Wayne Bouley, NH
Wayne E. Shultz, et al., PA
Wayne Fetty, PA
Wayne Frederick, et ux., PA
Wayne J. Newman, PA
Wayne M. Fausey, et ux., PA
Wayne Mutchler, PA
Wayne Reno, PA
Wayne Watts, PA
Wayne Weaver, et ux., PA
Wende Swartz, PA
Wendell Kibly, PA
Wendy Gable, PA
Wendy Gulliver, PA
Wendy M. Decker, PA
Wesley C. Nolan, PA
Wesley E. Murry, PA
Wilbur Stout, PA
Wilfredo Perez, et ux., PA
Will Christensen and Tabitha Gheen, PA
Willard Bullock, PA
Willard Comstock, et al., PA
Willard J. Race Jr., PA
Willard Novitch, PA
Willard R. Bullock, PA
William A. Cragle, PA
William A. Hooper, PA
William and Constance Morgan, PA
William and Dolores Smith, PA
William B. Allegar, et ux., PA
William B. and Debra Lamoreux, PA
William B. Everett, et ux., PA
William C. Bard, PA
William Celmer, PA
William D. Brown, et ux., PA
William D. Graby, PA
William D. Paterson Jr., VA
William Dean Zewan, PA
William Derhammer, et ux., PA
William E. Murry, PA
William E. Streater and Carol Streater and Mark W. Streater and Stephanie F. Streater, PA
William E. Zick, et ux., PA
William F. Bennett, et al., PA
William Foster, PA
William G. Bastian, et ux., PA
William G. Belloff, et al., PA
William G. Bernoski, et ux., PA
William G. Dengler, et ux., PA
William G. Pencek, et ux., PA
William Gordon, PA
William H. Wainwright, et al., PA
William J. Billets and Dolores Billets, FL
William J. Napier and Karen L. Napier, PA
William J. Petkavich, Jr., et al., FL
William J. and Luann Baron, PA
William J. Bernheisel, et ux., PA
William J. Billets, et ux., PA
William J. Miller, et ux., PA
William J. Napier, et ux., PA
William J. Petkavich, Jr., PA
William Jurbala, OK
William K. Johnson, PA
William K. Poust et ux., PA
William Karis, et al., PA
William L. Bake, MD
William L. Jesse, PA
William L. Weber, PA
William Leavy, NM
William Loftus, PA
William M. Deibler et ux., PA
William M. Regitz, PA
William M. Riggins, De
William M. Savage, PA
William M. Smith, Jr., et ux., PA
William M. Smith, PA
William R. Allison, et ux., PA
William R. Rohrer, PA
William Readler, PA
William Ritenour, PA
William S. and Nancy M. Rankin, PA
William V. Weiler and Esta G. Weiler, PA
William V. Weiler et ux., PA
William Zalenski, PA
Williams E. Streater, et al., PA
Williard Comstock, et ux., PA
Wilmer K. Smucker, et ux., PA
Wyditte L. Buck, PA
Yailine Eshelman, PA
Yvonne and Neil Young, PA

Individuals (cont'd)

Yvonne M. Katerman, PA
Zachary Hassel, PA
Zack Kanfel, PA
Zane Gilmore, PA
Zhi He, MD
Zigmond Rezykowski,
et ux., PA

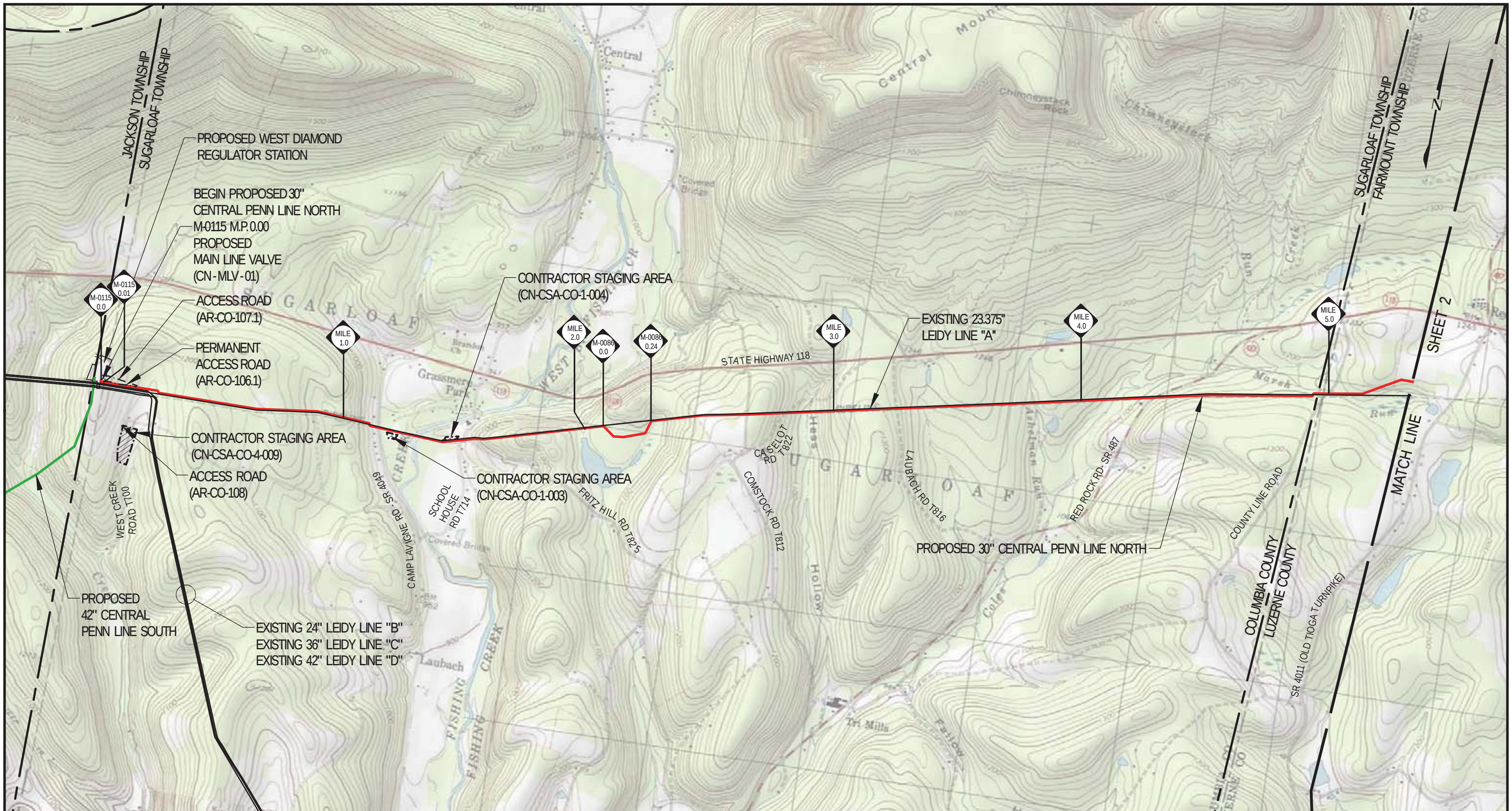
APPENDIX B

PROJECT OVERVIEW MAPS, BEST MANAGEMENT PRACTICE FIGURES, AND TYPICAL RIGHT-OF-WAY DRAWINGS

PROJECT OVERVIEW MAPS

Central Penn Line North

B-5



LEGEND

- PROPOSED 30" CENTRAL PENN LINE NORTH
- PROPOSED 42" CENTRAL PENN LINE SOUTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
  CONTRACTOR YARD/PIPE YARD

DRG 7.5 MIN. QUAD MAP:
41076-C4 (ELK GROVE, PA)
41076-C3 (RED ROCK, PA)

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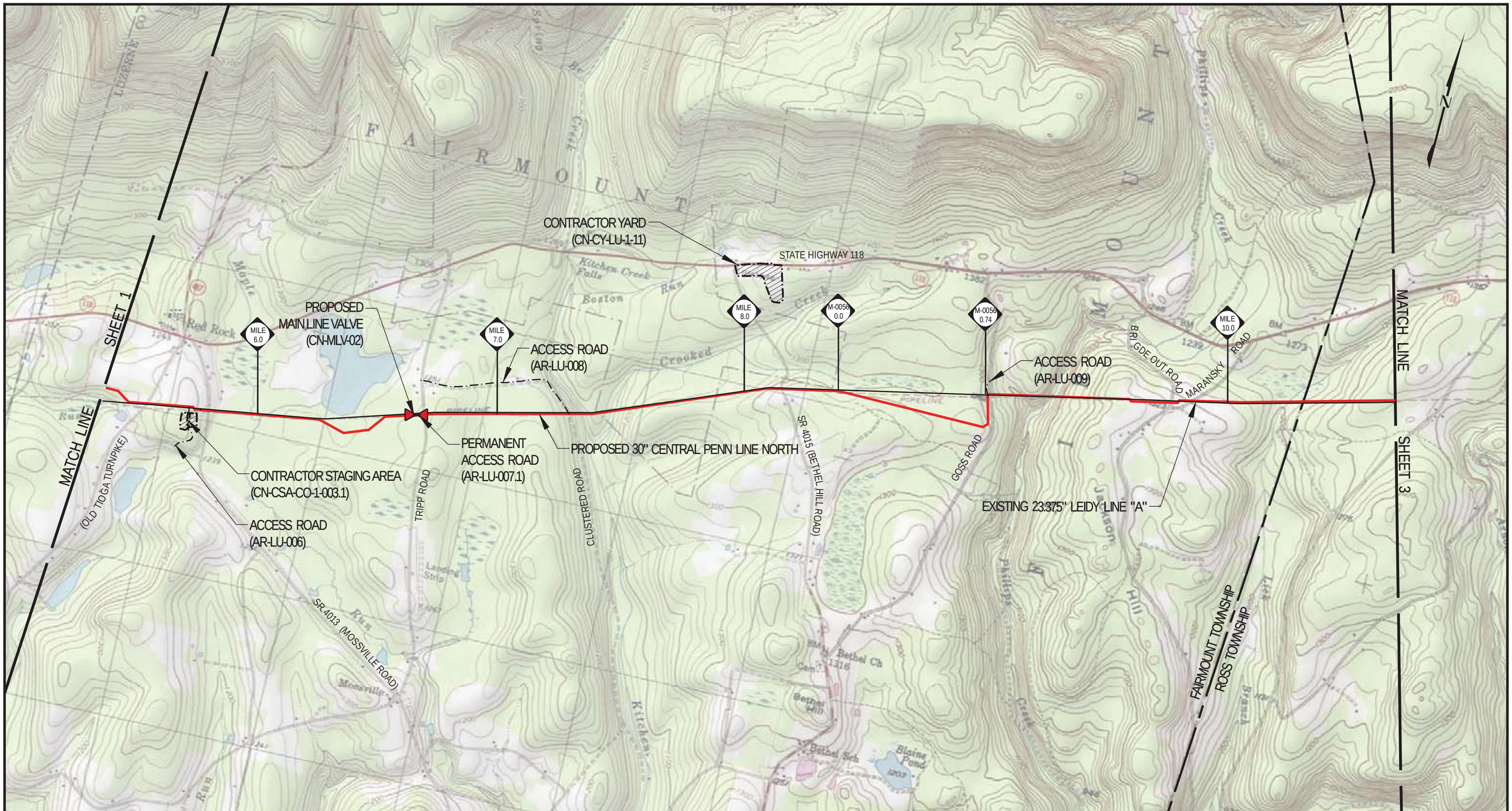
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line North



LEGEND

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- PROPOSED 42" CENTRAL PENN LINE SOUTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
  CONTRACTOR YARD/PIPE YARD

DRG 7.5 MIN. QUAD MAP:
41076-C3 (RED ROCK, PA)
41076-C2 (SWEET VALLEY, PA)

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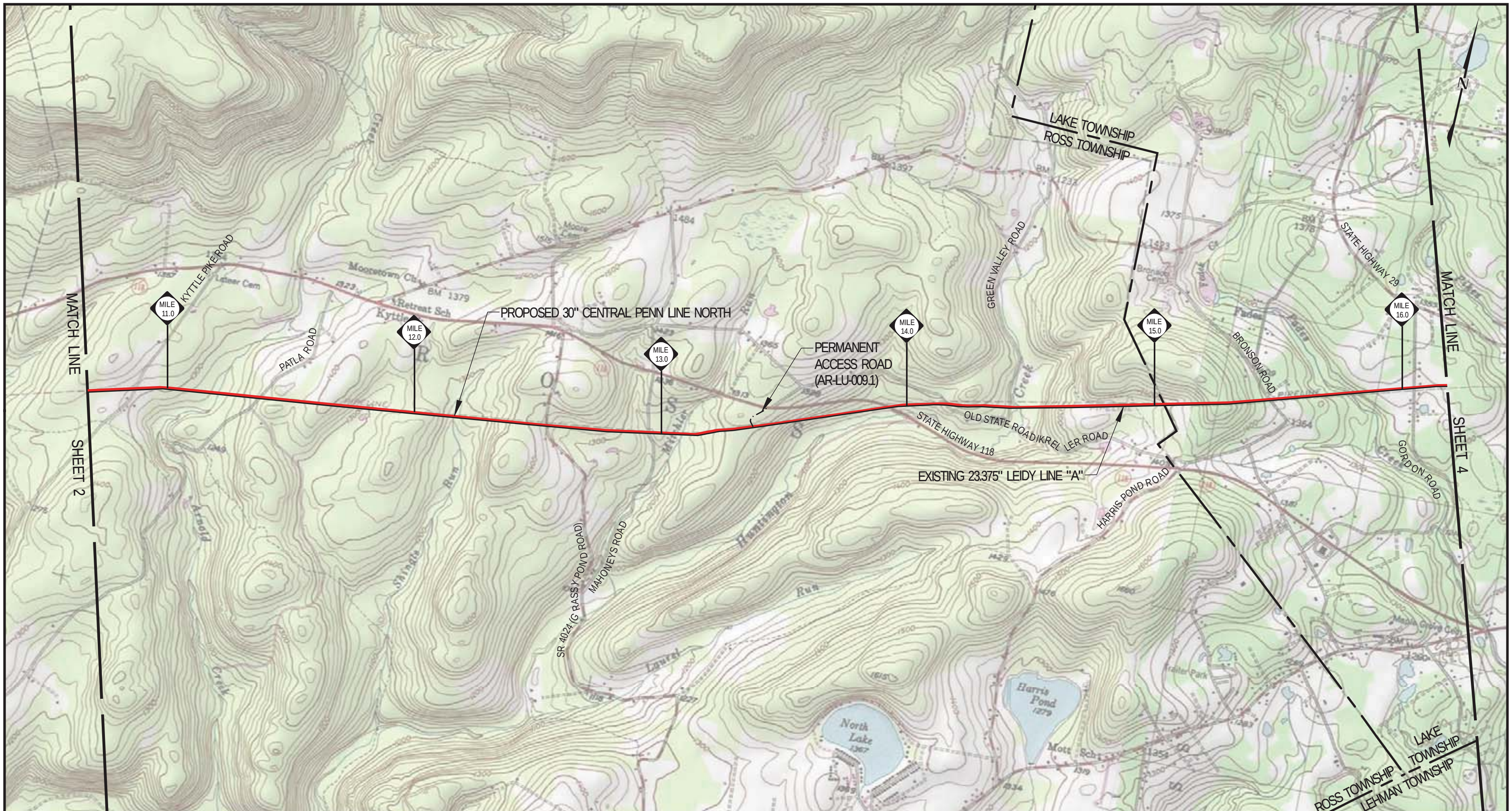
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line North



B-7

LEGEND

- PROPOSED 30" CENTRAL PENN LINE NORTH
- PROPOSED 42" CENTRAL PENN LINE SOUTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA CONTRACTOR YARD/PIPE YARD

DRG 7.5 MIN. QUAD MAP:
41076-C2 (SWEET VALLEY, PA)
41076-C1 (HARVYES LAKE, PA)

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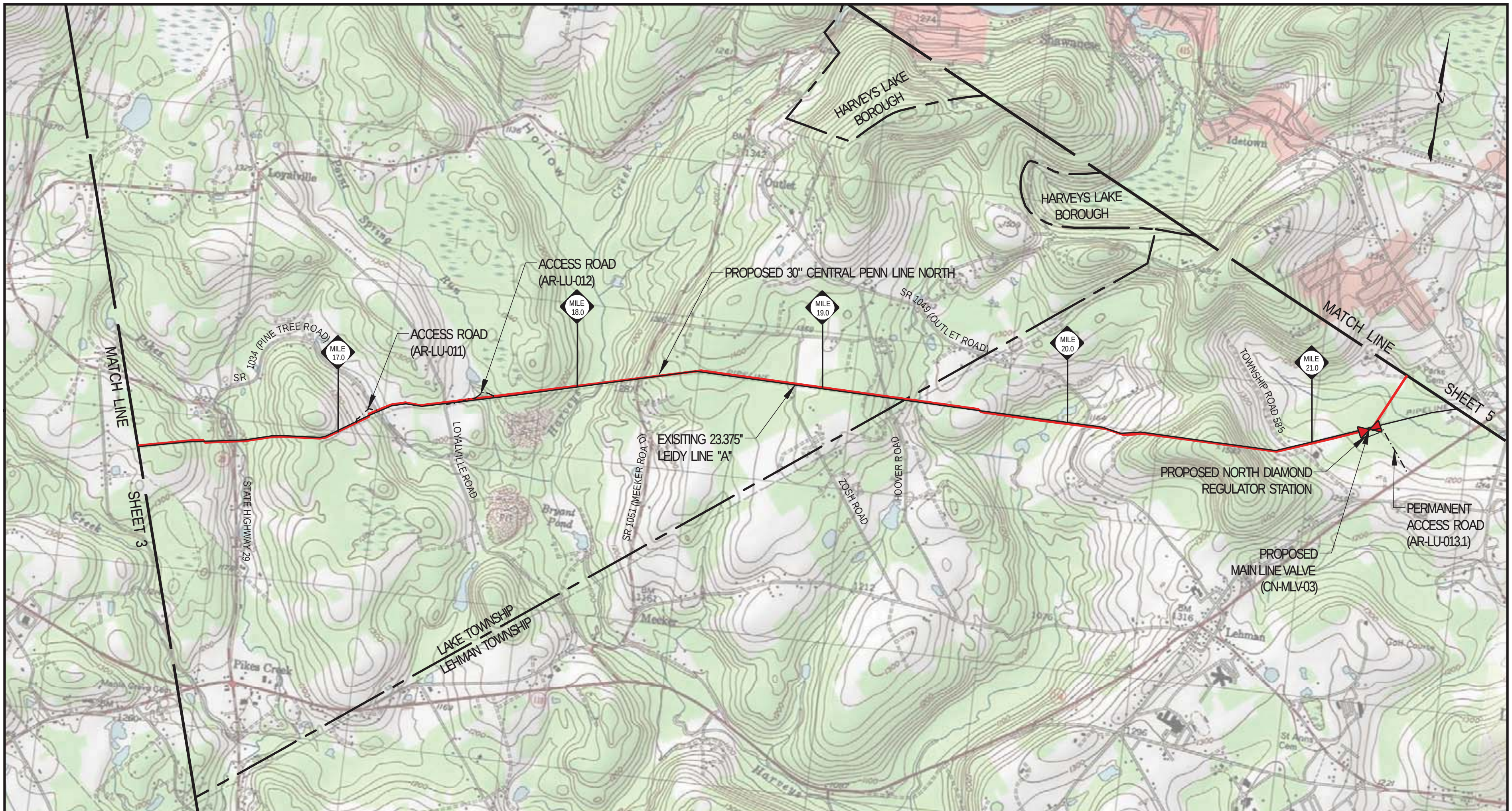
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line North



LEGEND

- PROPOSED 30" CENTRAL PENN LINE NORTH
- PROPOSED 42" CENTRAL PENN LINE SOUTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/PIPE YARD

DRG 7.5 MIN. QUAD MAP:
41076-C1 (HARVYES LAKE, PA)

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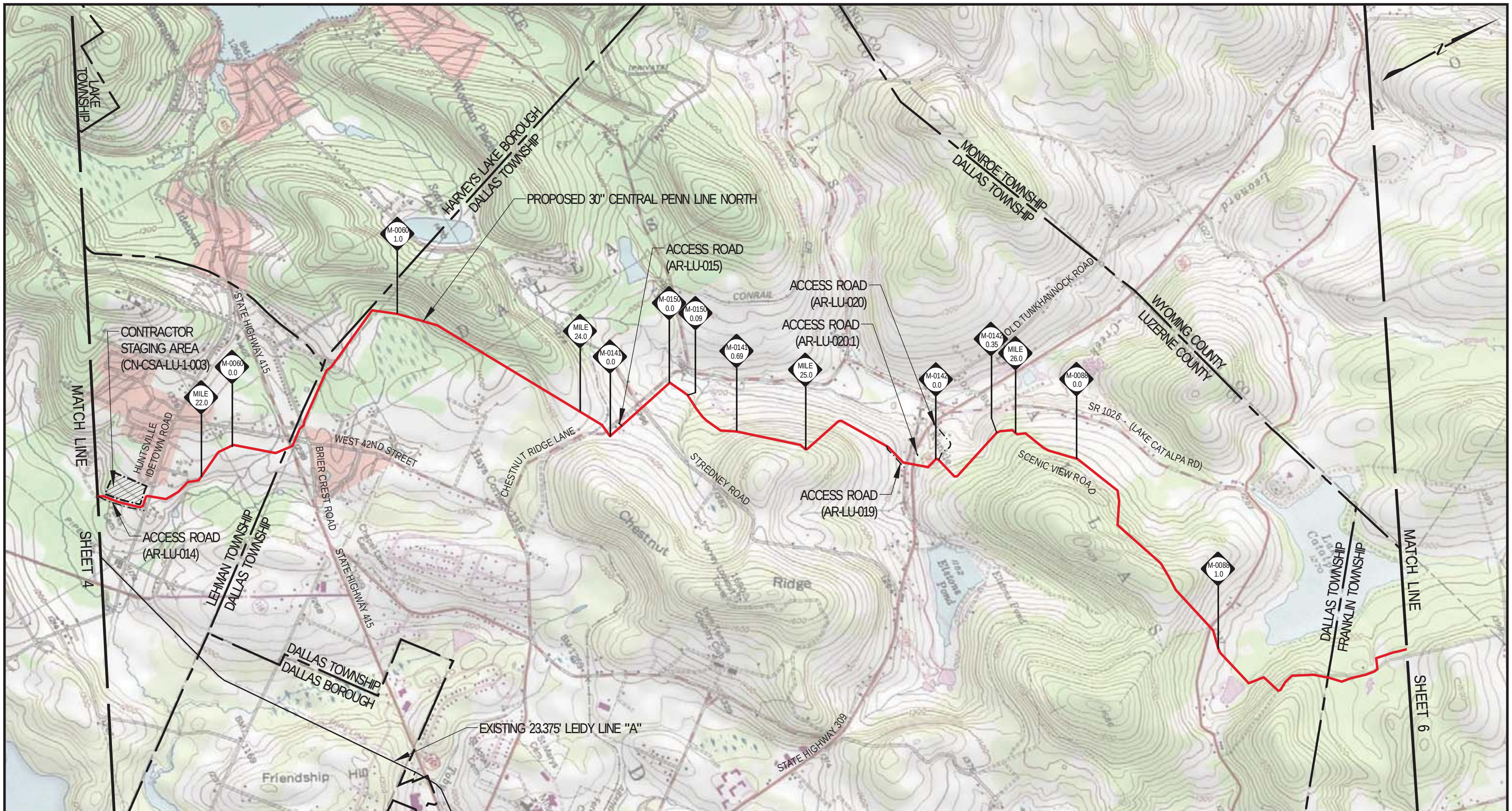
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line North



LEGEND

- PROPOSED 30" CENTRAL PENN LINE NORTH
- PROPOSED 42" CENTRAL PENN LINE SOUTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/PIPE YARD

DRG 7.5 MIN. QUAD MAP:
41076-C1 (HARVYES LAKE, PA)
41075-C8 (KINGSTON, PA)
41075-D8 (CENTER MORELAND, PA)

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SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line North

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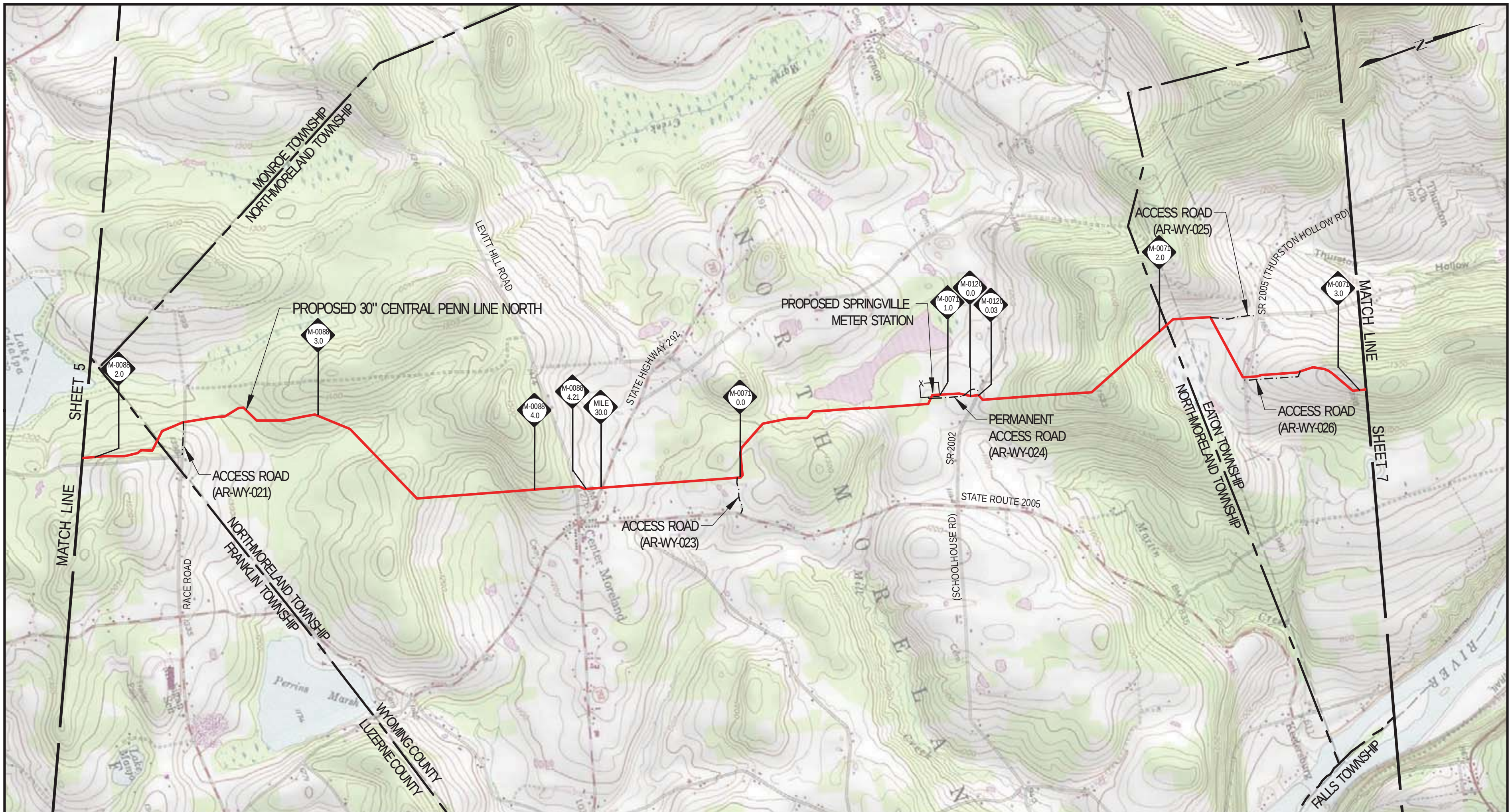

LEGEND

- PROPOSED 30" CENTRAL PENN LINE NORTH
- PROPOSED 42" CENTRAL PENN LINE SOUTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/PIPE YARD

DRG 7.5 MIN. QUAD MAP:
41075-D8 (CENTER MORELAND, PA)

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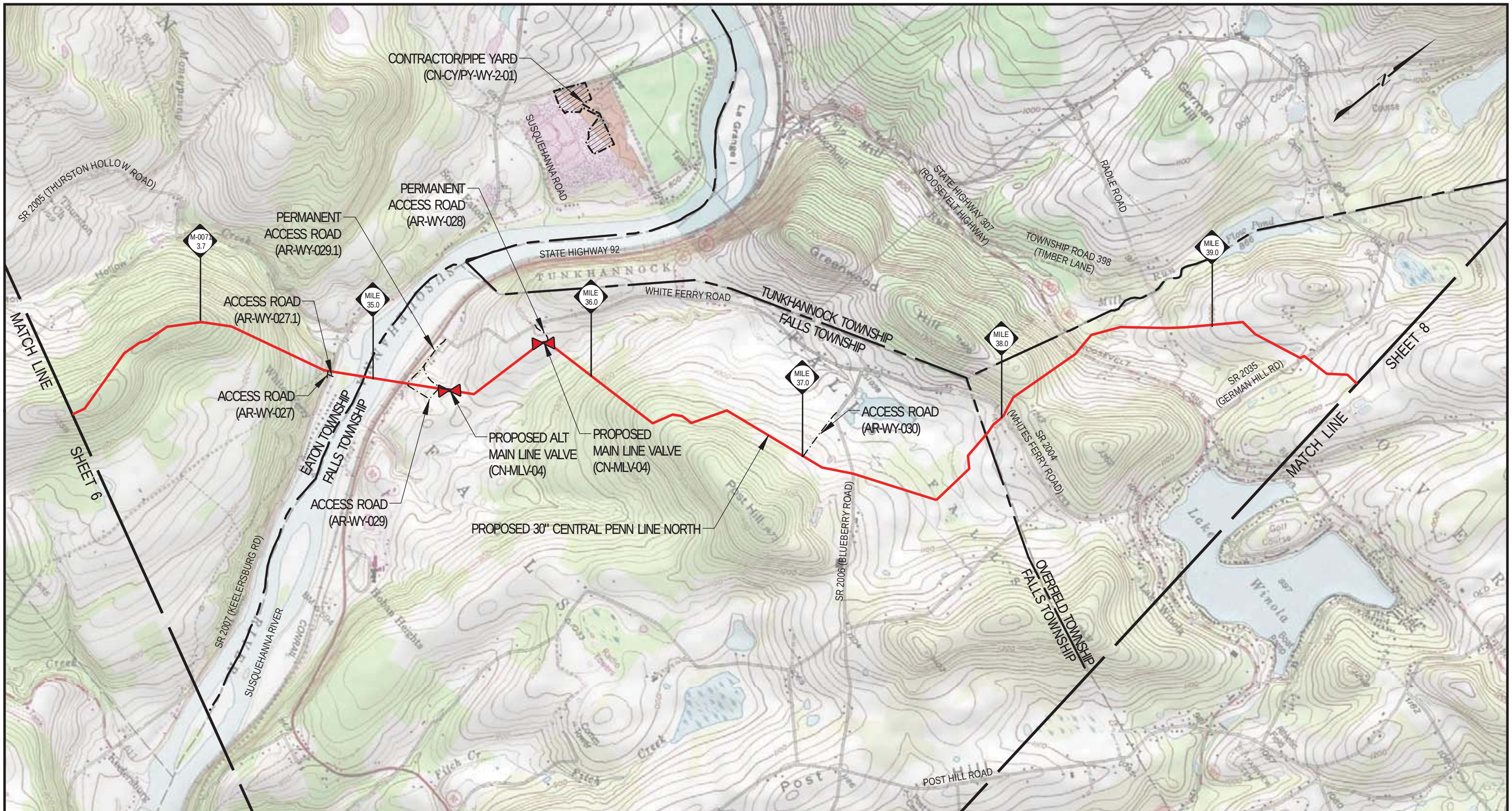
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line North



B-11

LEGEND

- PROPOSED 30" CENTRAL PENN LINE NORTH
- PROPOSED 42" CENTRAL PENN LINE SOUTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA CONTRACTOR YARD/PIPE YARD

DRG 7.5 MIN. QUAD MAP:
41075-D8 (CENTER MORELAND, PA)
41075-D7 (RANSOM, PA)
41075-E7 (FACTORYVILLE, PA)

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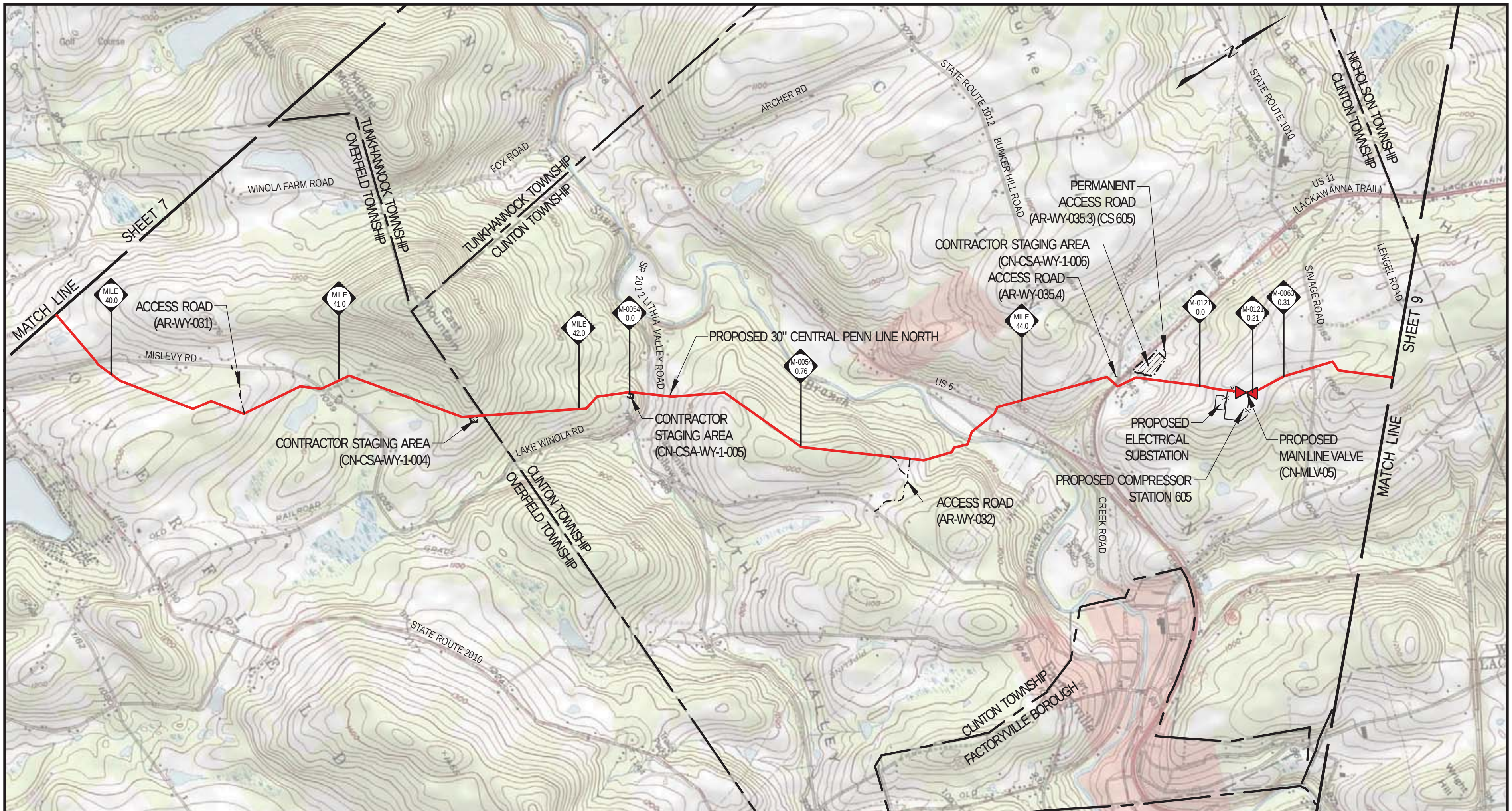
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line North



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- PROPOSED 42" CENTRAL PENN LINE SOUTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/PIPE YARD

DRG 7.5 MIN. QUAD MAP:
41075-E7 (FACTORYVILLE, PA)

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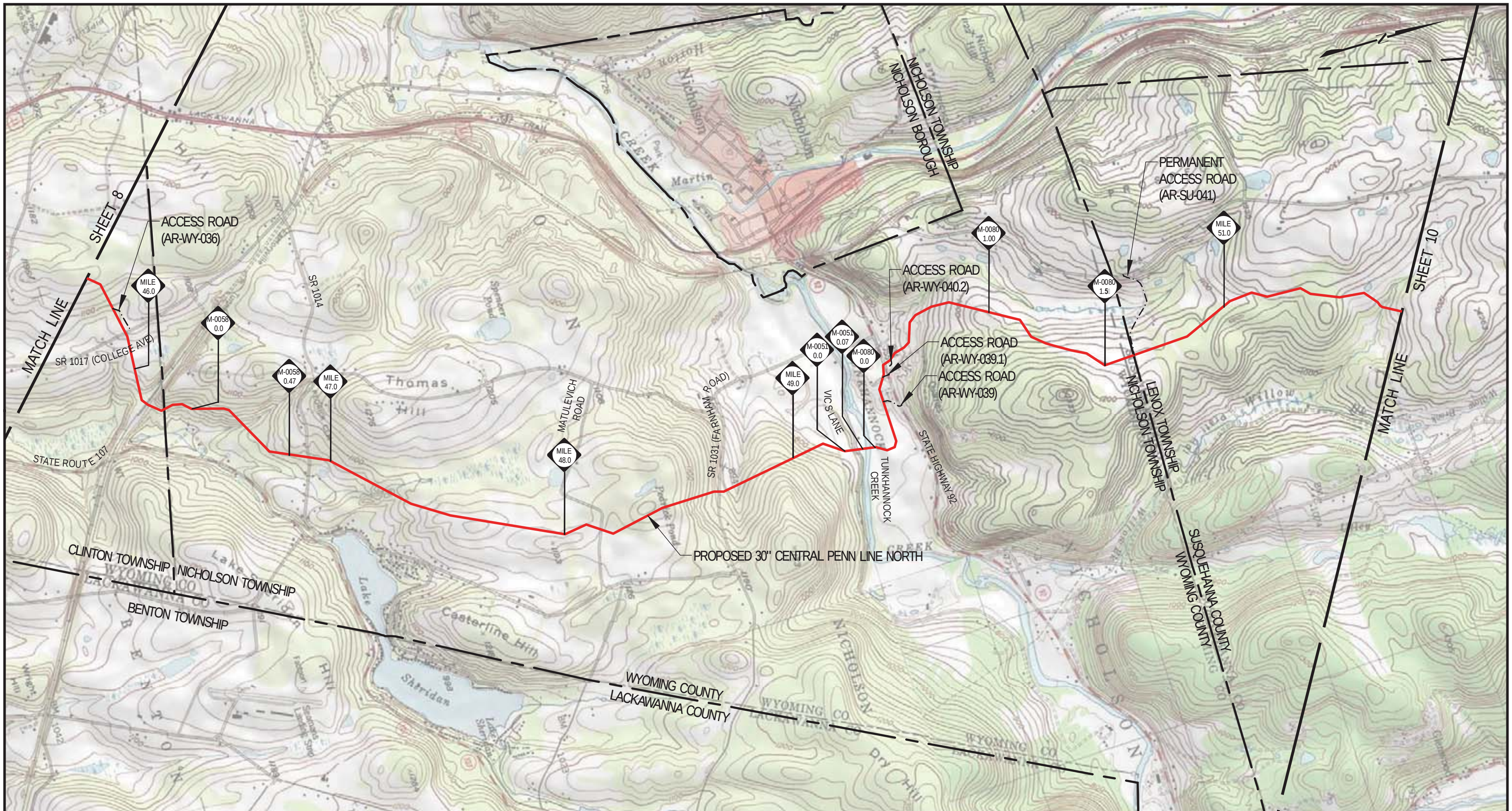
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line North



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- PROPOSED 42" CENTRAL PENN LINE SOUTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
  CONTRACTOR YARD/PIPE YARD

DRG 7.5 MIN. QUAD MAP:
41075-E7 (FACTORYVILLE, PA)
41075-F7 (HOP BOTTOM, PA)

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SCALE IN FEET

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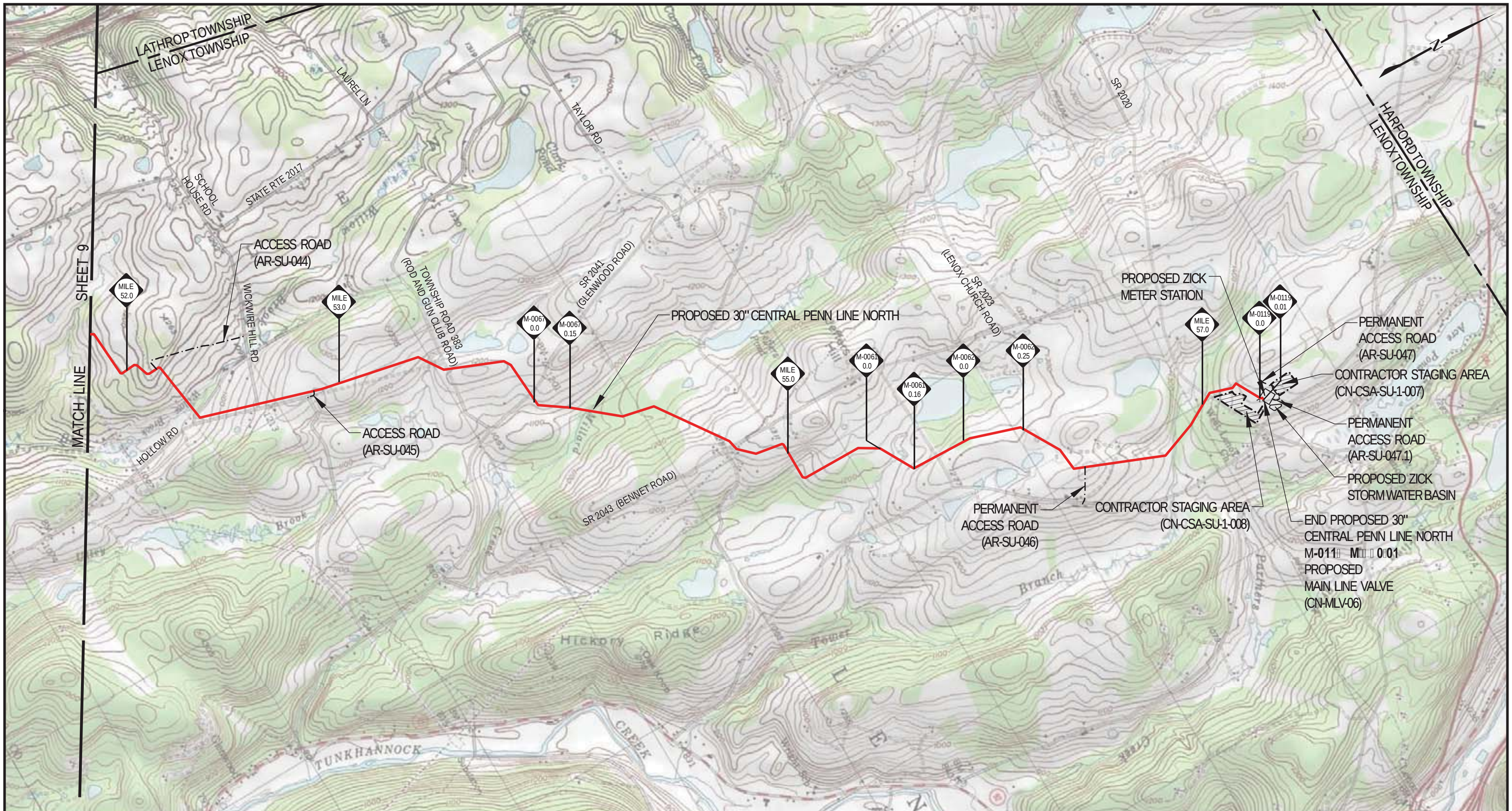
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line North



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- PROPOSED 42" CENTRAL PENN LINE SOUTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/PIPE YARD

DRG 7.5 MIN. QUAD MAP:
41075-F6 (LENOXVILLE, PA)

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SCALE IN FEET

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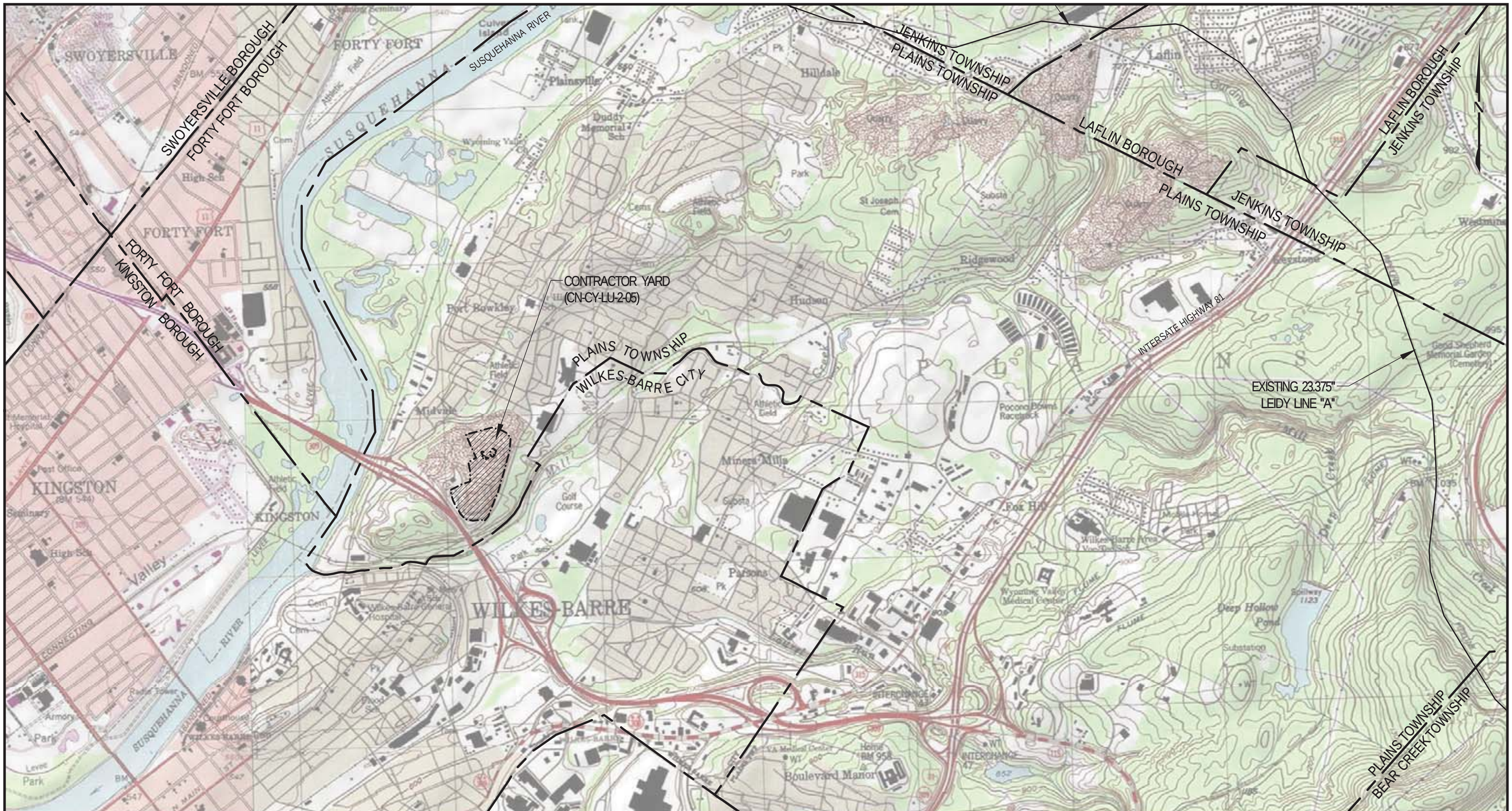
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line North



LEGEND

PROPOSED 30" CENTRAL PENN LINE NORTH
PROPOSED 42" CENTRAL PENN LINE SOUTH
EXISTING PIPELINE
FENCE LINE
ACCESS ROADS
COUNTY/TOWNSHIP BOUNDARY
CONTRACTOR STAGING AREA
CONTRACTOR YARD/PIPE YARD

DRG 7.5 MIN. QUAD MAP:
41075-B8 (WILKES-BARRE WEST, PA)

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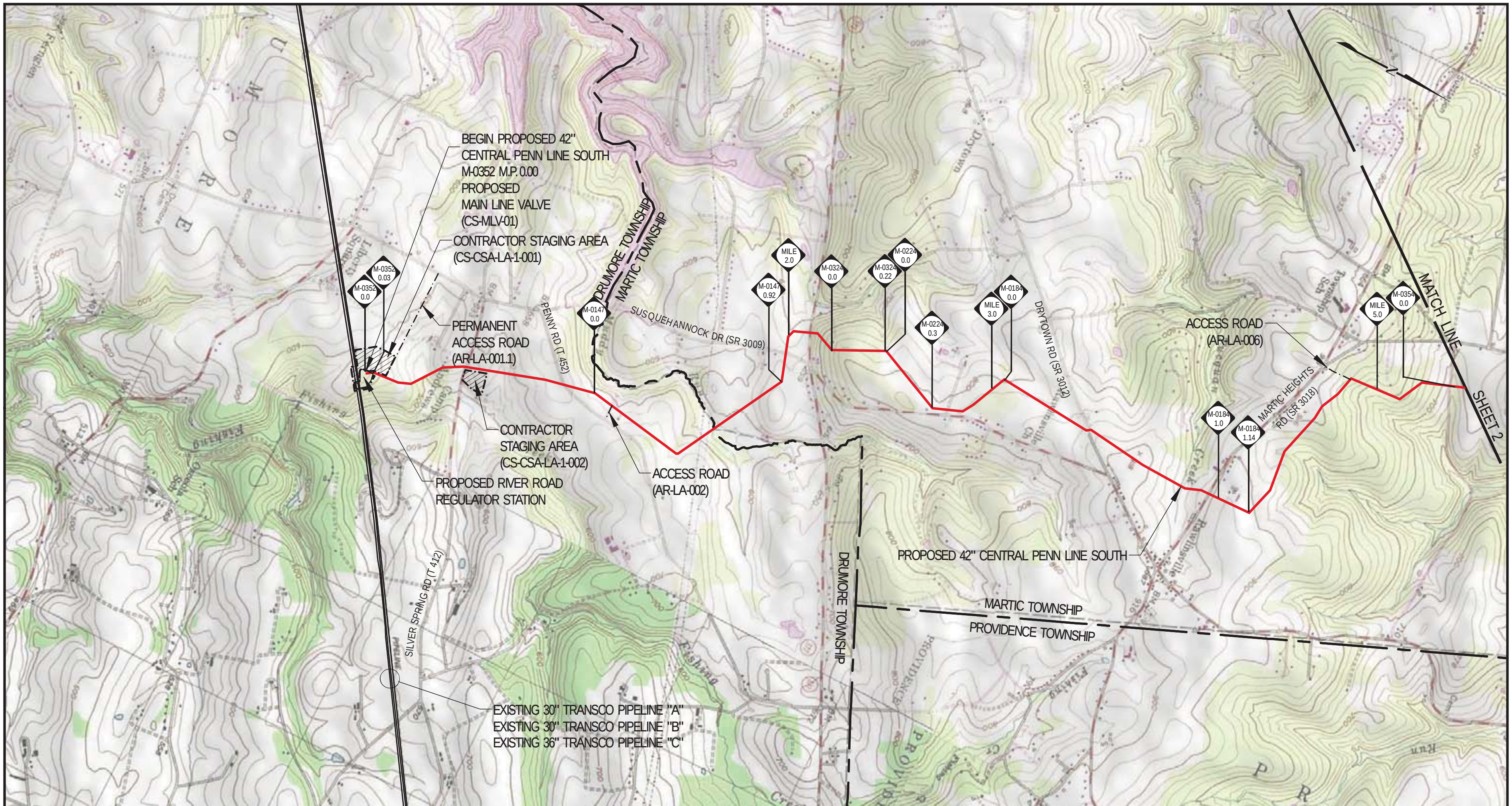
Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line North

Central Penn Line South



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- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
39076-G3 (HOLTWOOD, PA)
39076-H3 (CONESTOGA, PA)

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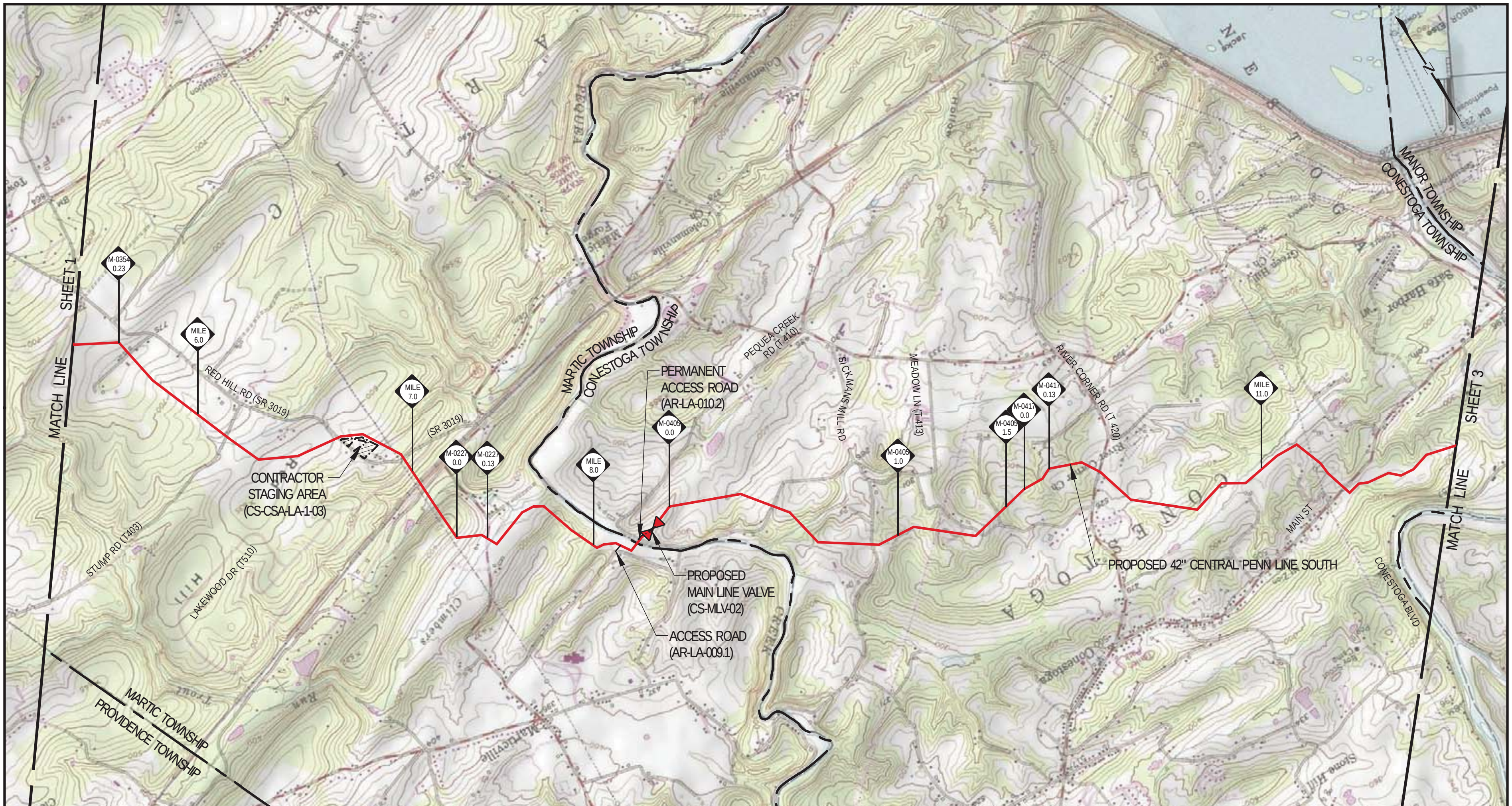
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



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- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
39076-H3 (CONESTOGA, PA)
39076-H4 (SAFE HARBOR, PA)

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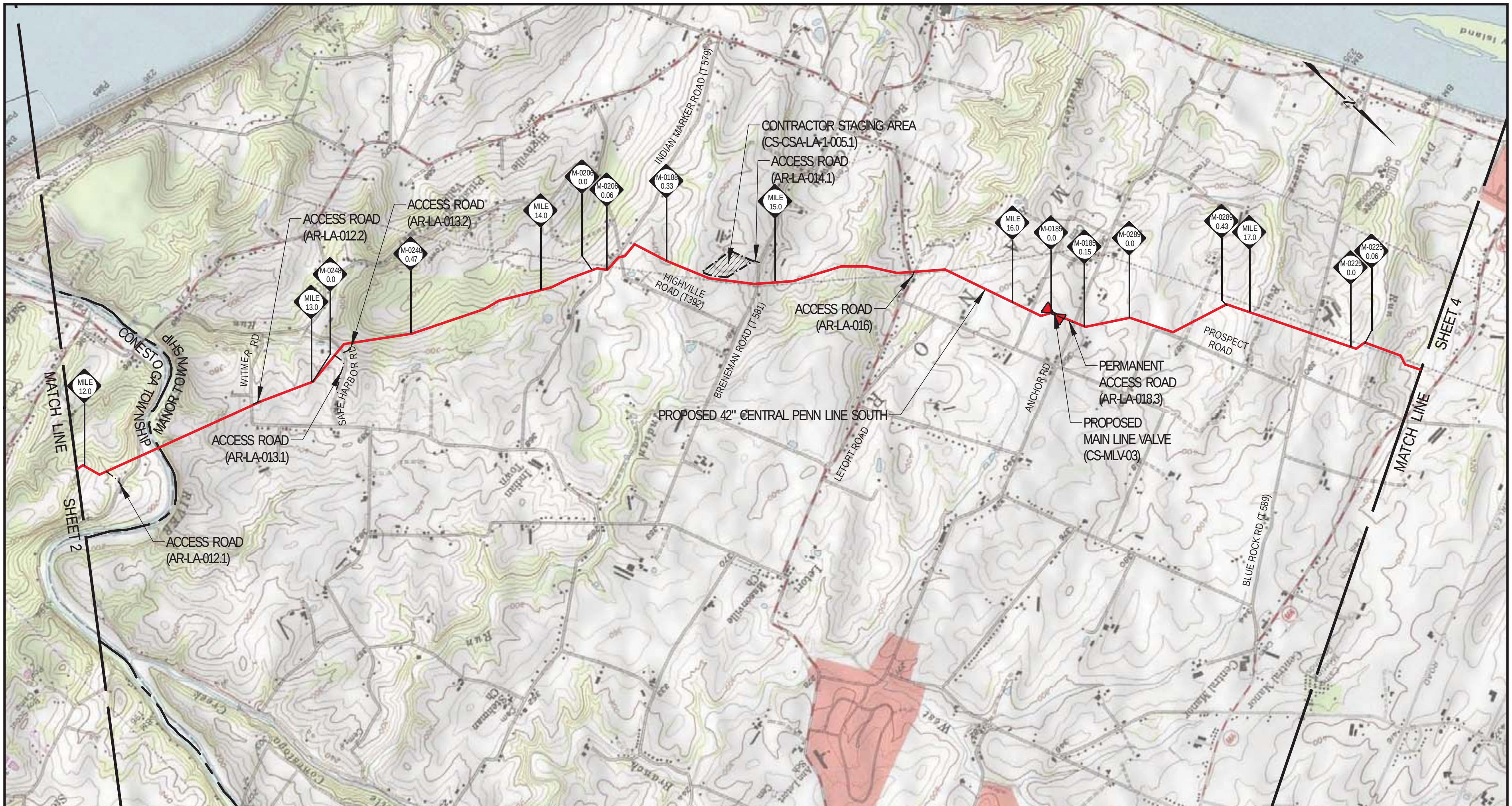
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



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- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
39076-H4 (SAFE HARBOR, PA)
40076-A4 (COLUMBIA EAST, PA)

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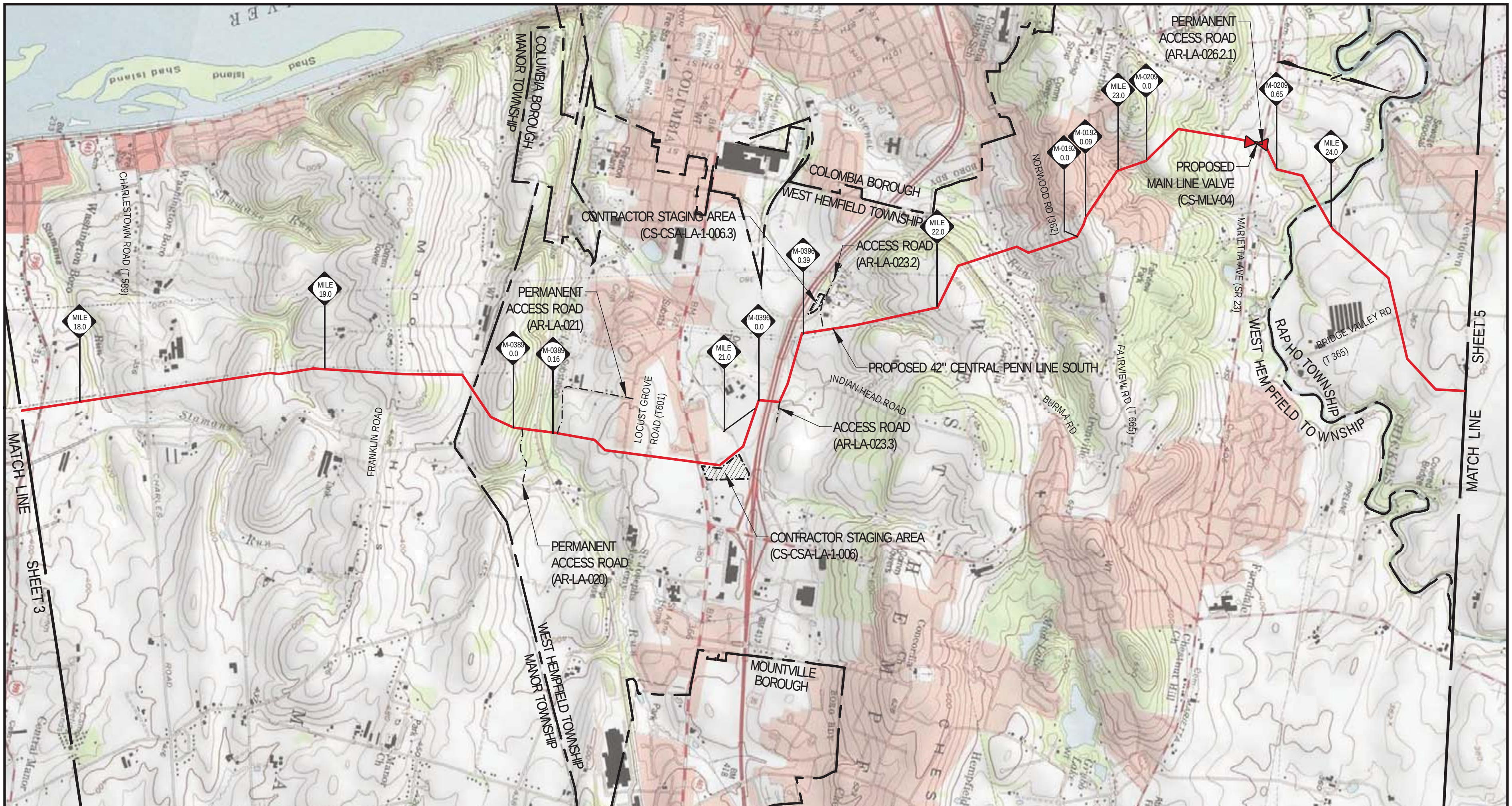
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



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- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
40076-A4 (COLUMBIA EAST, PA)

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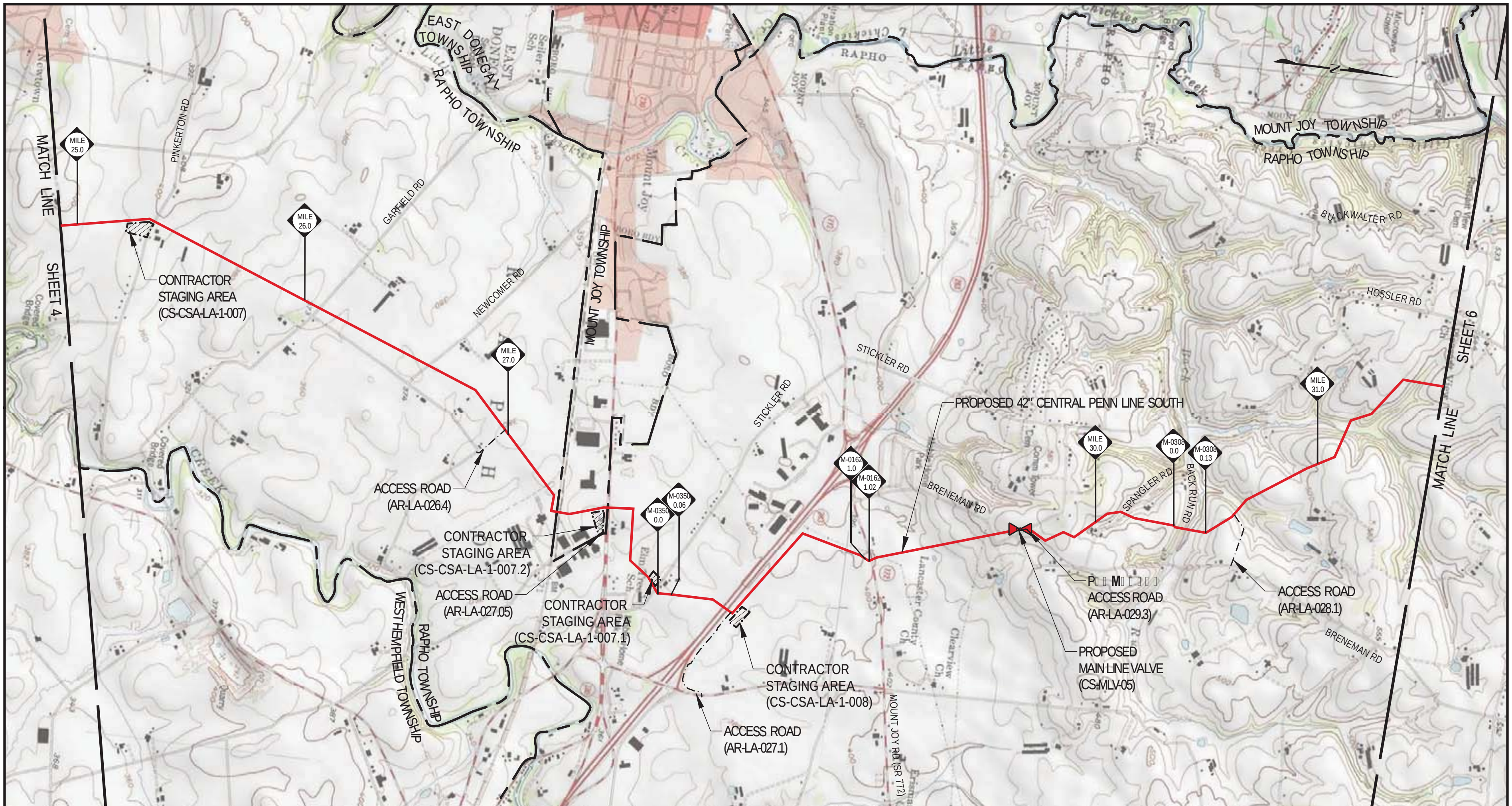
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



LEGEND

- PROPOSED 42" CENTRAL PENN LINE SOUTH
- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
40076-A4 (COLUMBIA EAST, PA)
40076-B4 (MANHEIM, PA)

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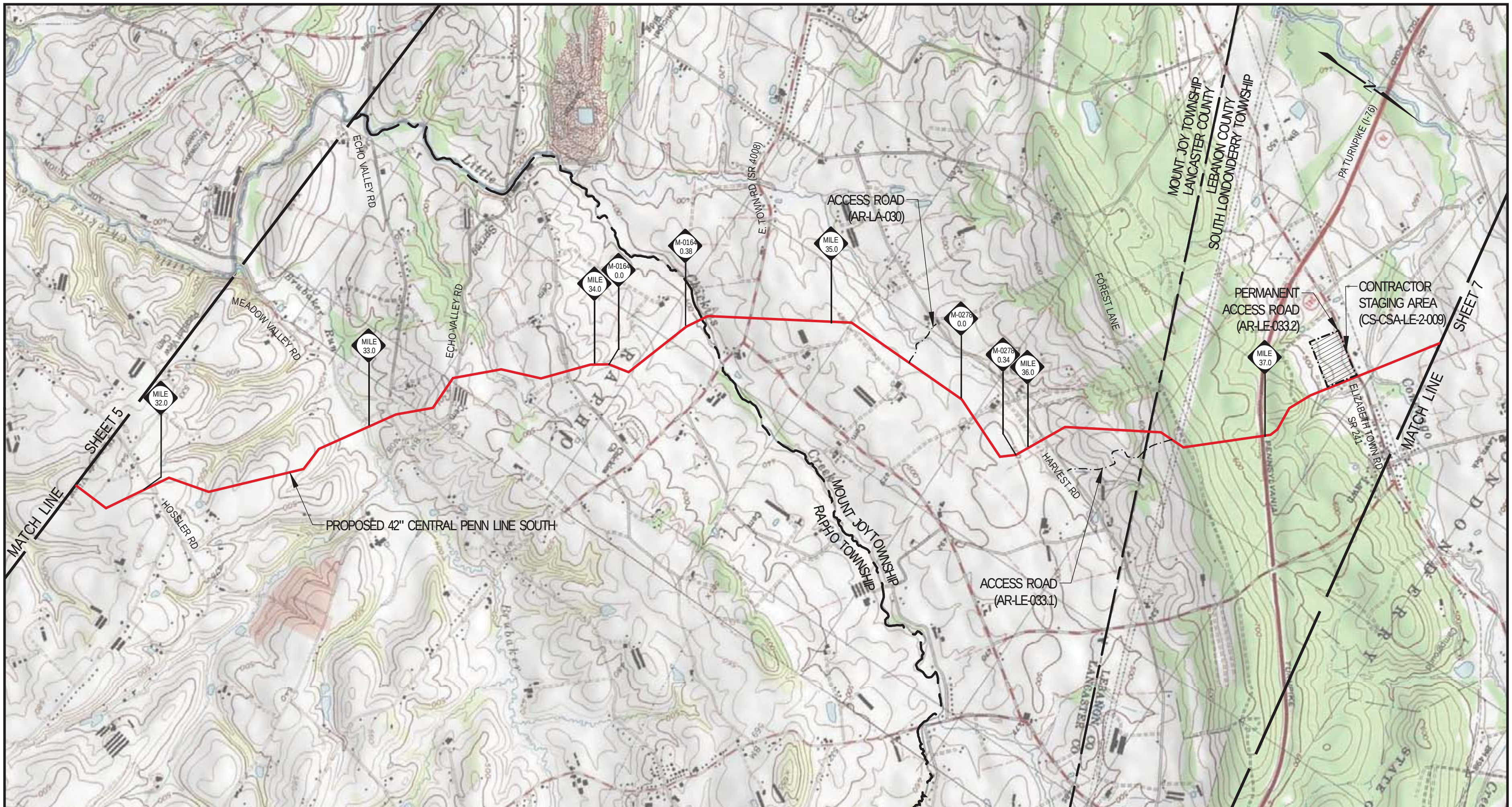
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



LEGEND

- PROPOSED 42" CENTRAL PENN LINE SOUTH
- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
40076-B4 (MANHEIM, PA)
40076-B5 (ELIZABETHTOWN, PA)

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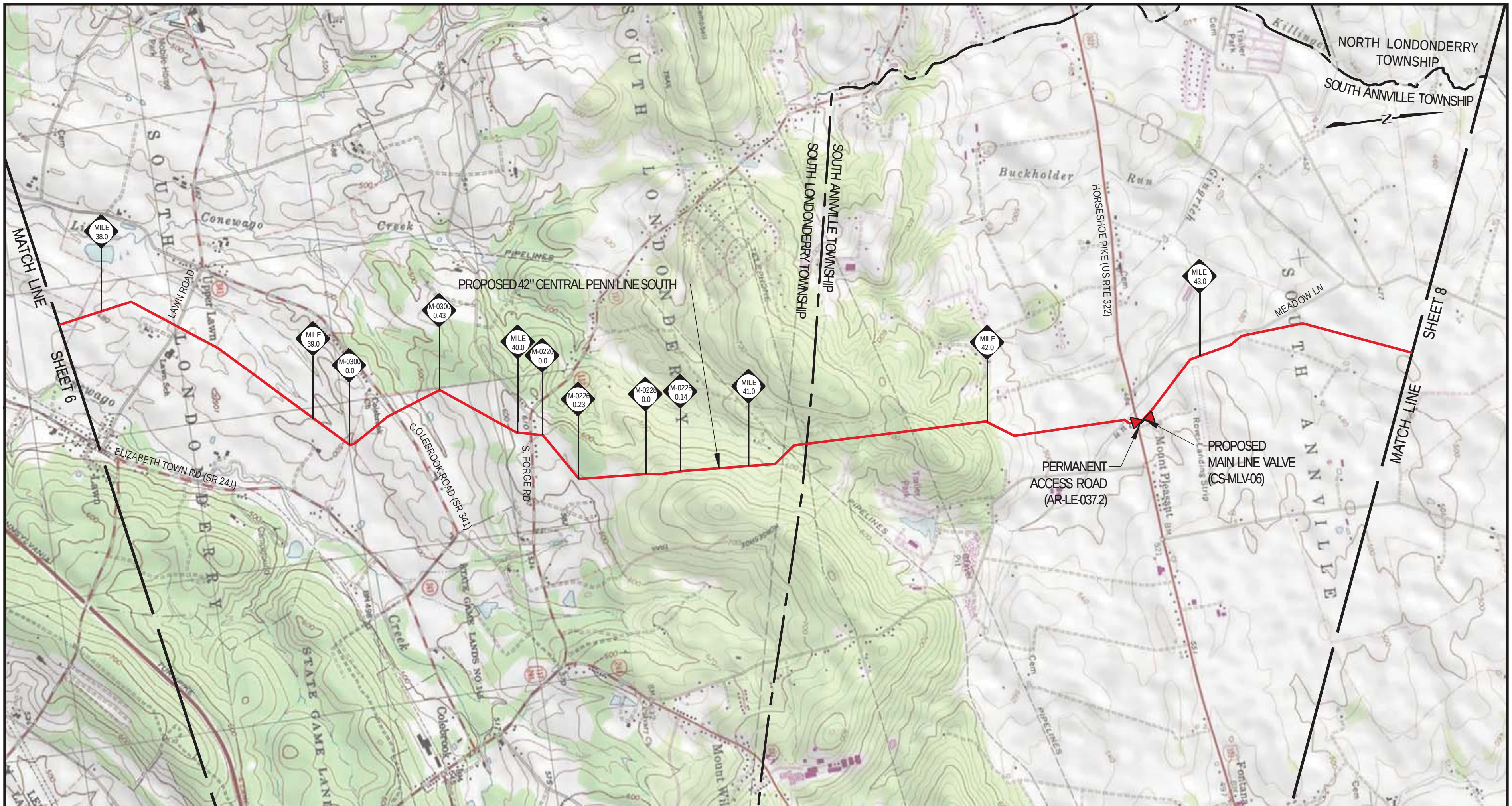
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



LEGEND

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- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
40076-B5 (ELIZABETHTOWN, PA)
40076-C5 (PALMYRA, PA)

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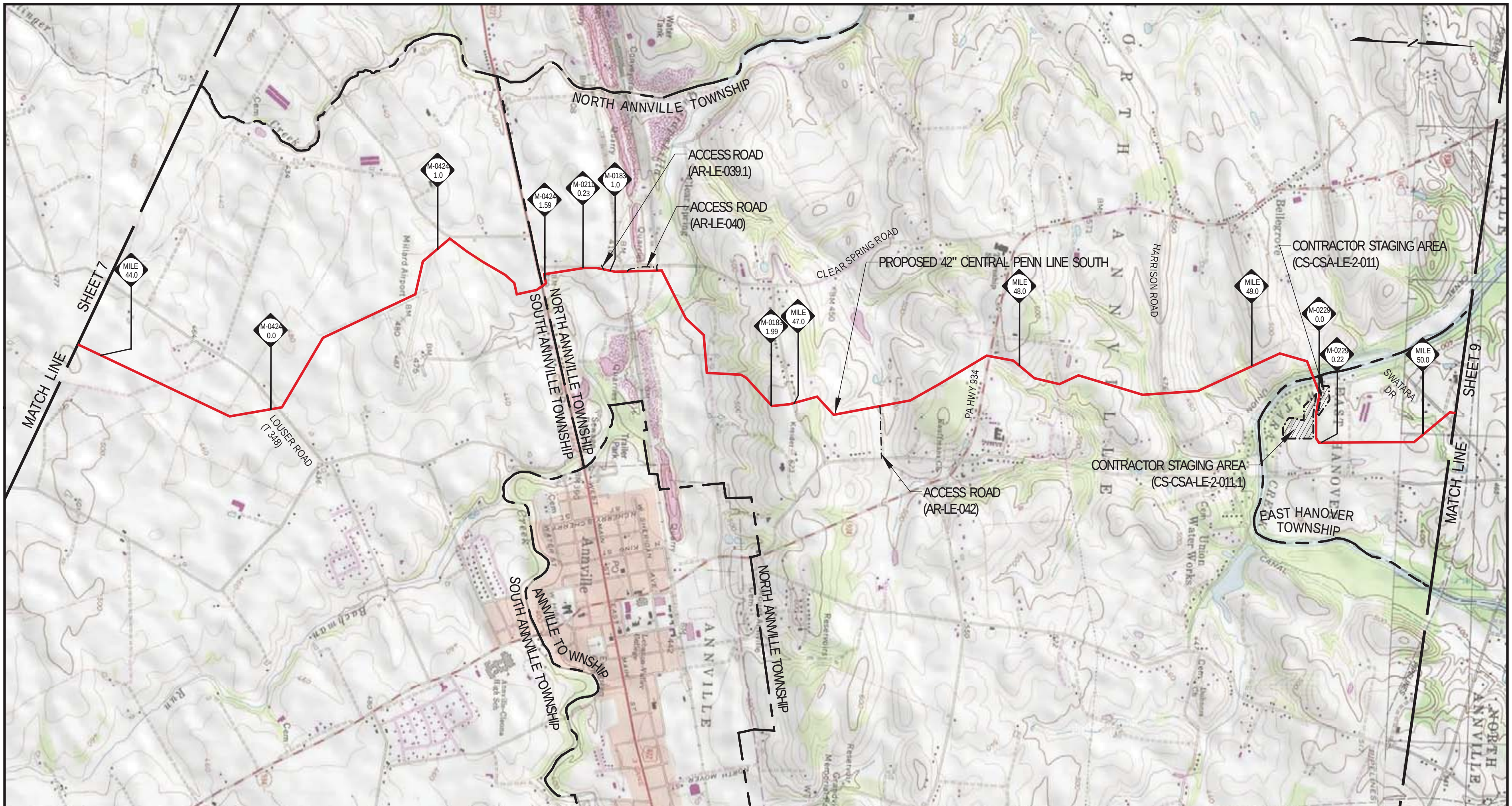
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



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- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
40076-C5 (PALMYRA, PA)
40076-D5 (INDIANTOWN, PA)

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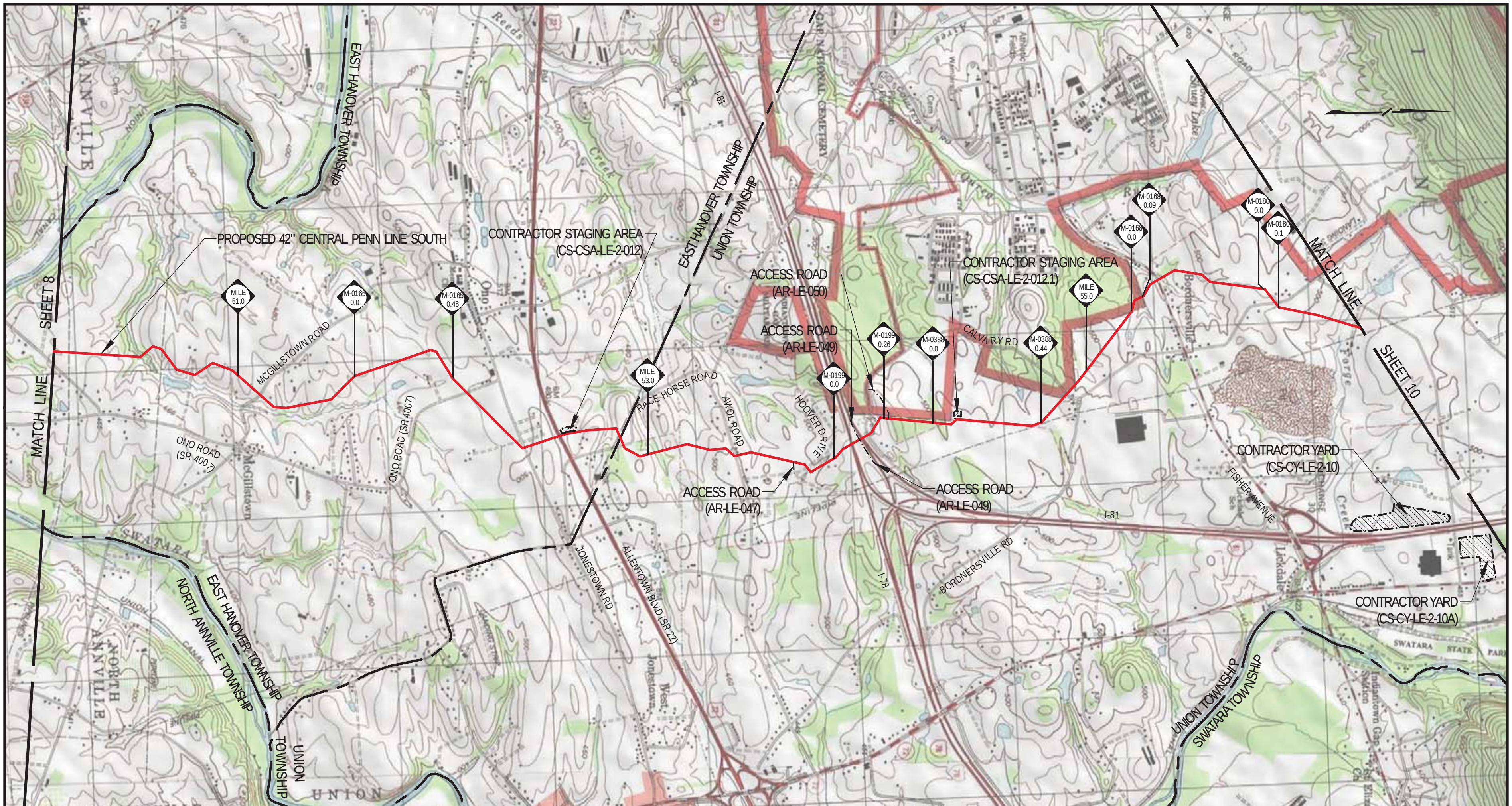
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South

B-27



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- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
40076-D5 (INDIANTOWN, PA)

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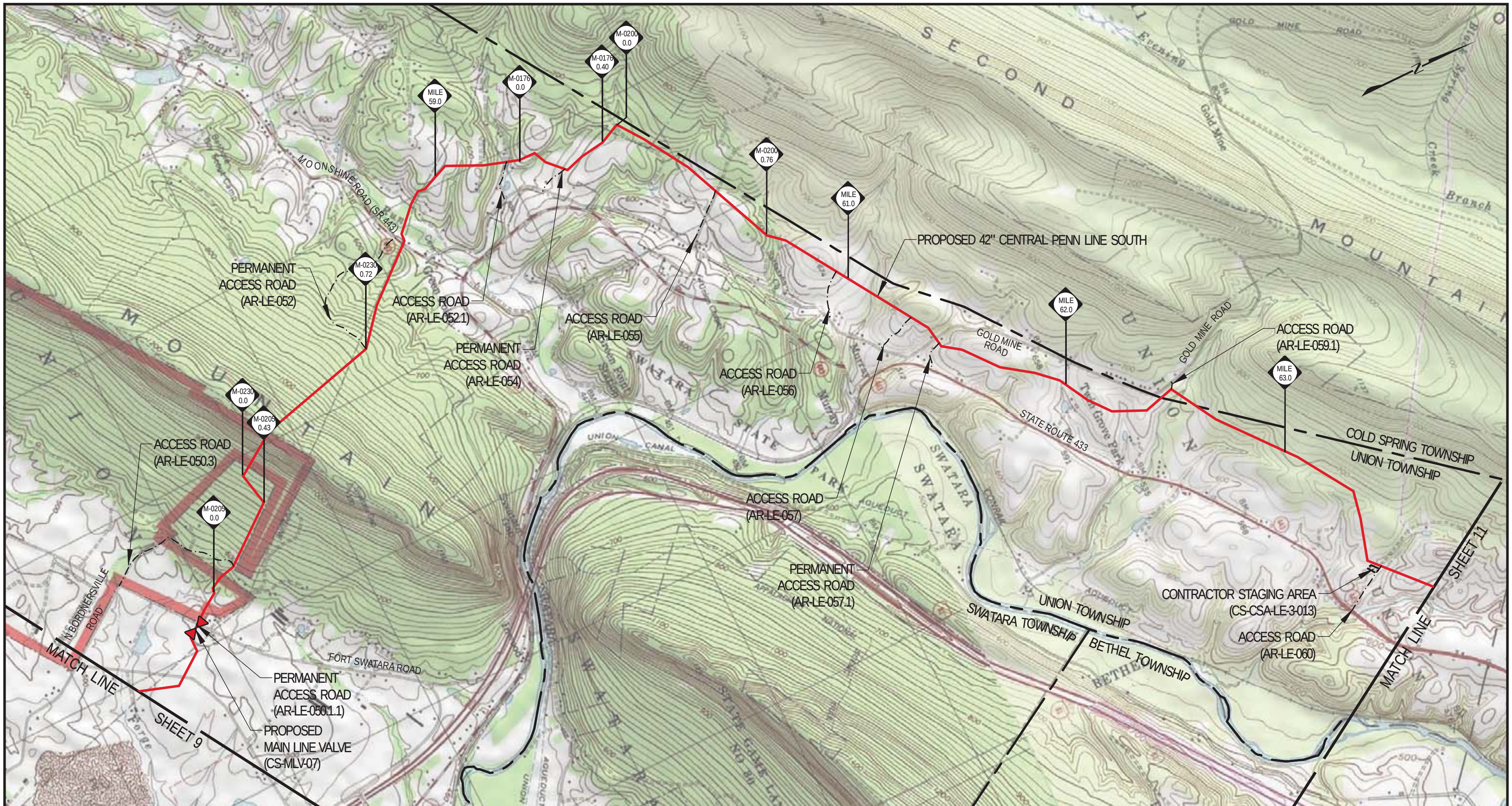
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



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- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
40076-D5 (INDIANTOWN, PA)
40076-E5 (TOWER CITY, PA)
40076-E4 (PINE GROVE, PA)

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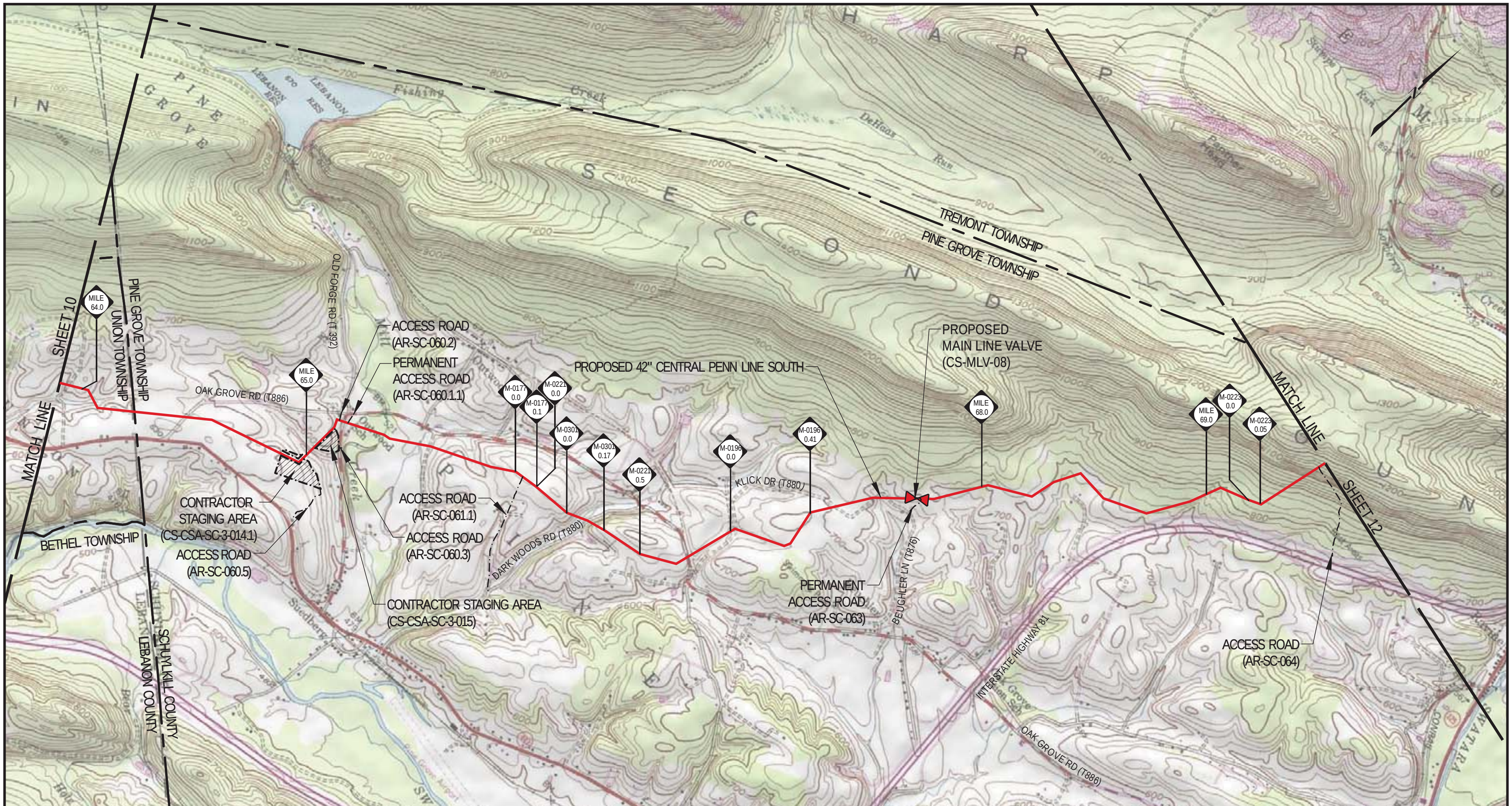
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



LEGEND

- PROPOSED 42" CENTRAL PENN LINE SOUTH
- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
40076-E4 (PINE GROVE, PA)

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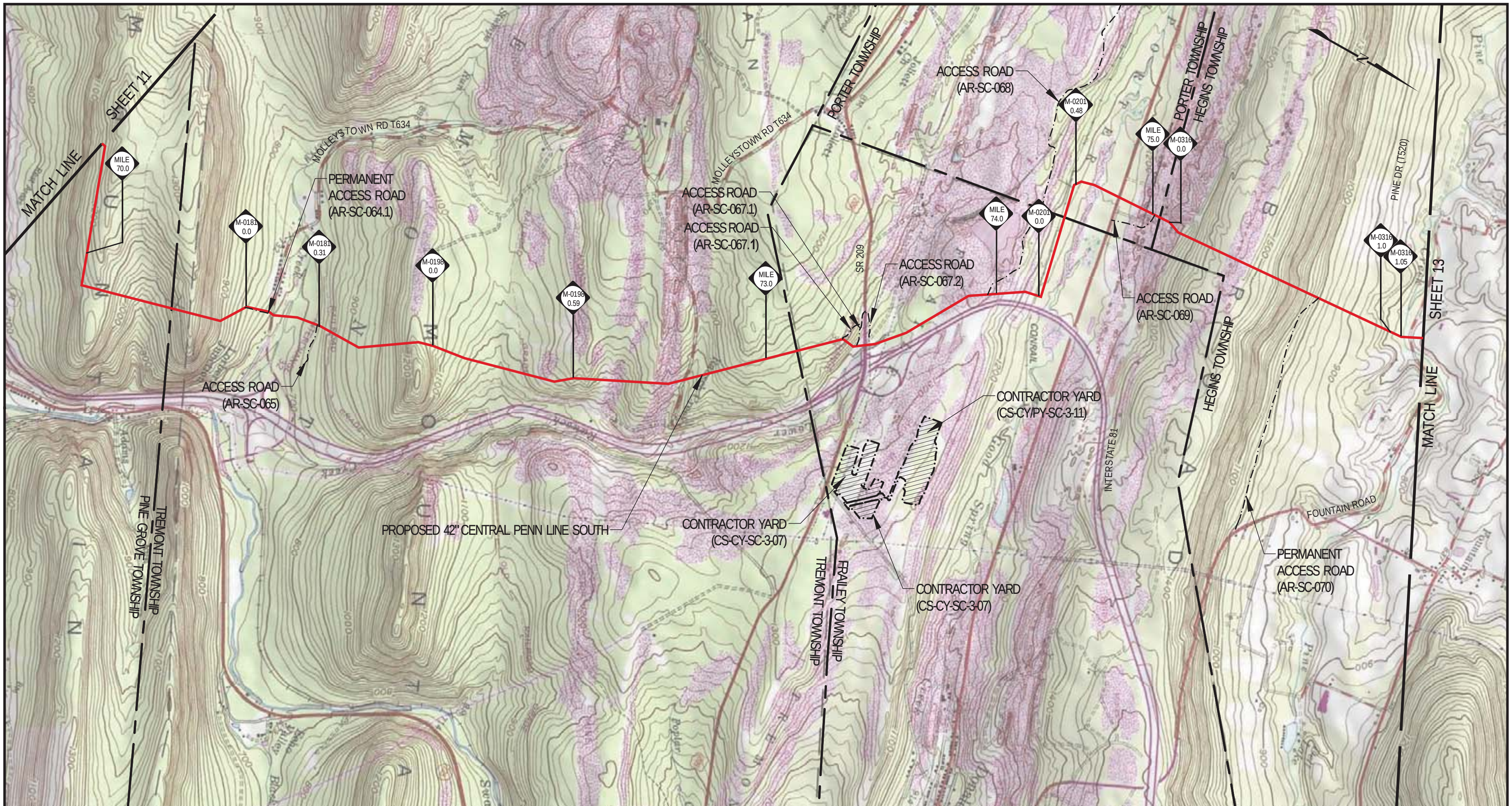
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



B-30

LEGEND

- PROPOSED 42" CENTRAL PENN LINE SOUTH
- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
40076-E4 (PINE GROVE, PA)
40076-F4 (TREMONT, PA)

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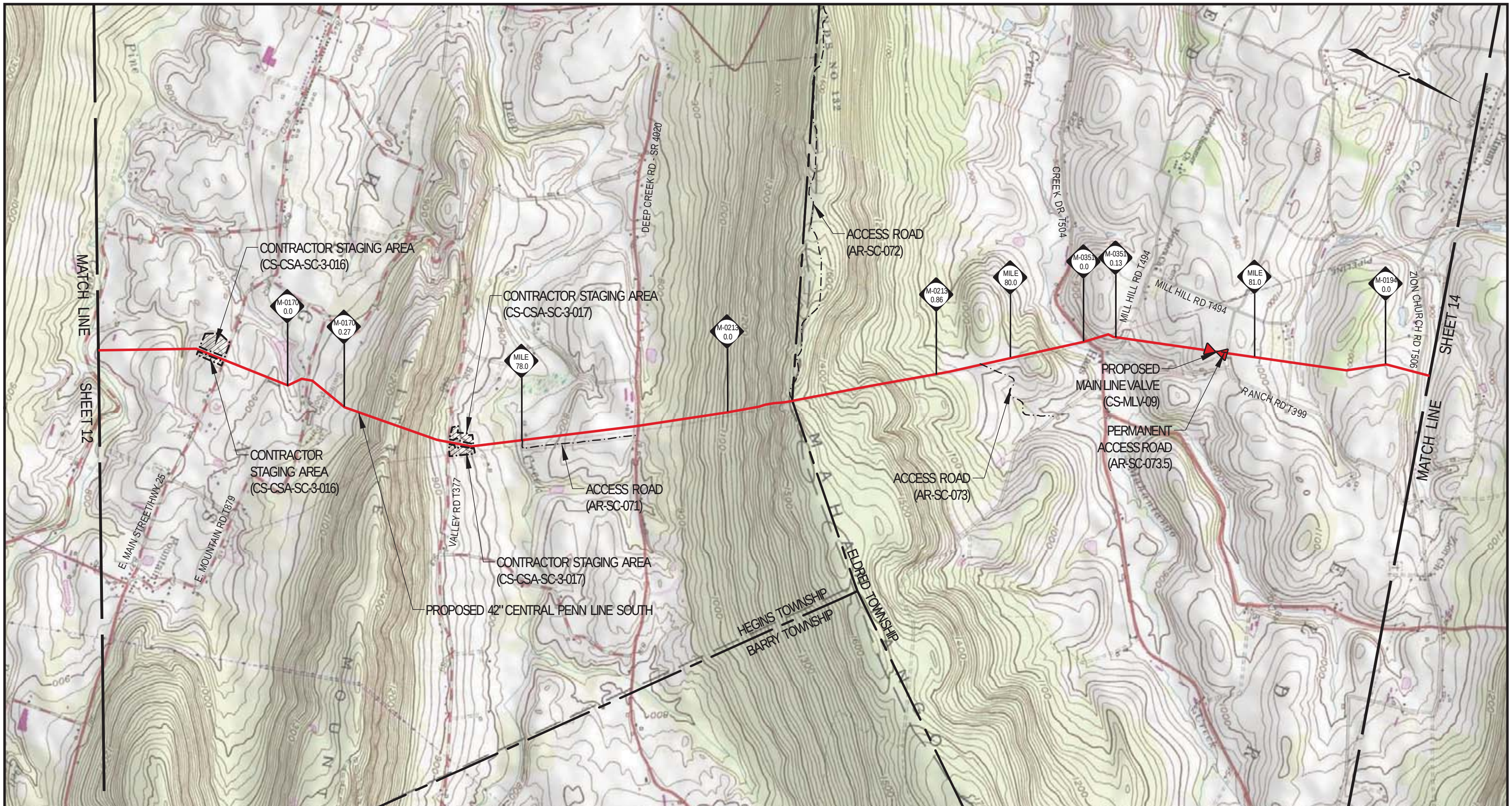
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



LEGEND
- PROPOSED 42" CENTRAL PENN LINE SOUTH
- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
40076-F4 (TREMONT, PA)
40076-F5 (VALLEY VIEW, PA)

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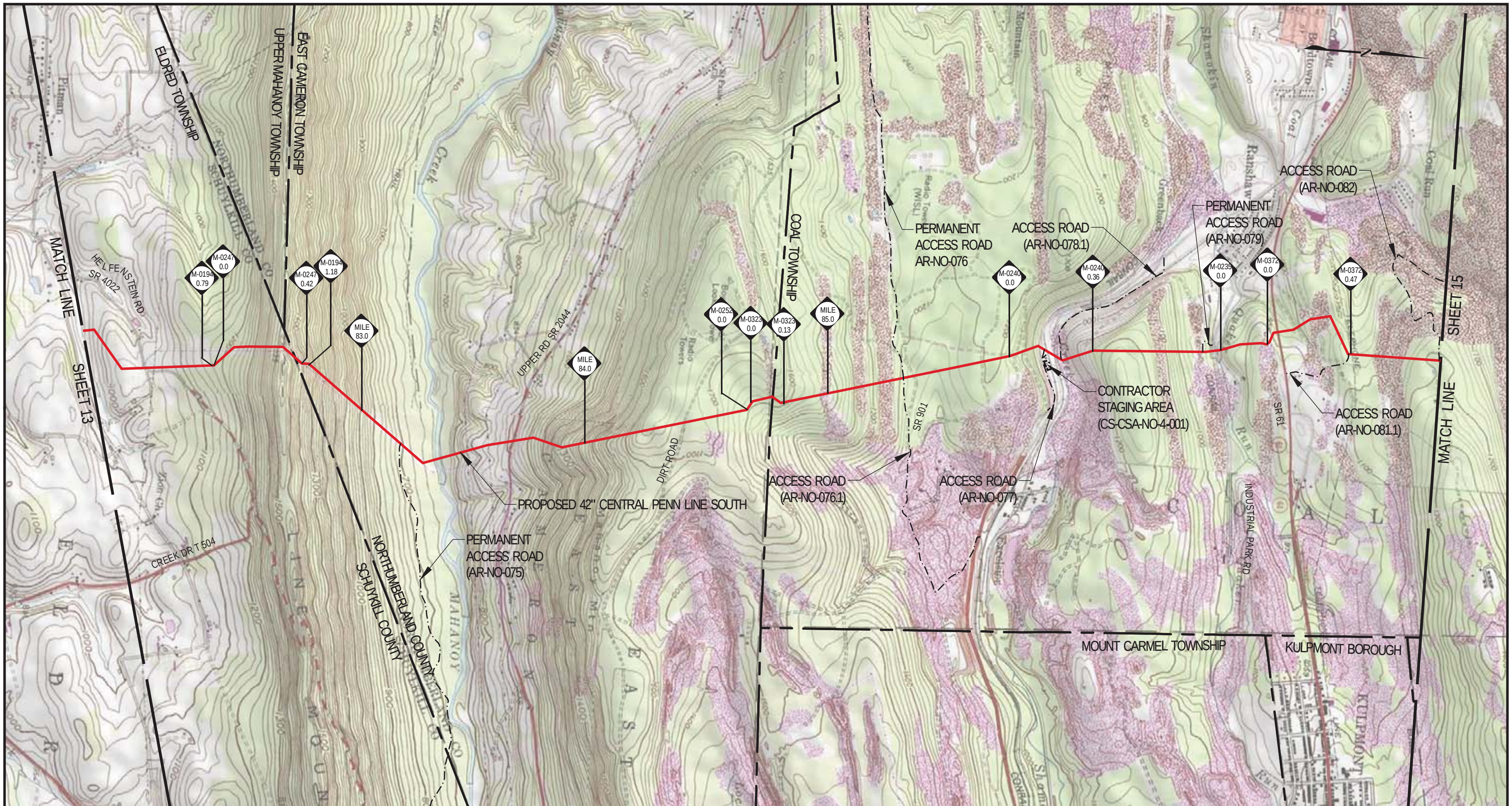
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



LEGEND

- PROPOSED 42" CENTRAL PENN LINE SOUTH
- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
40076-F5 (VALLEY VIEW, PA)
40076-F4 (TREMONT, PA)
40076-G4 (MOUNT CARMEL, PA)
40076-G5 (SHAMOKIN, PA)

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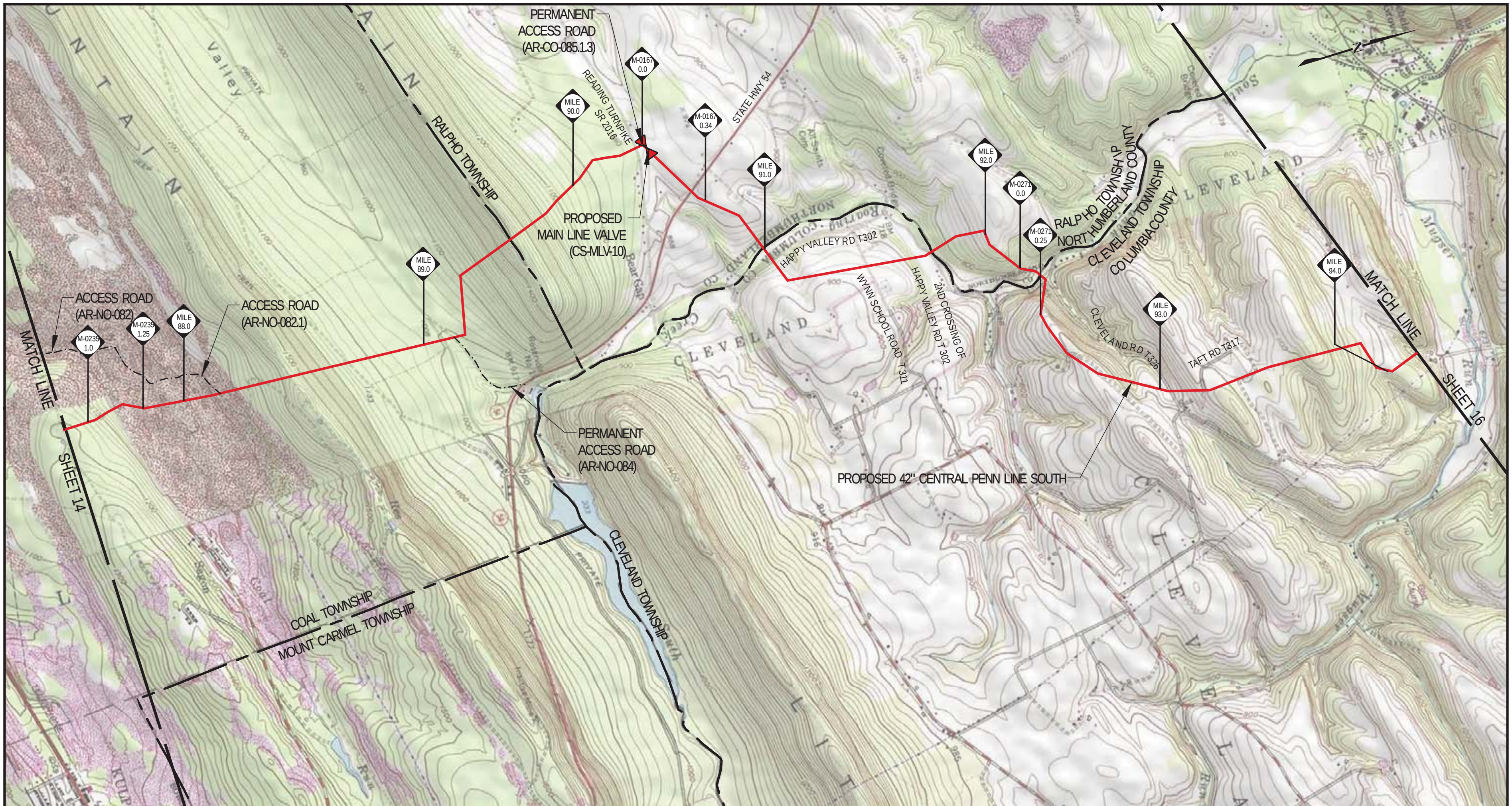
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



LEGEND

- PROPOSED 42" CENTRAL PENN LINE SOUTH
- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
40076-G5 (SHAMOKIN, PA)
40076-G4 (MOUNT CARMEL, PA)
40076-H4 (CATAWISSA, PA)

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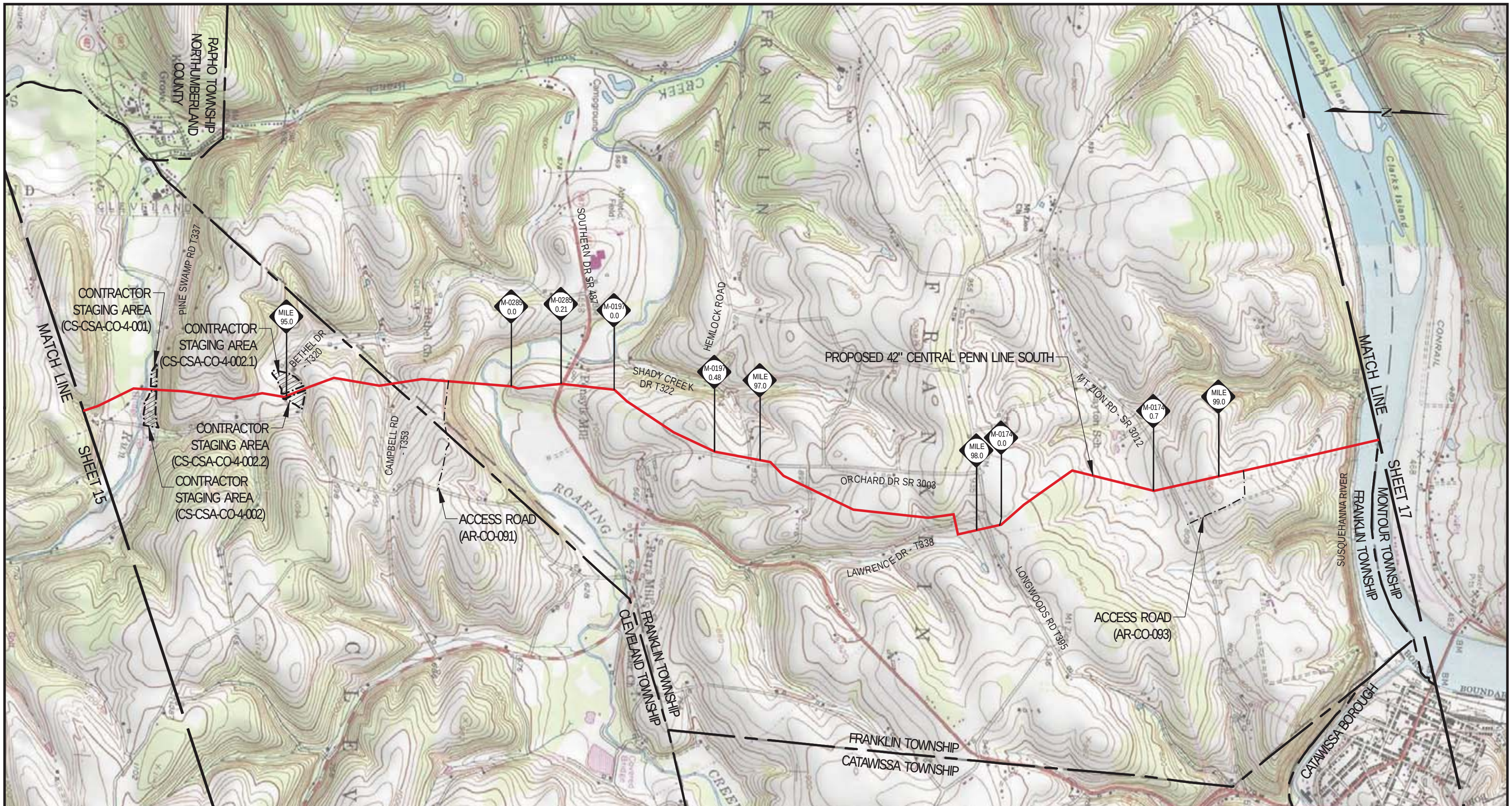
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



LEGEND

(red line)	PROPOSED 42" CENTRAL PENN LINE SOUTH
(green line)	PROPOSED 30" CENTRAL PENN LINE NORTH
(line)	EXISTING PIPELINE
—X—	FENCE LINE
(dash-dot line)	ACCESS ROADS
(dash-dot line)	PROPOSED EASEMENT
(dashed line)	COUNTY/TOWNSHIP BOUNDARY
(hatched box)	CONTRACTOR STAGING AREA CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
40076-H4 (CATAWISSA, PA)

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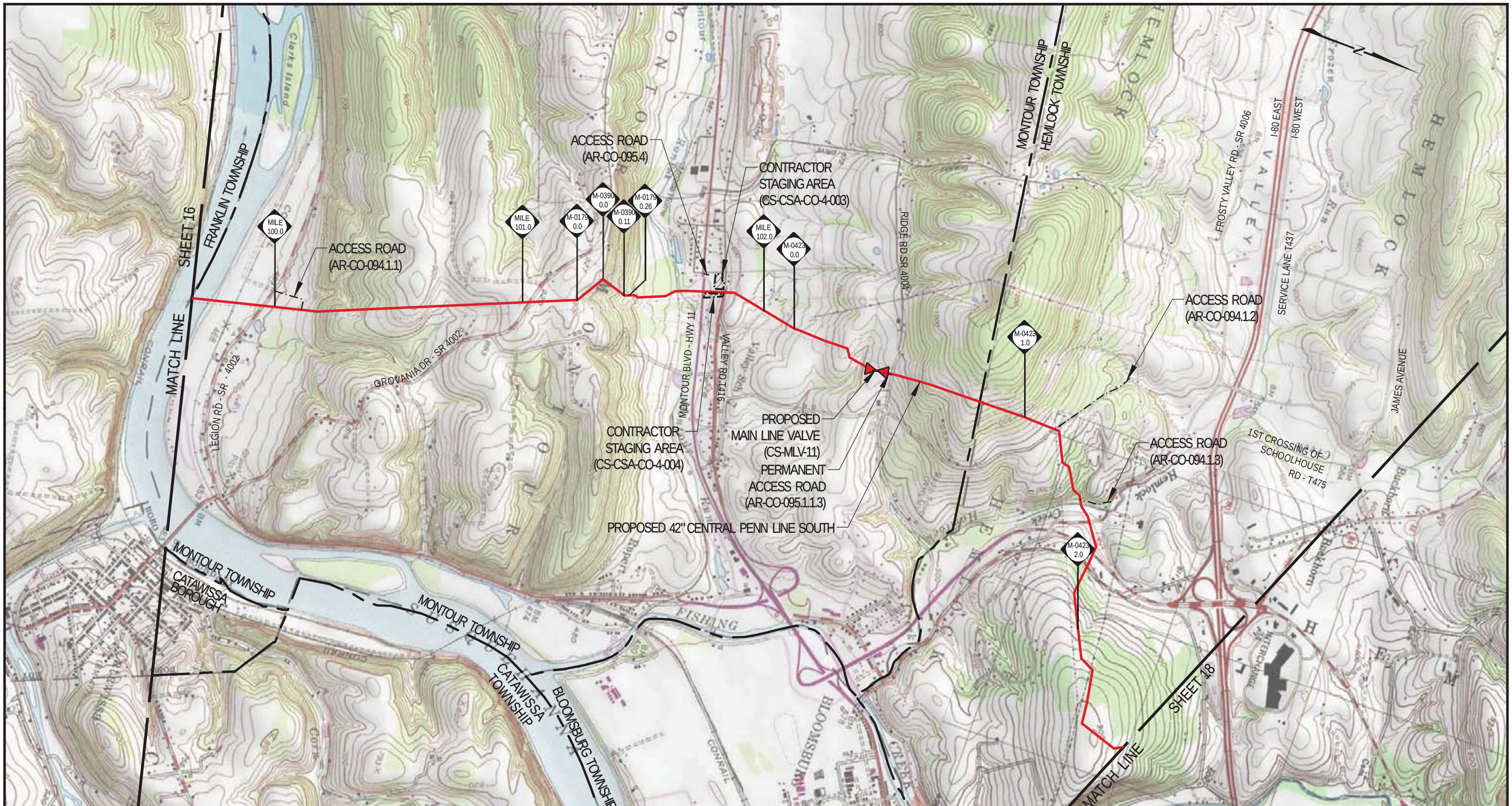
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



LEGEND

- PROPOSED 42" CENTRAL PENN LINE SOUTH
- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
40076-H4 (CATAWISSA, PA)
41076-A4 (BLOOMBURG, PA)
41076-A4 (MILLVILLE, PA)

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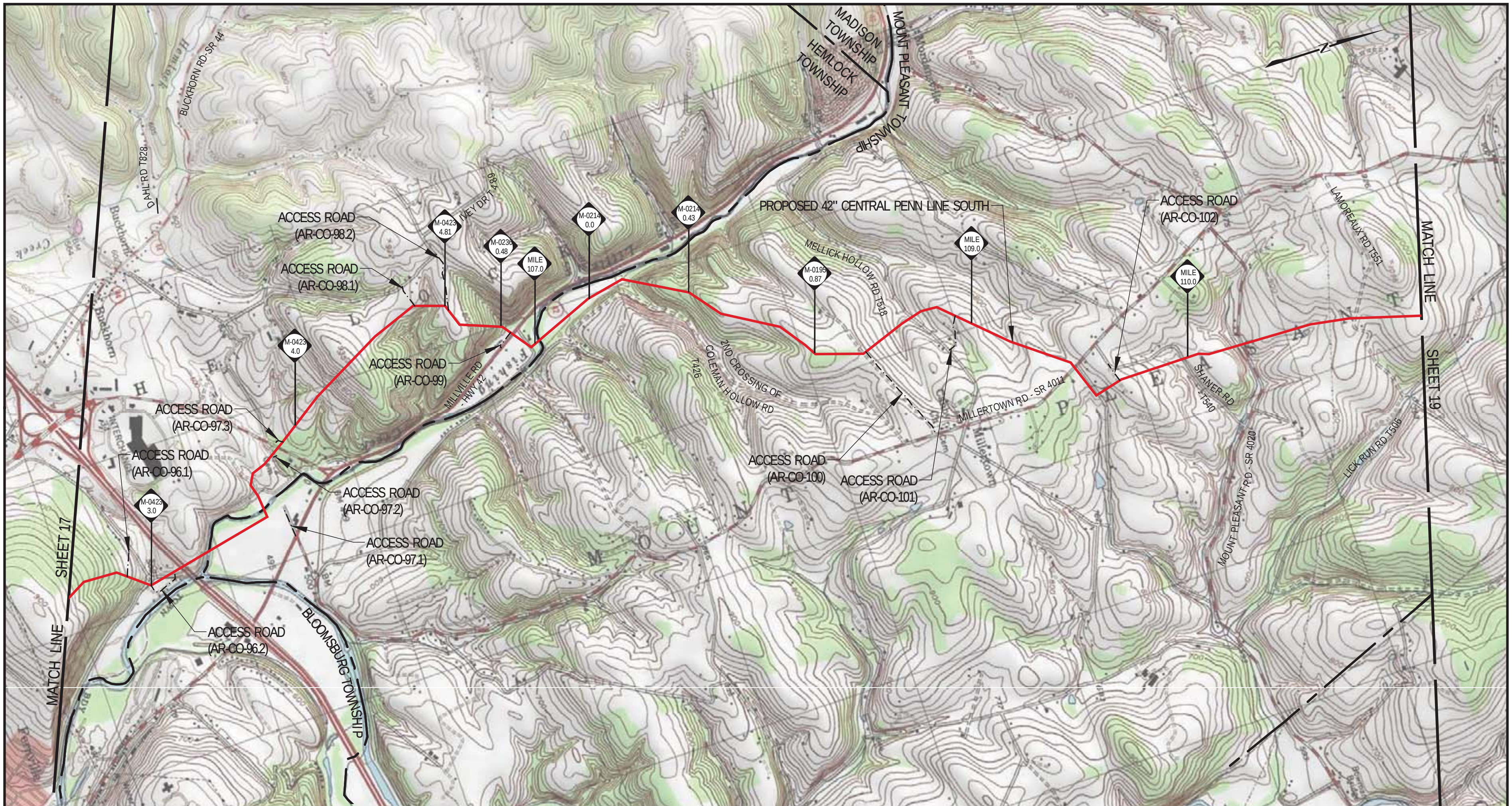
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South

B-36



LEGEND

- PROPOSED 42" CENTRAL PENN LINE SOUTH
- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
41076-A4 (BLOOMBURG, PA)

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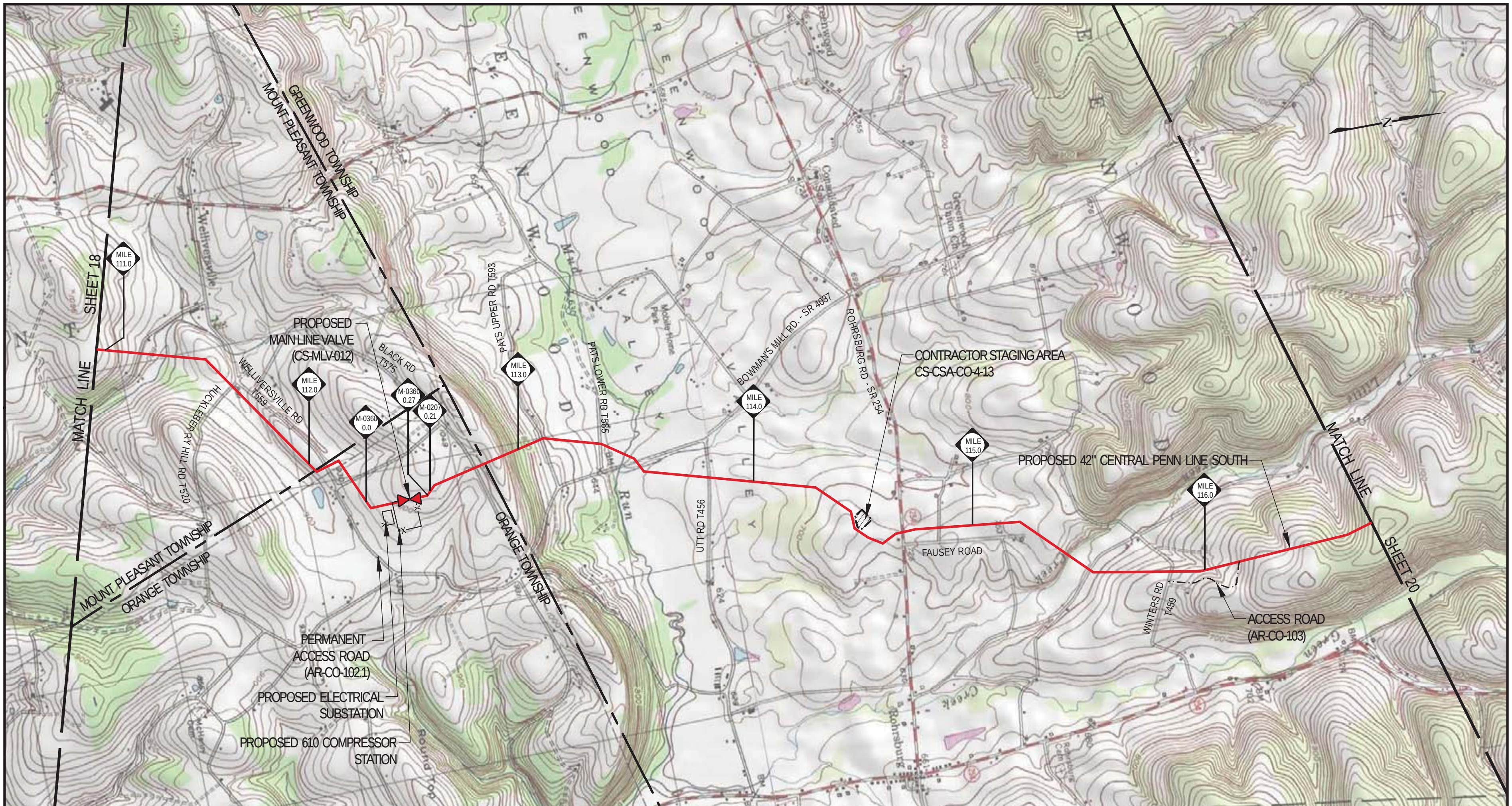
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



LEGEND

- PROPOSED 42" CENTRAL PENN LINE SOUTH
- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
41076-A4 (BLOOMBURG, PA)
41076-B4 (BENTON, PA)

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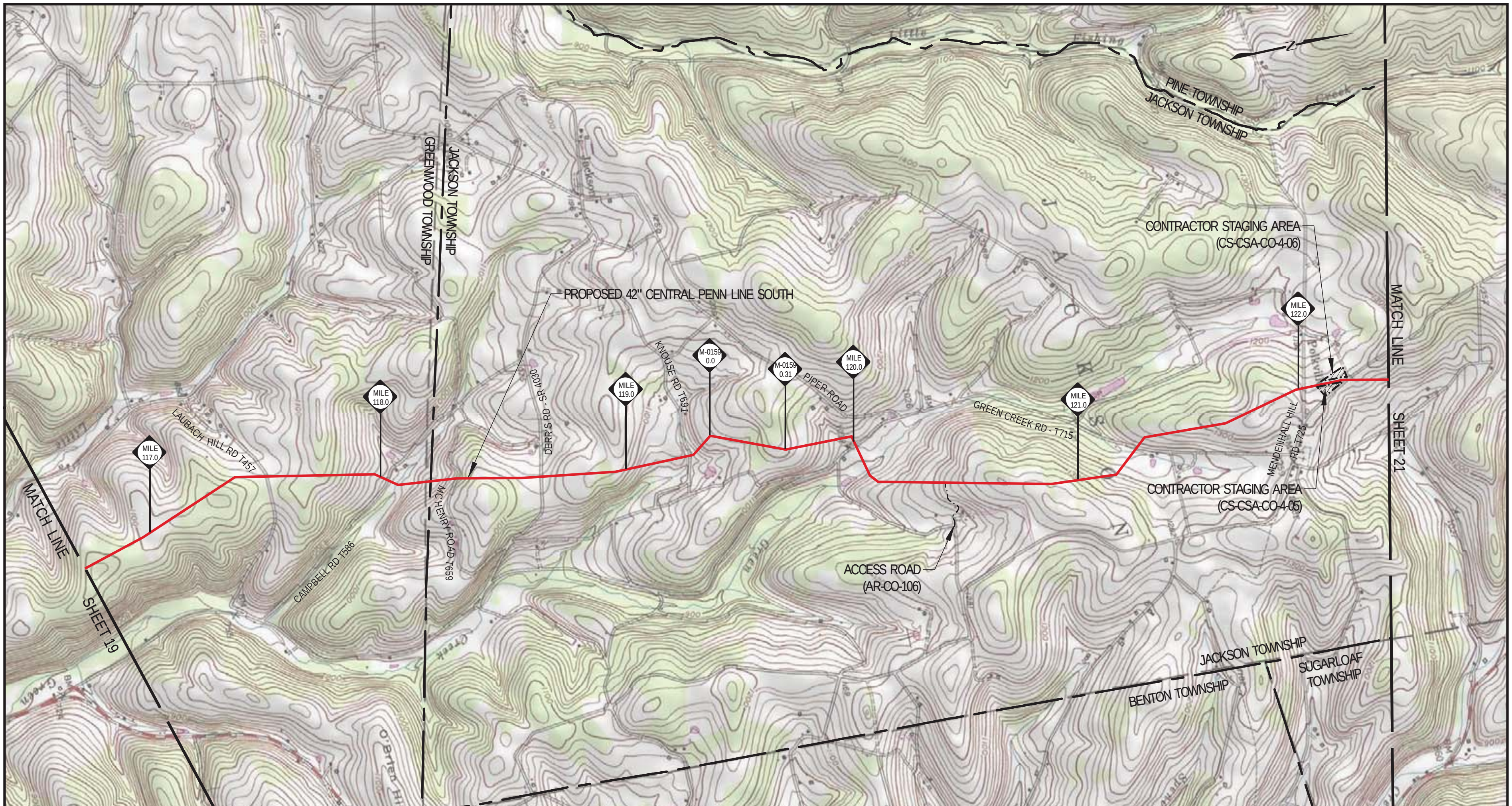
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



LEGEND

- PROPOSED 42" CENTRAL PENN LINE SOUTH
- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:
41076-B4 (BENTON, PA)
41076-C4 (ELK GROVE, PA)

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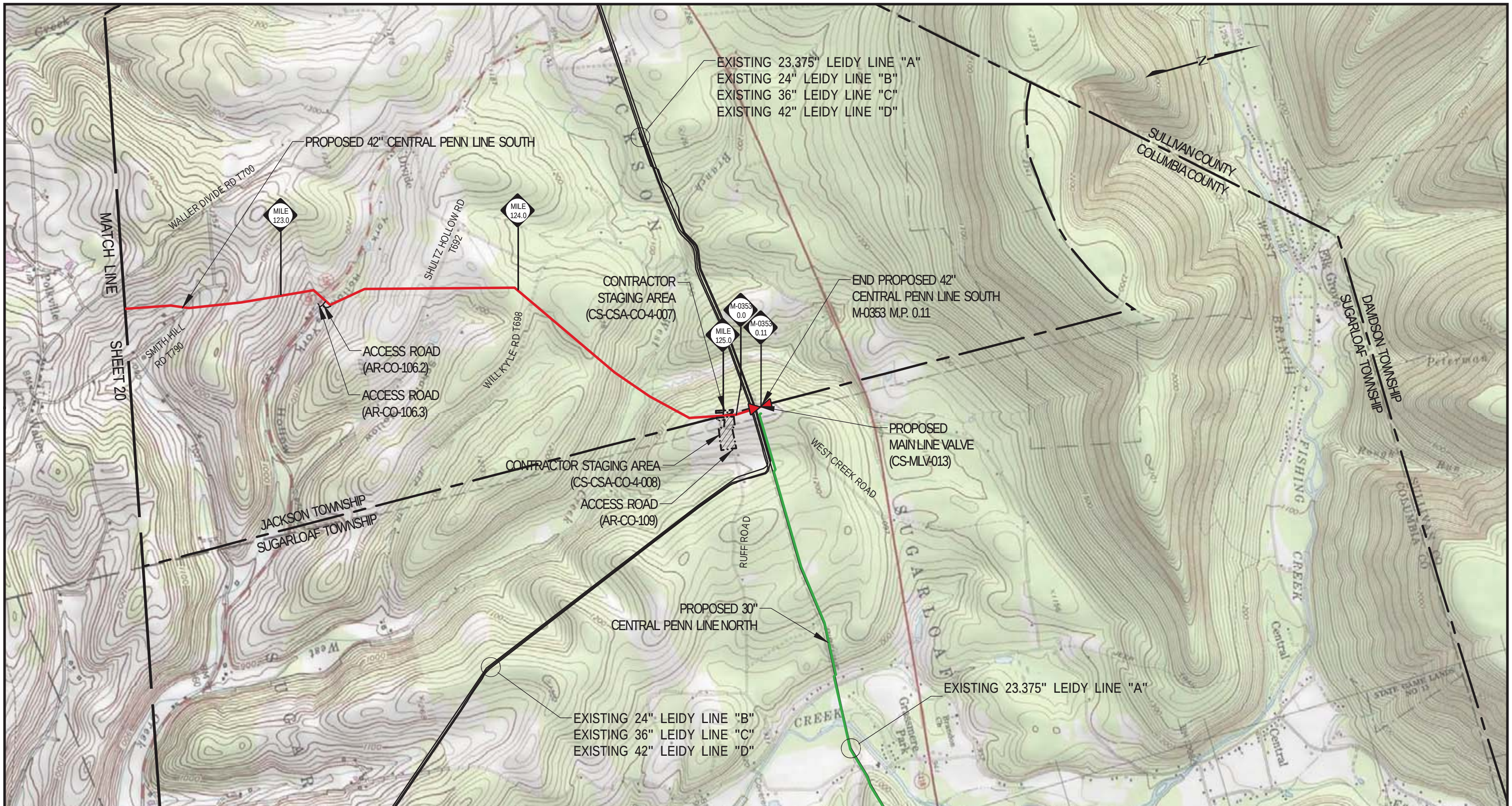
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



LEGEND

- PROPOSED 42" CENTRAL PENN LINE SOUTH
- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:

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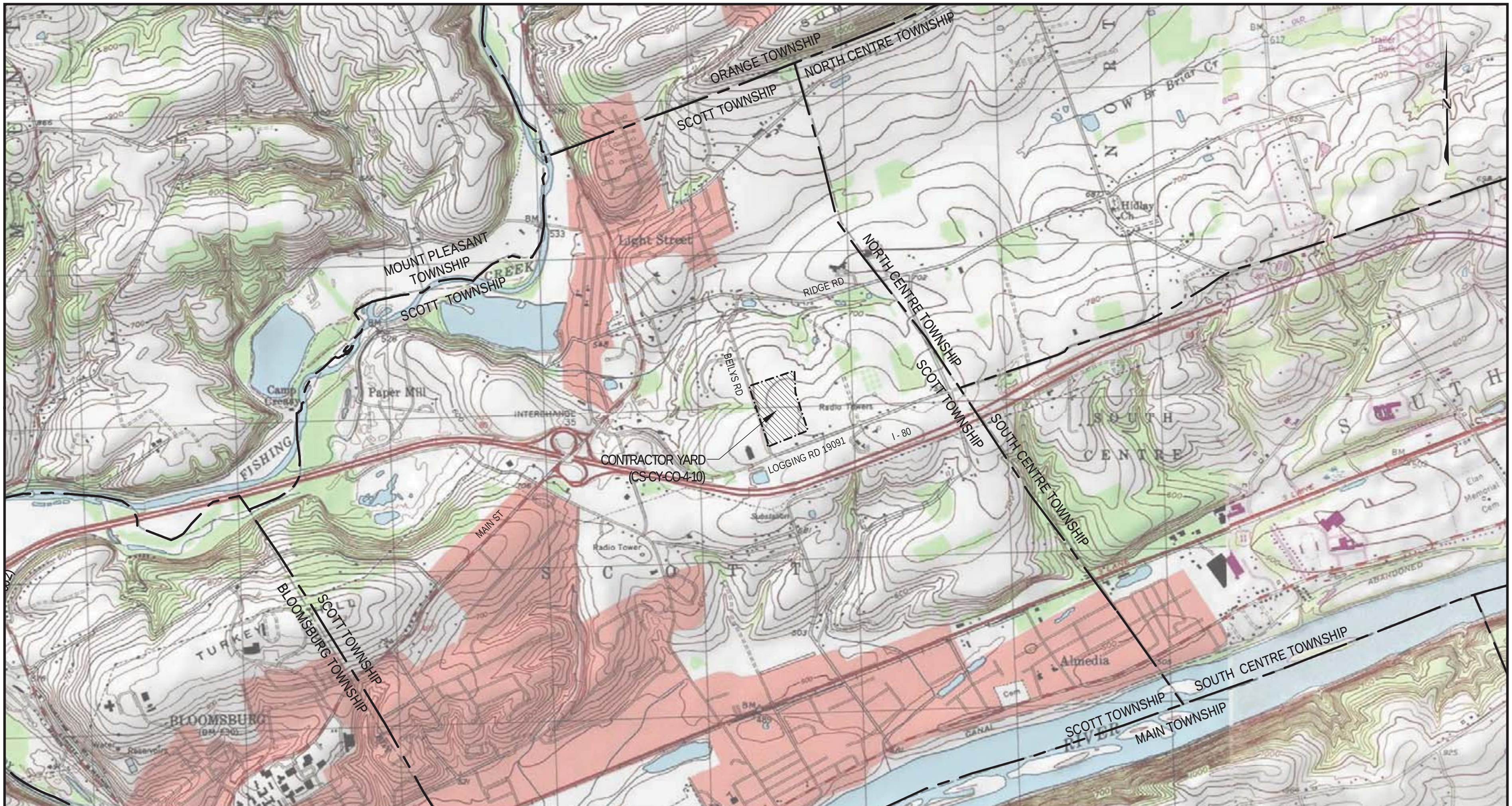
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



LEGEND

- PROPOSED 42" CENTRAL PENN LINE SOUTH
- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA
- CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:

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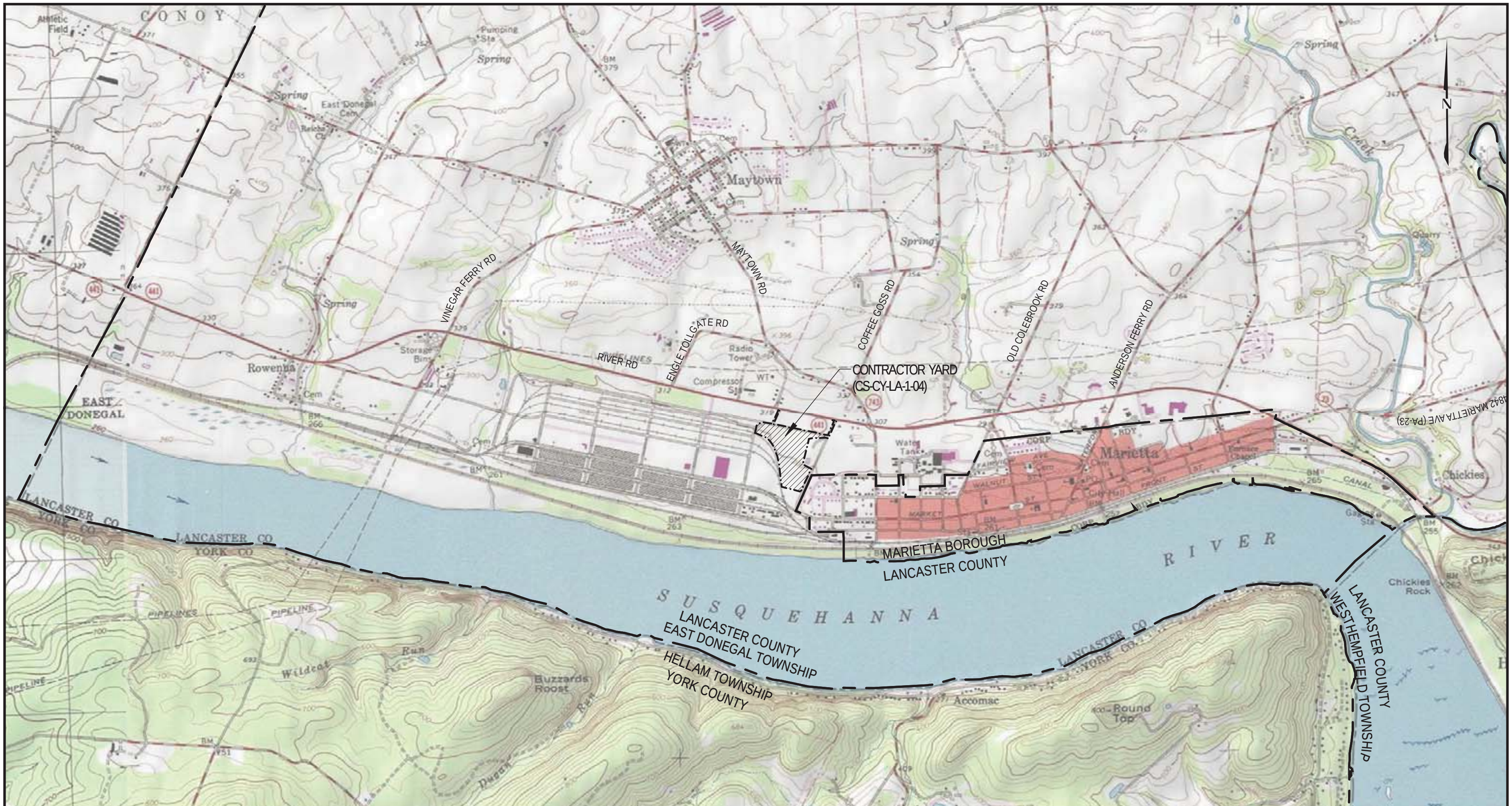
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



LEGEND
- PROPOSED 42" CENTRAL PENN LINE SOUTH
- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:

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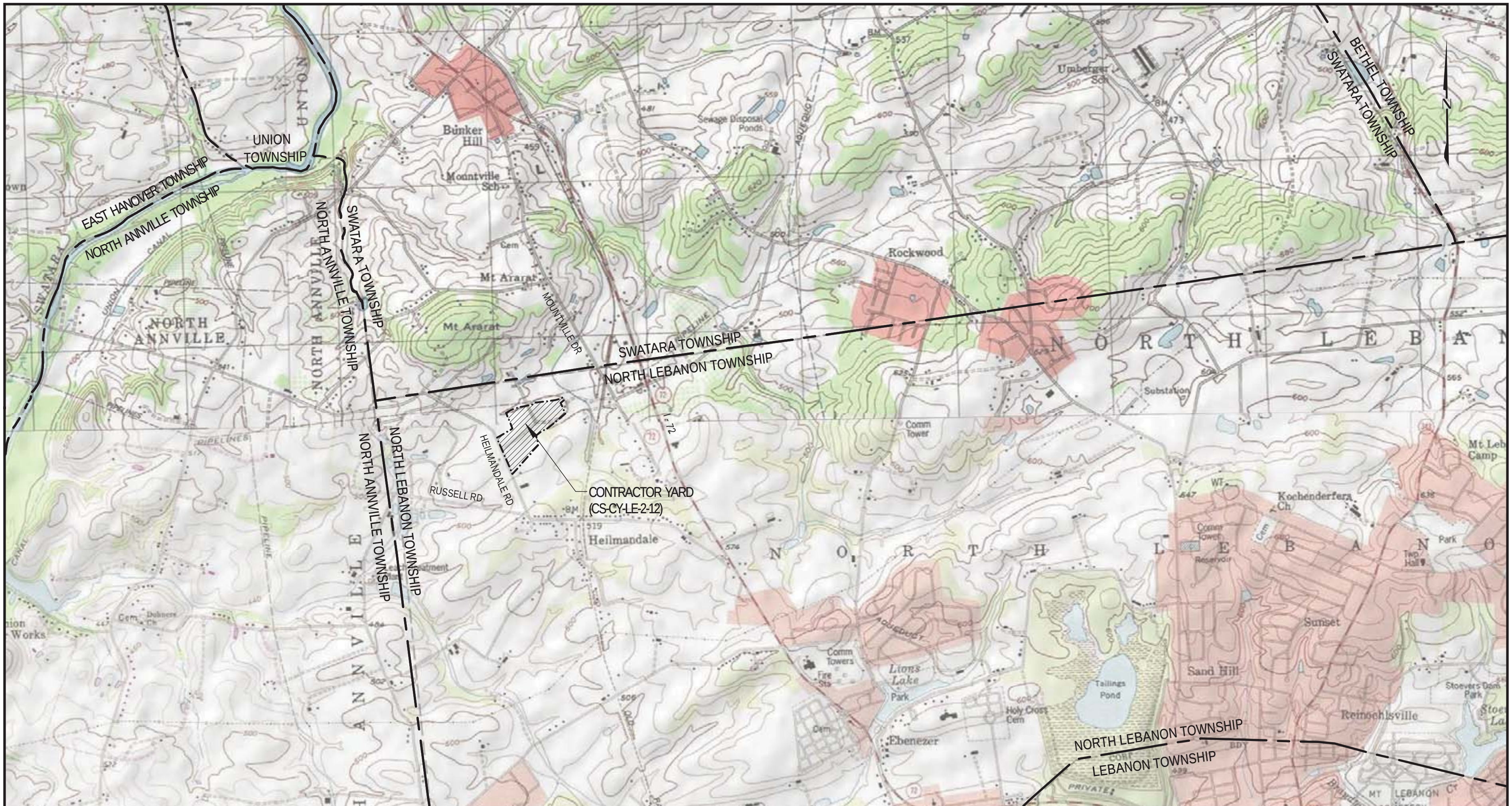
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South



LEGEND

- PROPOSED 42" CENTRAL PENN LINE SOUTH
- PROPOSED 30" CENTRAL PENN LINE NORTH
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- PROPOSED EASEMENT
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA CONTRACTOR YARD/ PIPE YARD

DRG 7.5 MIN. QUAD MAP:

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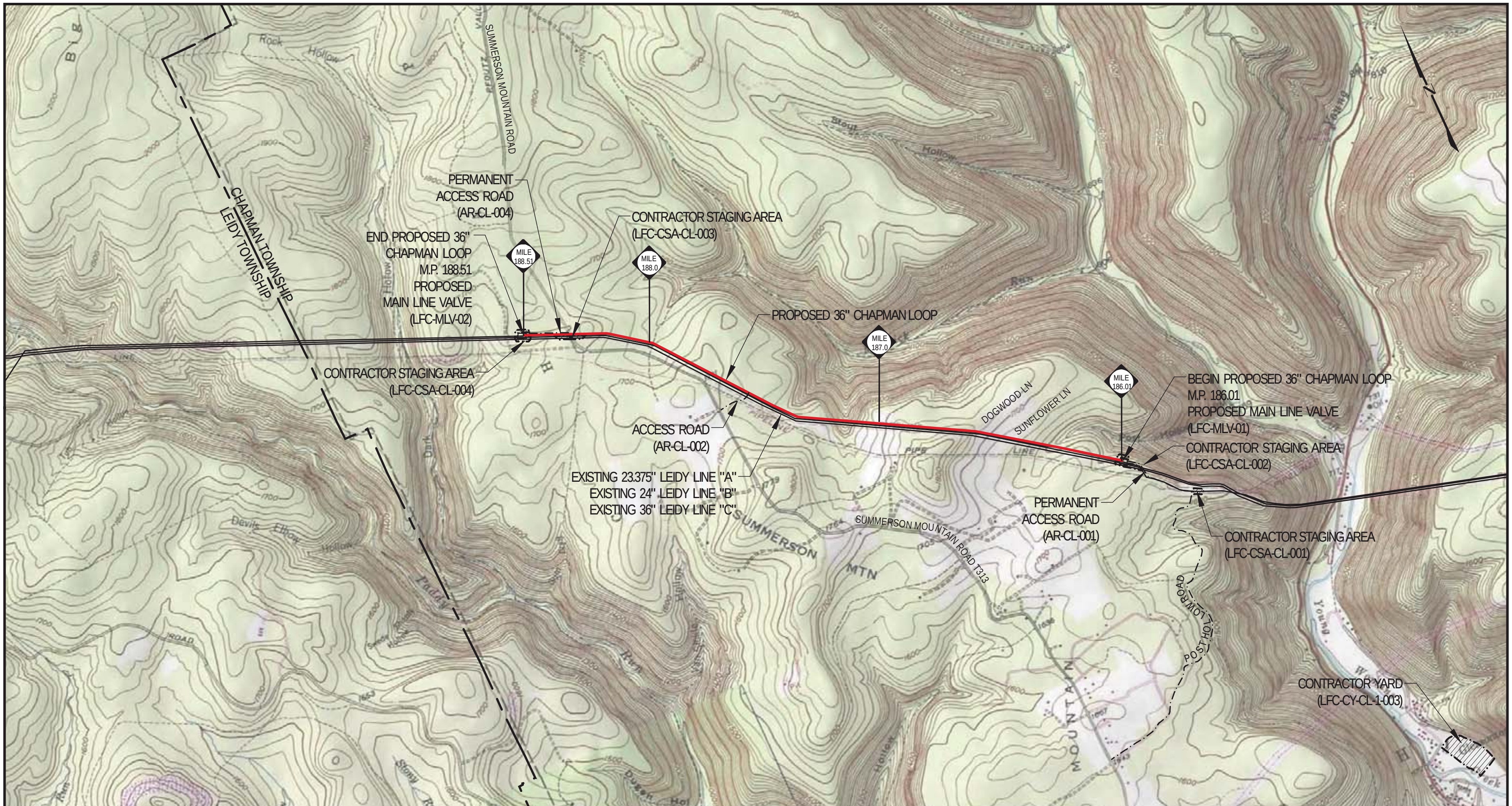
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Central Penn Line South

Chapman Loop



LEGEND

- PROPOSED 36" CHAPMAN LOOP
- EXISTING PIPELINE
- FENCE LINE
- ACCESS ROADS
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA/ CONTRACTOR YARD/PIPE YARD

DRG 7.5 MIN. QUAD MAP:
41077-D6 (YOUNG WOMANS CREEK, PA)
41077-D7 (TAMARACK, PA)

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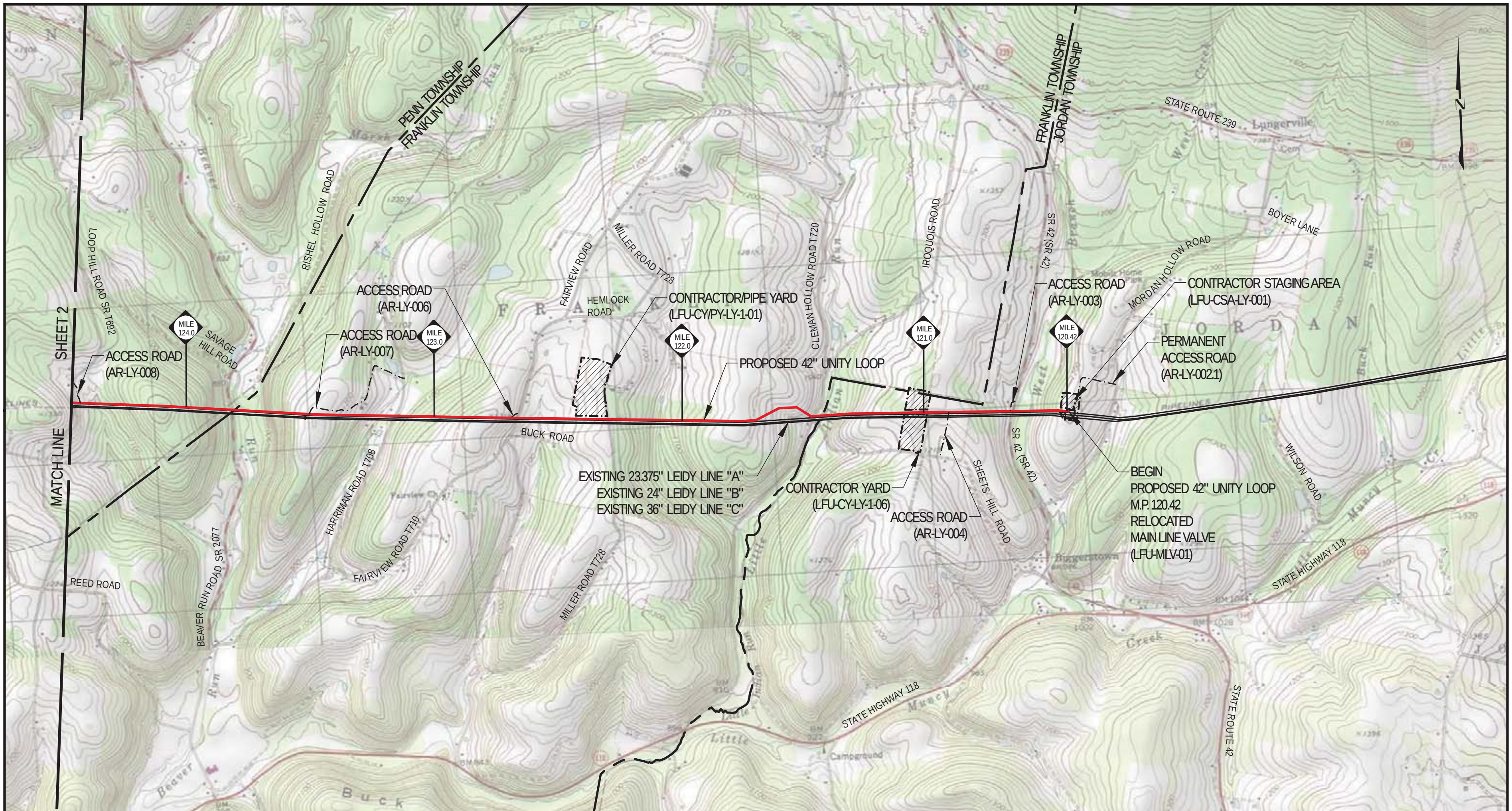
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Chapman Loop

Unity Loop



LEGEND

- PROPOSED 42" UNITY LOOP
- EXISTING PIPELINE
- ACCESS ROADS
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA/ CONTRACTOR YARD/PIPE YARD

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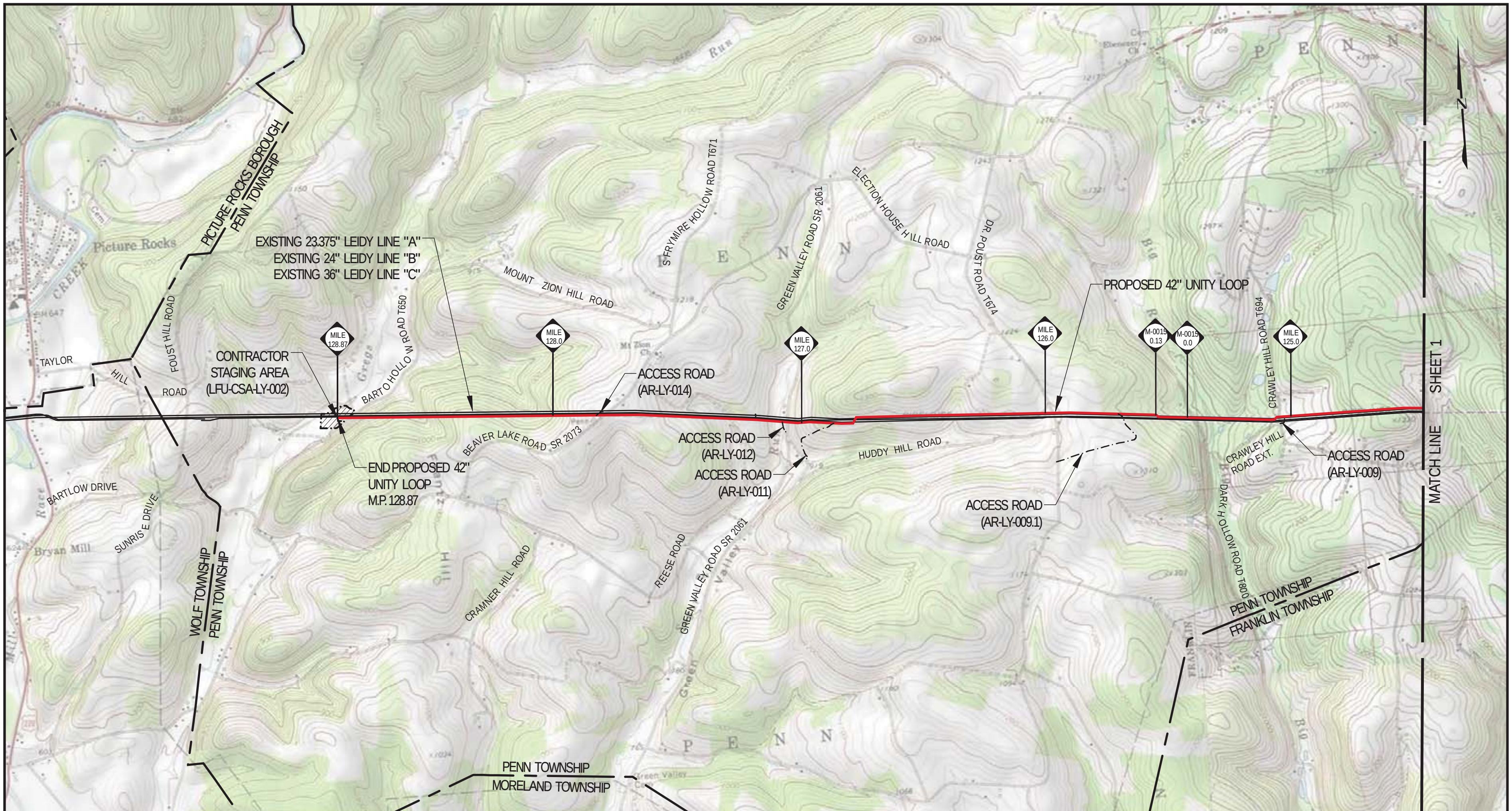
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Unity Loop



LEGEND

- PROPOSED 42" UNITY LOOP
- EXISTING PIPELINE
- ACCESS ROADS
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA/ CONTRACTOR YARD/PIPE YARD

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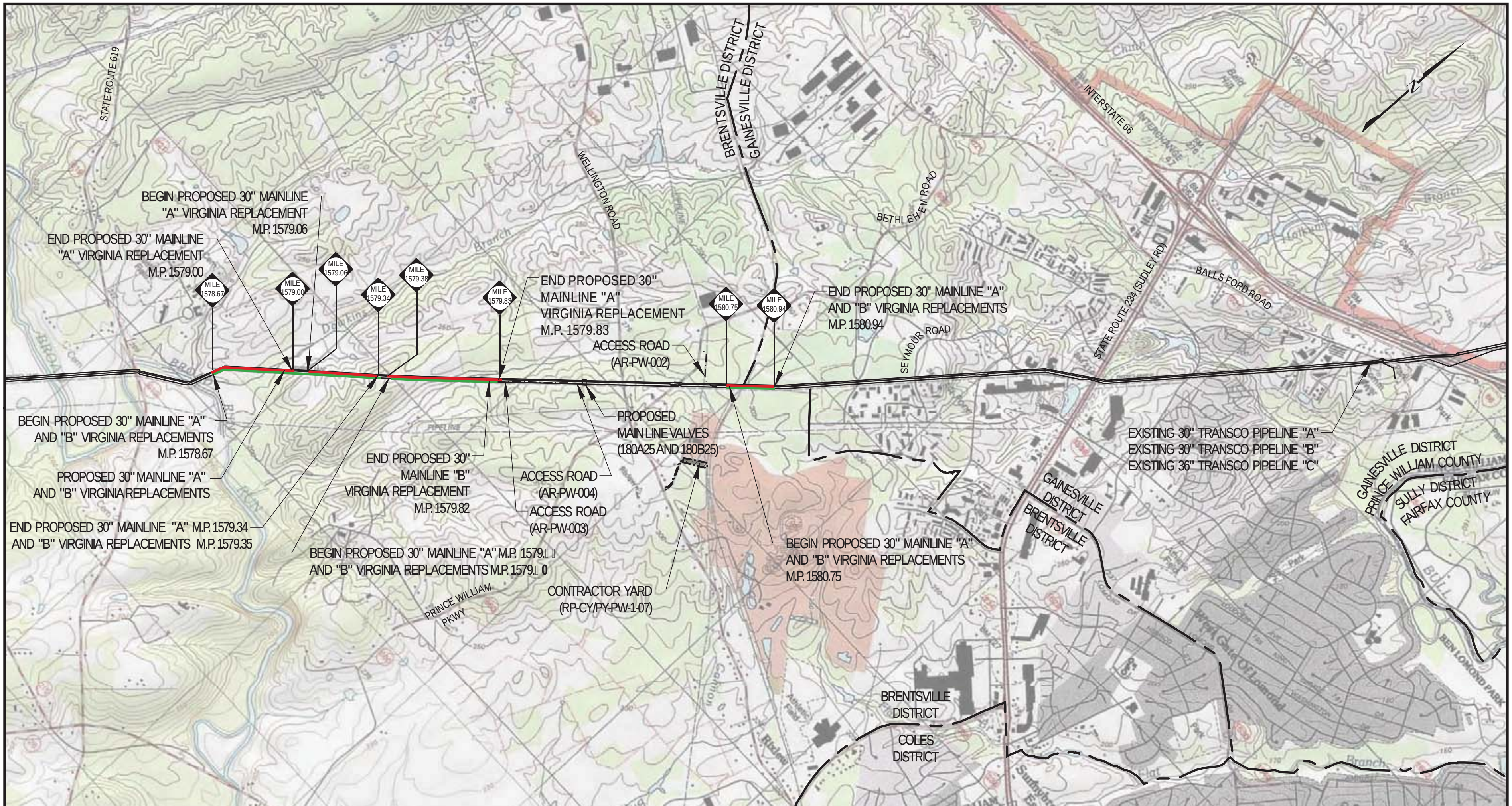
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Unity Loop

Mainline A and B Replacements

B-53



LEGEND
- PROPOSED 30" MAINLINE "A" VIRGINIA REPLACEMENT
- PROPOSED 30" MAINLINE "B" VIRGINIA REPLACEMENT
- EXISTING PIPELINE
- ACCESS ROADS
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA/ CONTRACTOR YARD/ PIPE YARD

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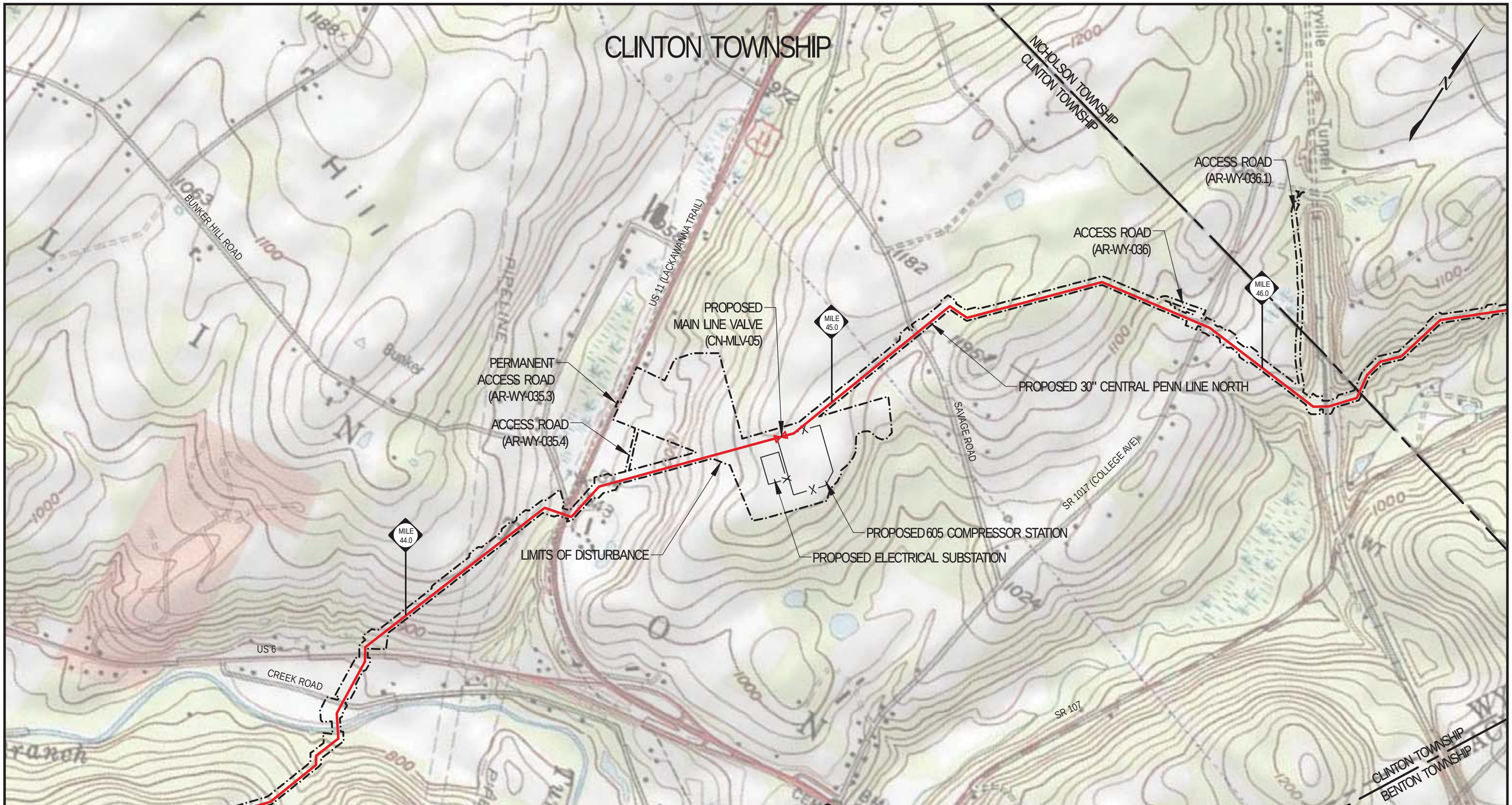
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Mainlaine "A" and "B" Virginia Replacements

New and Existing Compressor Stations



LEGEND

- PROPOSED 30" CENTRAL PENN LINE NORTH
- PROPOSED FENCE LINE
- LIMITS OF DISTURBANCE
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA/ CONTRACTOR YARD/ PIPE STORAGE YARD

NOTE:
DRG 7.5 MIN. QUAD MAP.
41075-E7 (FACTORYVILLE, PA)

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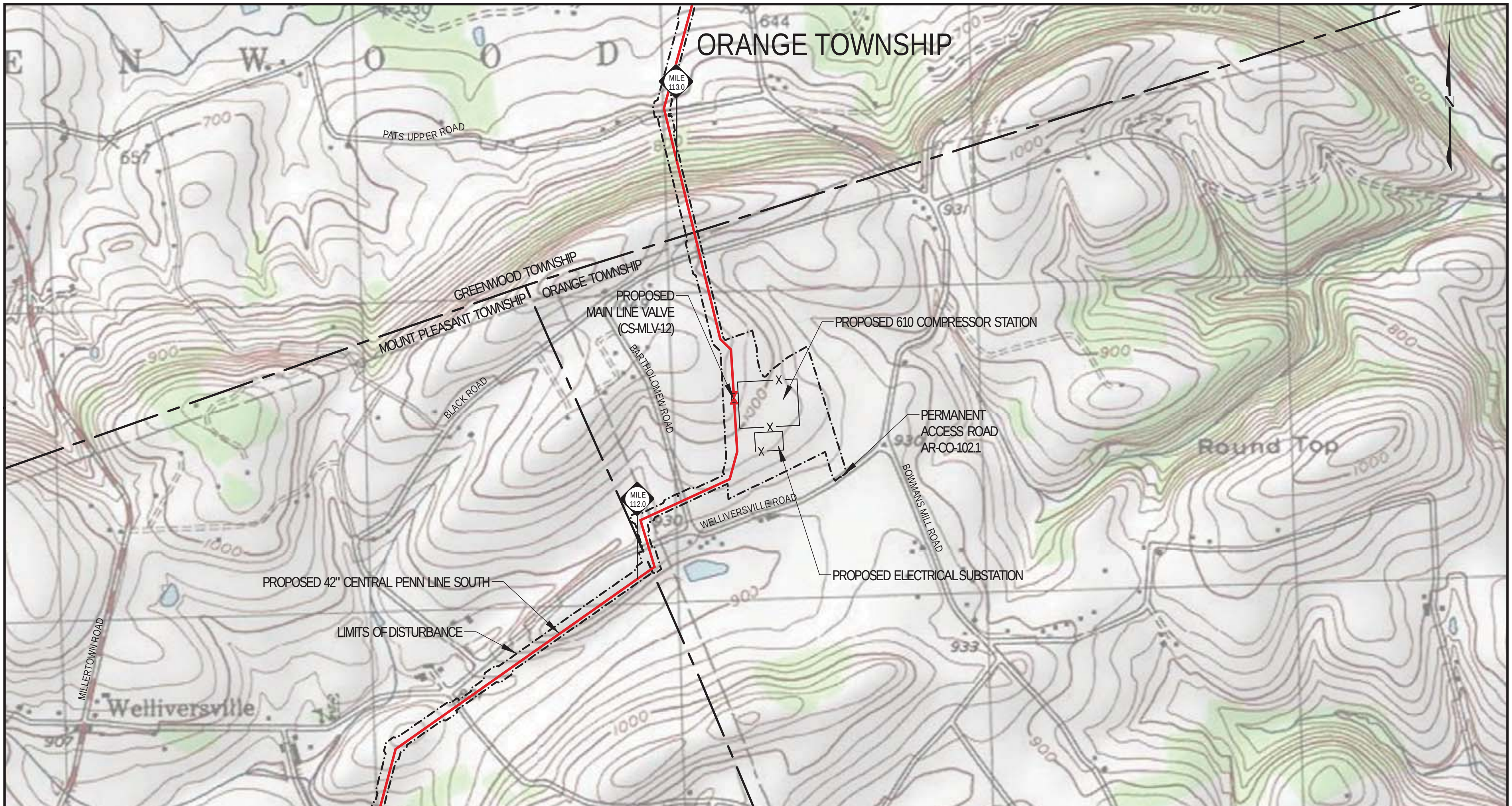
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Proposed Compressor Station 605



LEGEND

- PROPOSED 42" CENTRAL PENN LINE SOUTH
- PROPOSED FENCE LINE
- LIMITS OF DISTURBANCE
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR STAGING AREA/ CONTRACTOR YARD/ PIPE STORAGE YARD

DRG 7.5 MIN. QUAD MAP:
41076-A4 (BLOOMBURG, PA)

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SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Proposed Compressor Station 610

NOTE: NO NWI/NHD FEATURES LOCATED
WITHIN PROPOSED TEMPORARY WORKSPACE

LEGEND

- EXISTING PIPELINE
- EXISTING FENCELINE
- COUNTY/TOWNSHIP BOUNDARY
- TOTAL AREA OF TEMPORARY WORKSPACE.....36.10 ACRES

DRG 7.5 MIN. QUAD MAP:
41077-C2 (SALLADASBURG, PA)

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SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Compressor Station 520

LEGEND

- PROPOSED 30" CENTRAL PENN LINE NORTH
- PROPOSED 42" CENTRAL PENN LINE SOUTH
- EXISTING PIPELINE
- EXISTING FENCELINE
- COUNTY/TOWNSHIP BOUNDARY
- TOTAL AREA OF TEMPORARY WORKSPACE.....32.01 ACRES

DRG 7.5 MIN. QUAD MAPS:
41076-C4 (ELK GROVE, PA)

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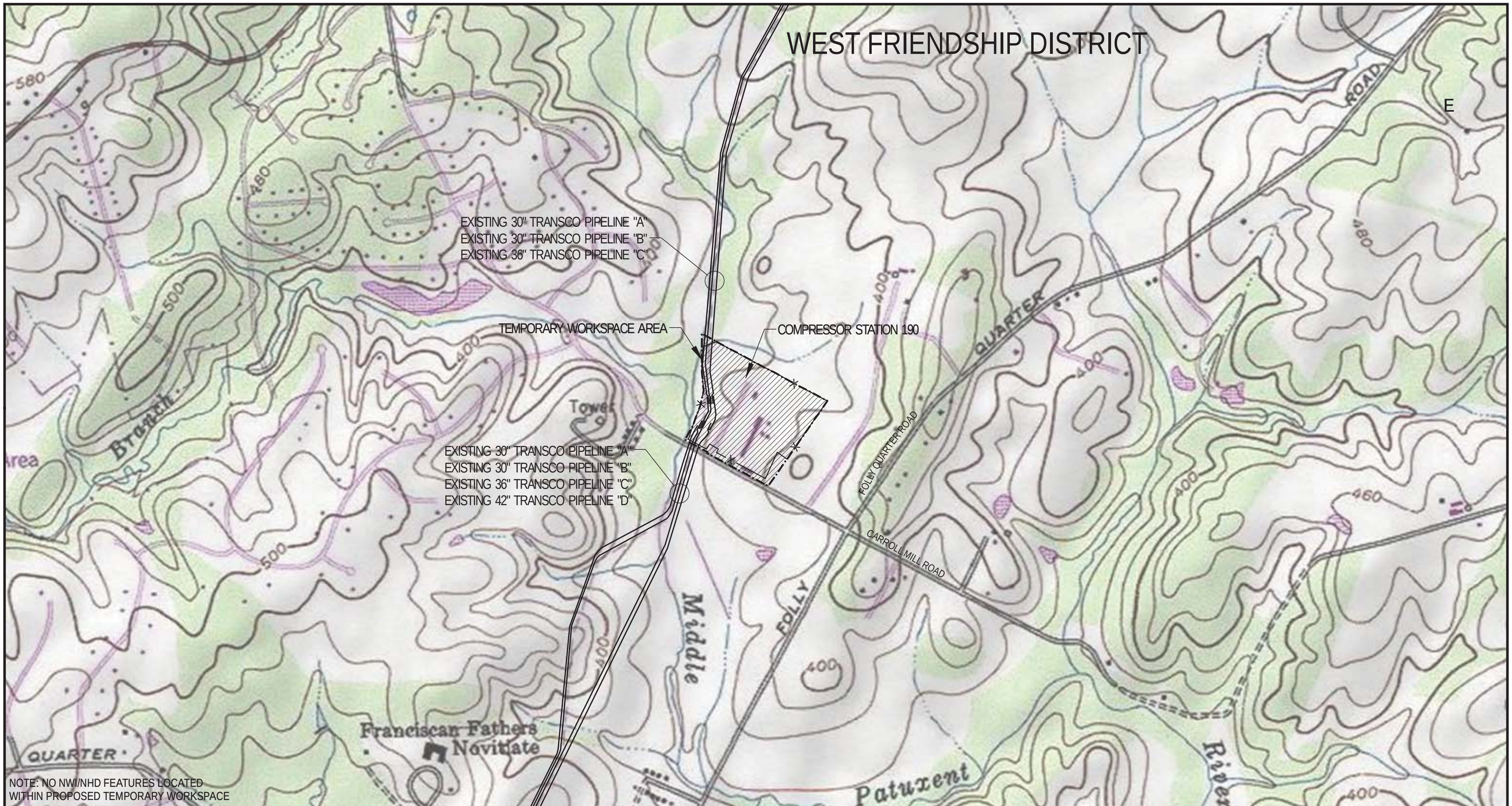
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Compressor Station 517



LEGEND

- EXISTING PIPELINE
- EXISTING FENCELINE
- COUNTY/TOWNSHIP BOUNDARY
- TOTAL AREA OF TEMPORARY WORKSPACE.....30.00 ACRES

DRG 7.5 MIN. QUAD MAPS:
39076-C3 (SYKESVILLE, MA)

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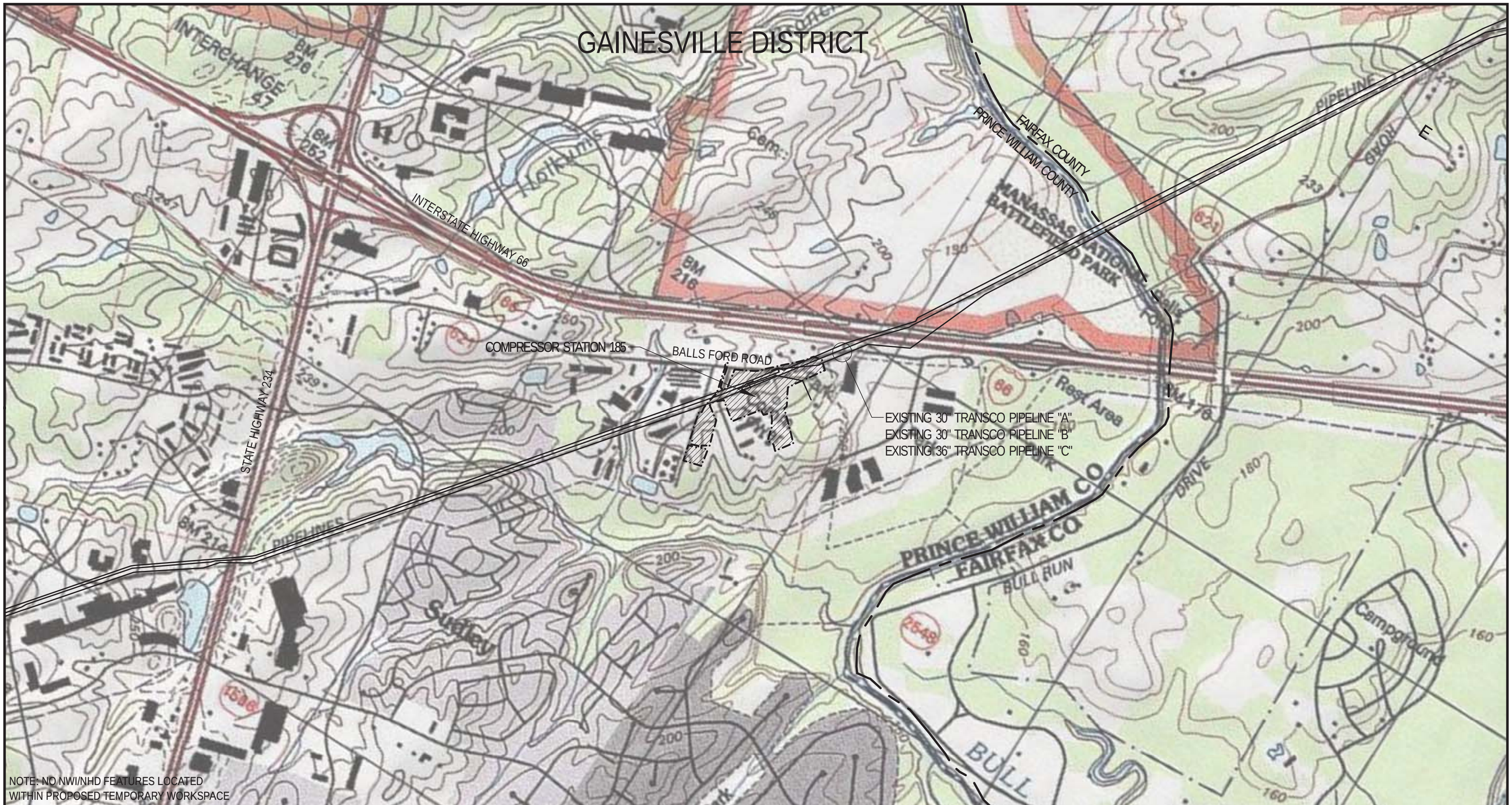
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Compressor Station 190



LEGEND

EXISTING PIPELINE

COUNTY/TOWNSHIP BOUNDARY

TOTAL AREA OF TEMPORARY WORKSPACE.....13.68 ACRES

DRG 7.5 MIN. QUAD:
380775-G5 (GAINESVILLE, VA)

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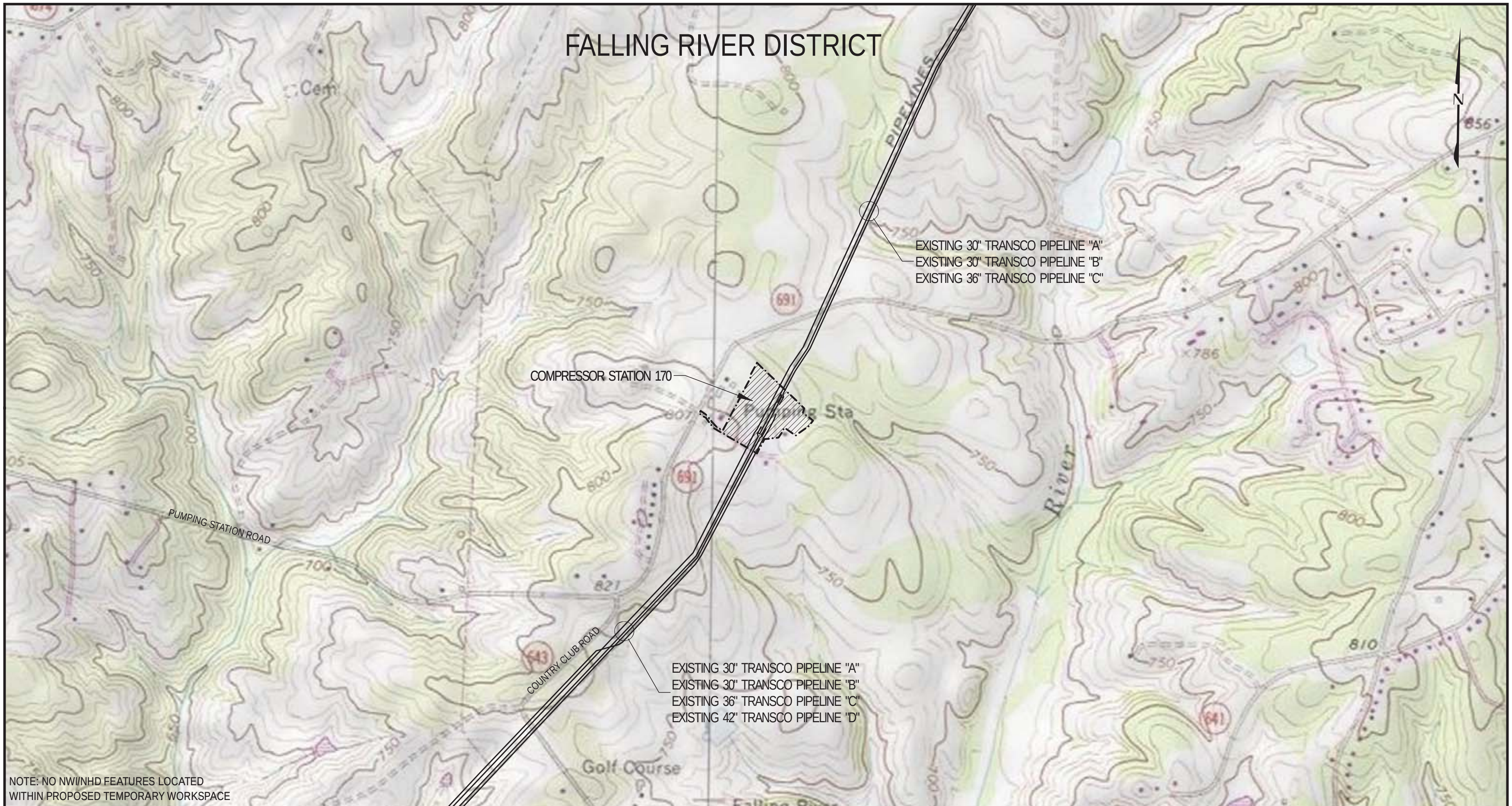
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Compressor Station 185



LEGEND

EXISTING PIPELINE

COUNTY/TOWNSHIP BOUNDARY

TOTAL AREA OF TEMPORARY WORKSPACE.....10.73 ACRES

DRG 7.5 MIN. QUAD MAPS:
37078-C8 (CONCORD, VA)
37078-C7 (APPOMATTOX, VA)

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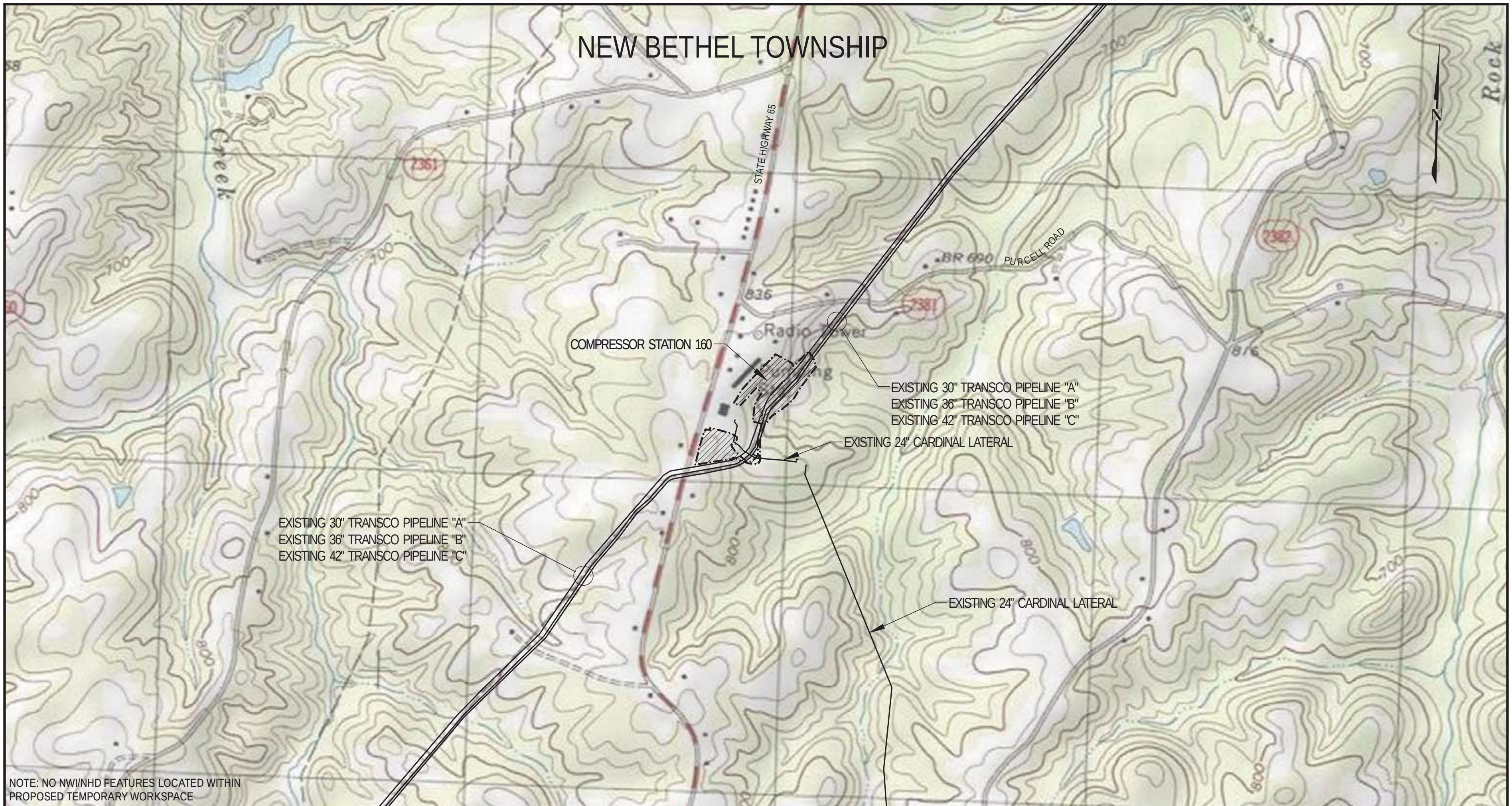
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Compressor Station 170



LEGEND

EXISTING PIPELINE

COUNTY/TOWNSHIP BOUNDARY

TOTAL AREA OF TEMPORARY WORKSPACE.....10.45 ACRES

DRG 7.5. MIN. QUAD MAP:
36079-C7 (BETHANY, NC)

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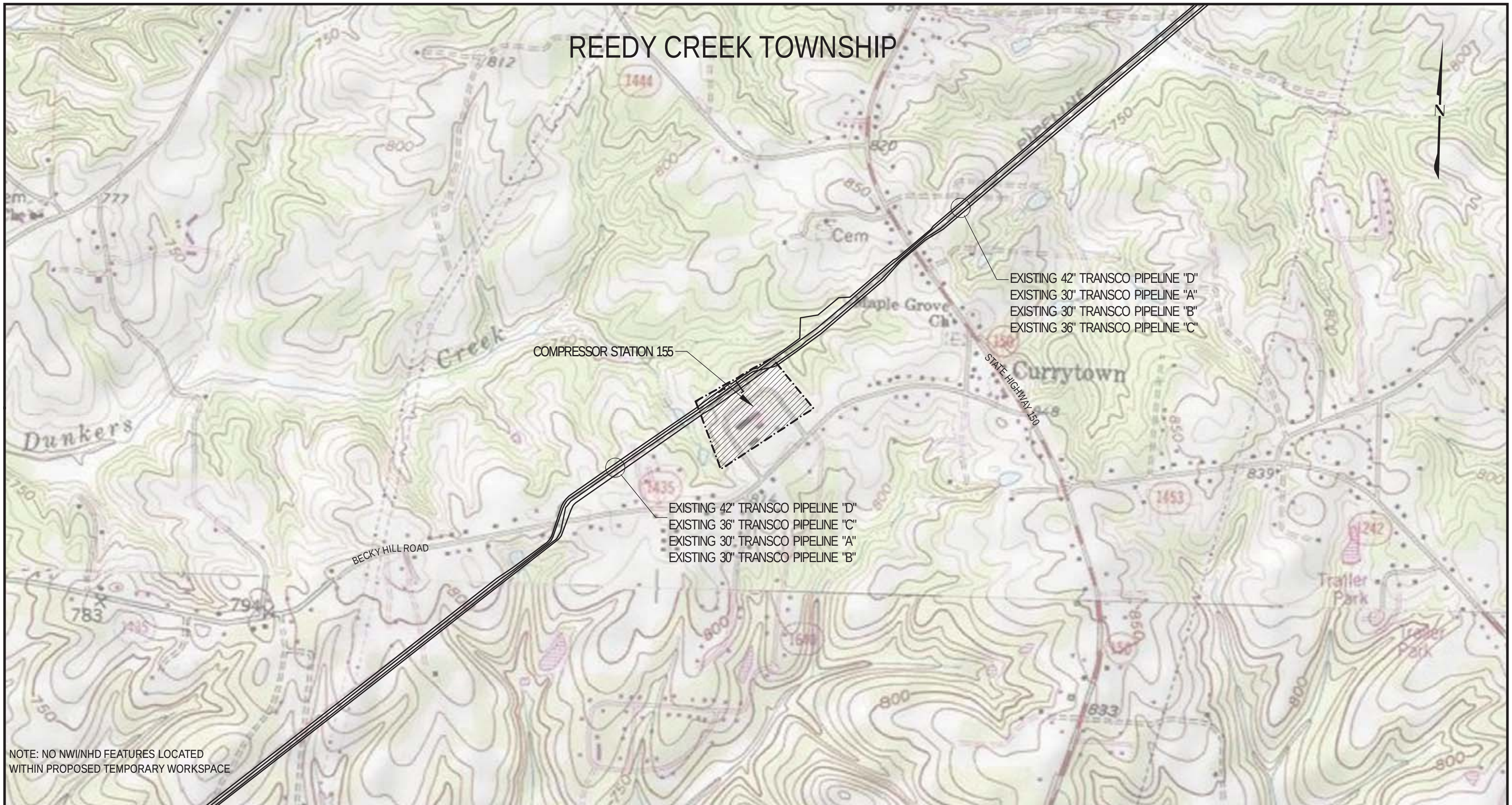
SCALE IN FEET

Appendix B

Atlantic Sunrise Project

Project Overview Maps

Compressor Station 160



LEGEND

EXISTING PIPELINE

COUNTY/TOWNSHIP BOUNDARY

TOTAL AREA OF TEMPORARY WORKSPACE.....17.55 ACRES

DRG 7.5 MIN. QUAD MAP:
35080-H3 (WELCOME, NC)

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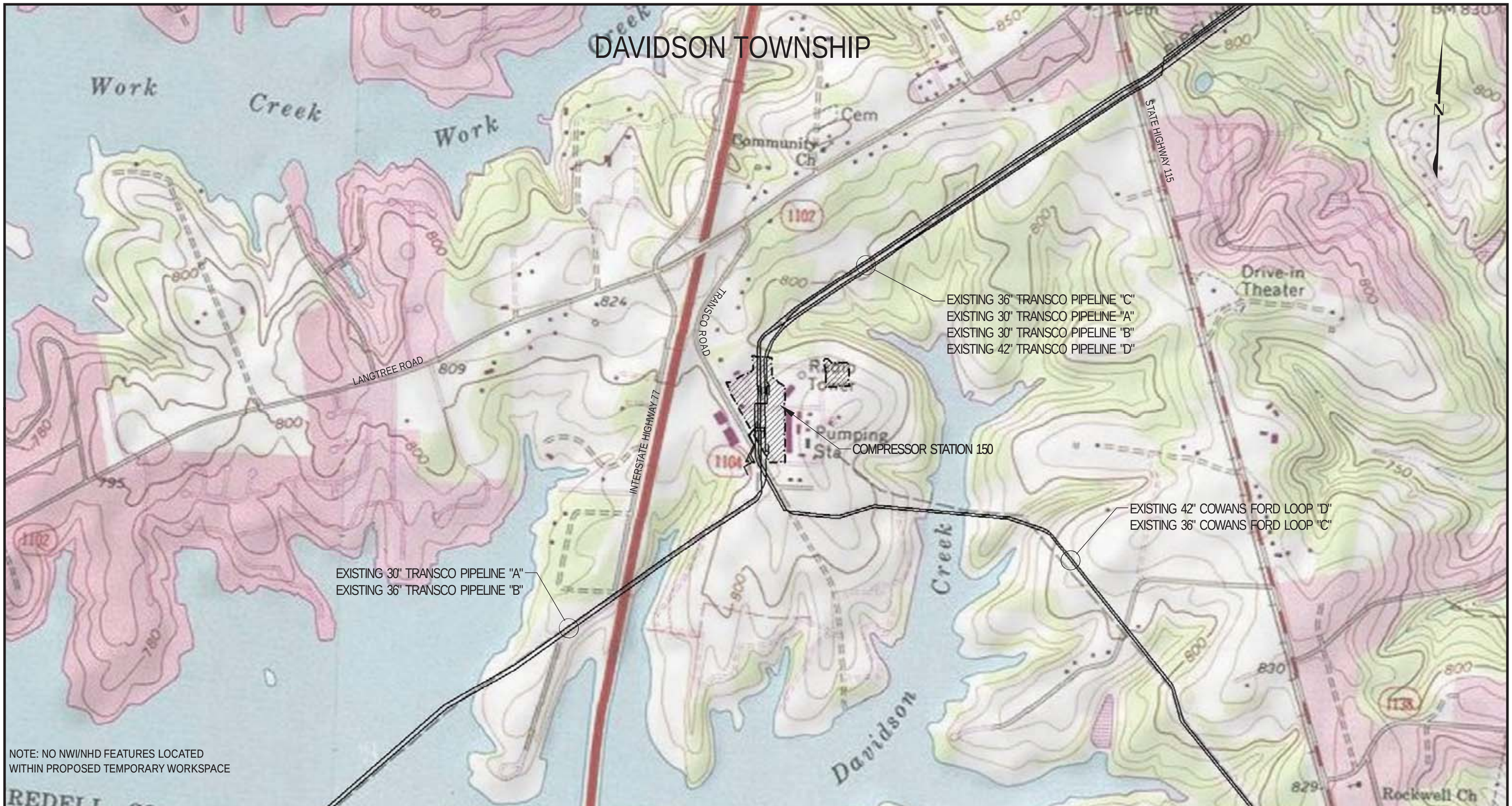
SCALE IN FEET

Appendix B

Atlantic Sunrise Project

Project Overview Maps

Compressor Station 155



NOTE: NO NWI/NHD FEATURES LOCATED
WITHIN PROPOSED TEMPORARY WORKSPACE

LEGEND

EXISTING PIPELINE
COUNTY/TOWNSHIP BOUNDARY
TOTAL AREA OF TEMPORARY WORKSPACE.....11.24 ACRES

DRG 7.5 MIN. QUAD MAPS:
35080-E7 (MOORESVILLE, NC)

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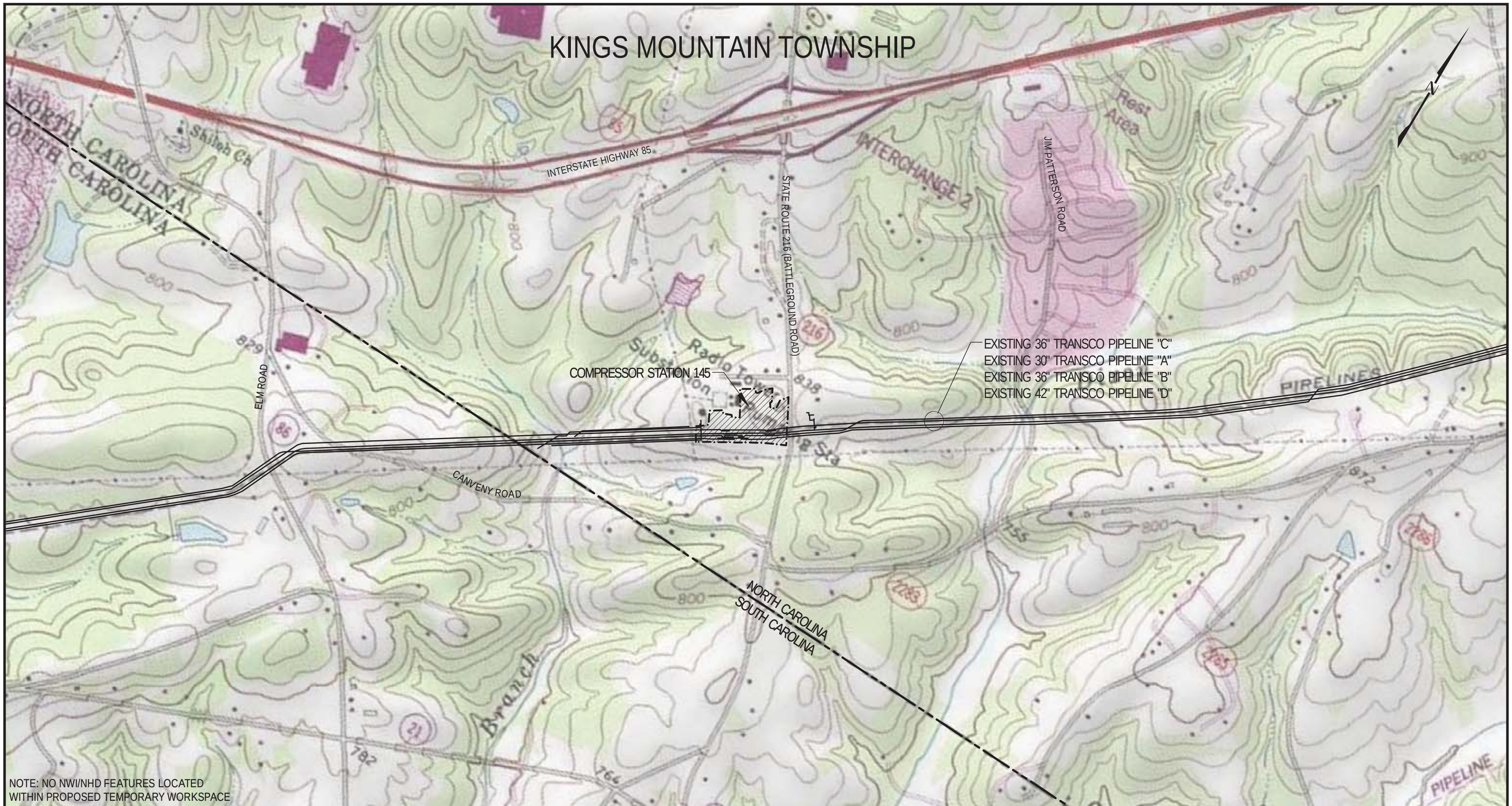
SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Compressor Station 150



LEGEND

EXISTING PIPELINE

STATE BOUNDARY

TOTAL AREA OF TEMPORARY WORKSPACE.....8.95 ACRES

DRG 7.5 MIN. QUAD MAPS:
35081-B4 (GROVER, NC)

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SCALE IN FEET

Appendix B
Atlantic Sunrise Project
Project Overview Maps
Compressor Station 145

BEST MANAGEMENT PRACTICE FIGURES AND TYPICAL RIGHT-OF-WAY DRAWINGS

List of Best Management Practices

Typical Right-of-Way Cross-Sections

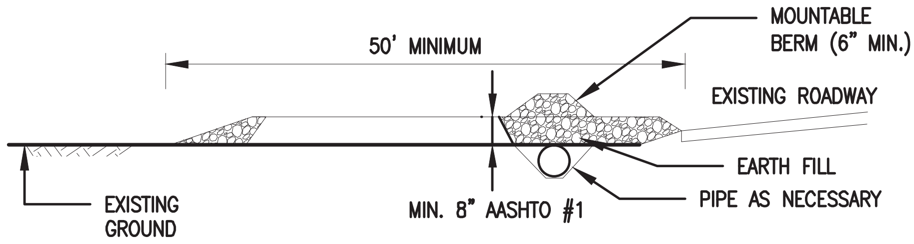
PROPOSED 30” CENTRAL PENN LINE NORTH

PROPOSED 42” CENTRAL PENN LINE SOUTH

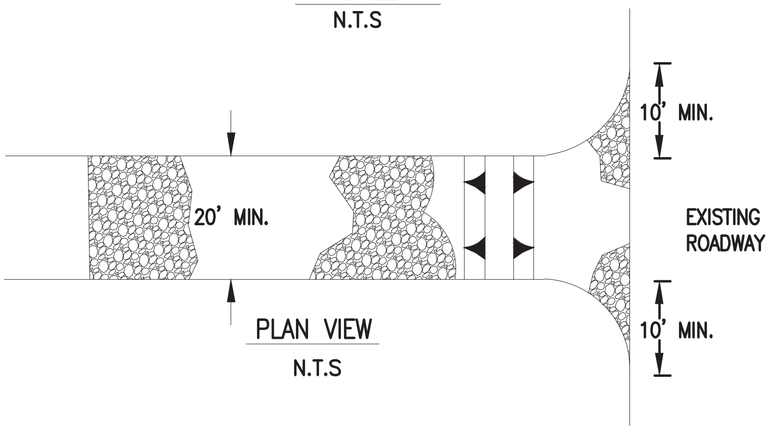
PROPOSED 36” CHAPMAN LOOP

PROPOSED 42” UNITY LOOP

PROPOSED 30” MAINLINE “A” AND “B” VIRGINIA REPLACEMENTS



PROFILE
N.T.S



PLAN VIEW
N.T.S

*MOUNTABLE BERM USED TO PROVIDE PROPER COVER FOR PIPE

NOTES:

1. TOPSOIL TO BE REMOVED PRIOR TO INSTALLATION OF ROCK CONSTRUCTION ENTRANCE. EXTEND ROCK OVER FULL WIDTH OF ENTRANCE.

2. RUNOFF SHALL BE DIVERTED FROM ROADWAY TO A SUITABLE SEDIMENT REMOVAL BMP PRIOR TO ENTERING ROCK CONSTRUCTION ENTRANCE.

3. MOUNTABLE BERM SHOULD BE INSTALLED WHEREVER OPTIONAL CULVERT PIPE IS USED AND PROPER PIPE COVER AS SPECIFIED BY MANUFACTURER IS NOT OTHERWISE PROVIDED. PIPE TO BE SIZED APPROPRIATELY FOR SIZE OF DITCH BEING CROSSED.

4. MAINTENANCE: ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE IMMEDIATELY. IF EXCESSIVE AMOUNTS OF SEDIMENT ARE BEING DEPOSITED ON ROADWAY, EXTEND LENGTH OF ROCK CONSTRUCTION ENTRANCE BY 50 FOOT INCREMENTS UNTIL CONDITION IS ALLEVIATED OR INSTALL WASH RACK. WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER DRAINAGE COURSES IS NOT ACCEPTABLE.

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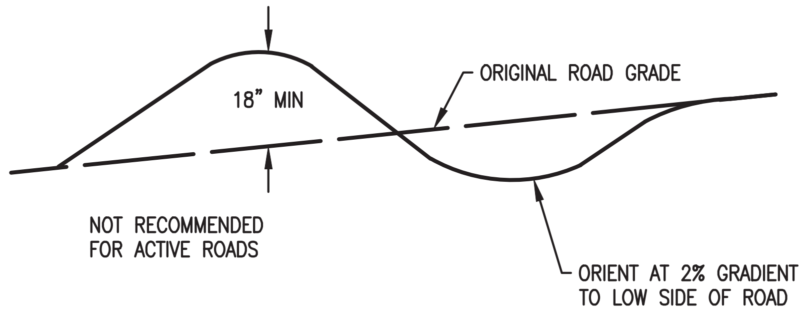
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

RCE ROCK CONSTRUCTION ENTRANCE

Williams.

1



PLAN VIEW

N.T.S

NOTES:

1. WATERBARS MUST DISCHARGE TO A STABLE AREA.
2. WATERBARS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED OR ERODED WATERBARS SHALL BE RESTORED TO ORIGINAL DIMENSIONS WITHIN 24 HOURS OF INSPECTION.
3. MAINTENANCE OF WATERBARS SHALL BE PROVIDED UNTIL ROADWAY, SKIDTRAIL, OR RIGHT–OF–WAY HAS ACHIEVED PERMANENT STABILIZATION.
4. WATERBARS ON RETIRED ROADWAYS, SKIDTRAILS, AND RIGHT–OF–WAYS SHALL BE LEFT IN PLACE AFTER PERMANENT STABILIZATION HAS BEEN ACHIEVED.
   ALL WATERBARS SHOWN ON THE PLANS ARE INTENDED TO BE PERMANENT BMP'S.
5. ADDITIONAL WATERBARS MAY BE INSTALLED AS APPROPRIATE DURING CONSTRUCTION.
6. WATERBARS SHOULD BE CONSTRUCTED TO DISCHARGE TO ALTERNATE SIDES OF THE ROW, WHERE POSSIBLE/PRACTICAL.
7. A "SOFT" TRENCH PLUG MAY BE USED TO CONTROL INSTANCES WHERE A WATERBAR DISCHARGES TO THE TRENCH IN STEEP SLOPE AREAS.
8. A "J–HOOK" OUTLET MAY BE USED AT WATERBARS TO CONTROL THE FLOW OF RUNOFF. HAY BALES, SILT SOCKS OR SUPER SILT FENCE TRENCHED IN MAY BE USED AS "J–HOOK" OUTLETS.
9. THE POST CONSTRUCTION STORMWATER MANAGEMENT PLAN (PCSM) FOR THE LINEAR PORTION OF THIS PROJECT IS TO RESTORE THE CONSTRUCTION RIGHT–OF–WAY TO ITS ORIGINAL CONTOURS FOLLOWING PIPELINE INSTALLATION AND RESTORATION. THE ENTIRE AREA WILL BE PERMANENTLY RE–VEGETATED OR STABILIZED WITH PERVIOUS MATERIAL. WATER BARS INSTALLED DURING CONSTRUCTION ACTIVITIES WILL REMAIN AS PERMANENT WATER BARS AND ACT AS PCSM BMP'S.

TABLE 3.1 – MAXIMUM WATERBAR SPACING

PERCENT SLOPE	SPACING (FT)
<5	N/A
5–15	300
15–30	200
>30	100

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STANDARD ENVIRONMENTAL DETAIL

WB

WATER BAR

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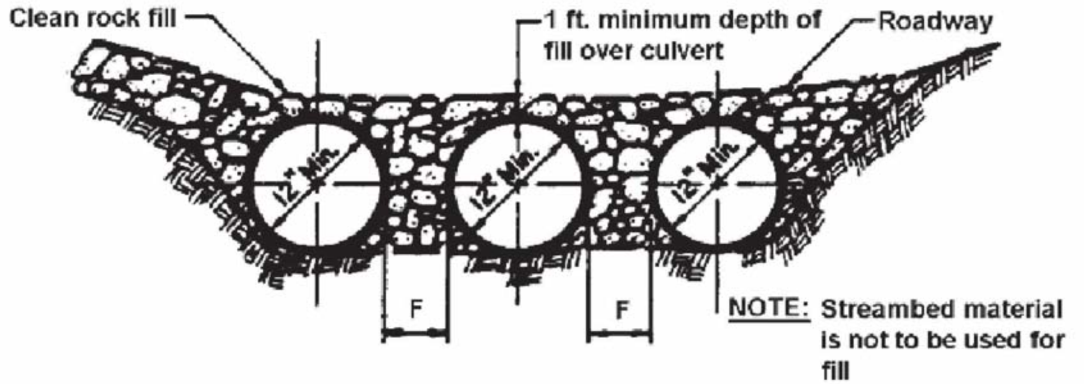
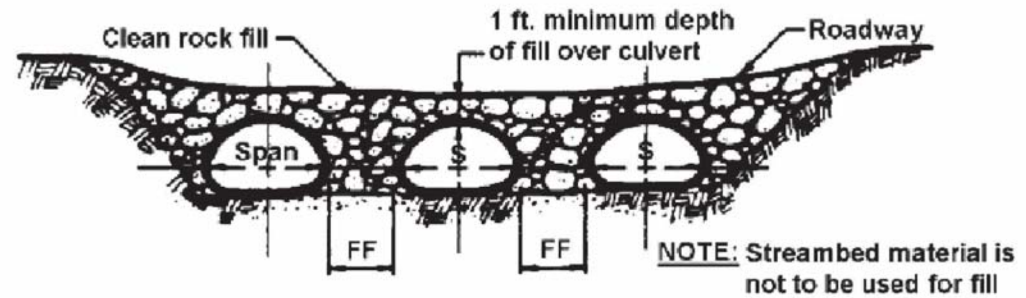
2





SECTIONS

NOT TO SCALE

TABLE 3.5 – MINIMUM DISTANCE BETWEEN CULVERT PIPES

PIPE DIAMETER	MIMIMUM DISTANCE (F)
12" TO 24"	12"
24" TO 72"	½ DIAMETER (D)
72" TO 120"	36"
PIPE ARCH SIZE (IN.)	MIMIMUM DISTANCE (FF)
18" X 11" TO 25" X 16"	12"
25" X 16" TO 72" X 44"	1/3 SPAN OF PIPE ARCH
ABOVE 72" X 44"	30"

NOTES:

1. MULTIPLE PIPES AND MULTIPLE SPAN BRIDGES AND CULVERTS WHICH MAY TEND TO COLLECT DEBRIS, CONTRIBUTE TO THE FORMATION OF ICE JAMS AND INCREASE HEAD LOSSES SHALL BE AVOIDED TO THE MAXIMUM EXTENT PRACTICABLE. CROSSINGS OF LESS THAN 15 FEET SHALL BE BY ONE SPAN, EXCEPT WHERE CONDITIONS MAKE IT IMPRACTICAL TO AFFECT THE CROSSING WITHOUT MULTIPLE SPANS (PA. DEP).

2. PROVIDE 50' STABILIZED ACCESS TO CROSSING ON BOTH SIDES OF STREAM CHANNEL (STANDARD CONSTRUCTION DETAIL AA-TYP-0018).

3. PIPES SHALL EXTEND BEYOND THE TOE OF THE ROADWAY.

4. RUNOFF FROM THE ROADWAY SHALL BE DIVERTED OFF THE ROADWAY AND INTO A SEDIMENT REMOVAL BMP BEFORE IT REACHES THE ROCK APPROACH TO THE CROSSING.

5. MAINTENANCE:
   a. TEMPORARY STREAM CROSSINGS SHALL BE INSPECTED ON A DAILY BASIS.

   b. DAMAGED CROSSINGS SHALL BE REPAIRED WITHIN 24 HOURS OF THE INSPECTION AND BEFORE ANY SUBSEQUENT USE.

   c. SEDIMENT DEPOSITS ON THE CROSSING OR ITS APPROACHES SHALL BE REMOVED WITHIN 24 HOURS OF THE INSPECTION.

6. AS SOON AS THE TEMPORARY CROSSING IS NO LONGER NEEDED, IT SHALL BE REMOVED. ALL MATERIALS SHALL BE DISPOSED OF PROPERLY AND DISTURBED AREAS STABILIZED.

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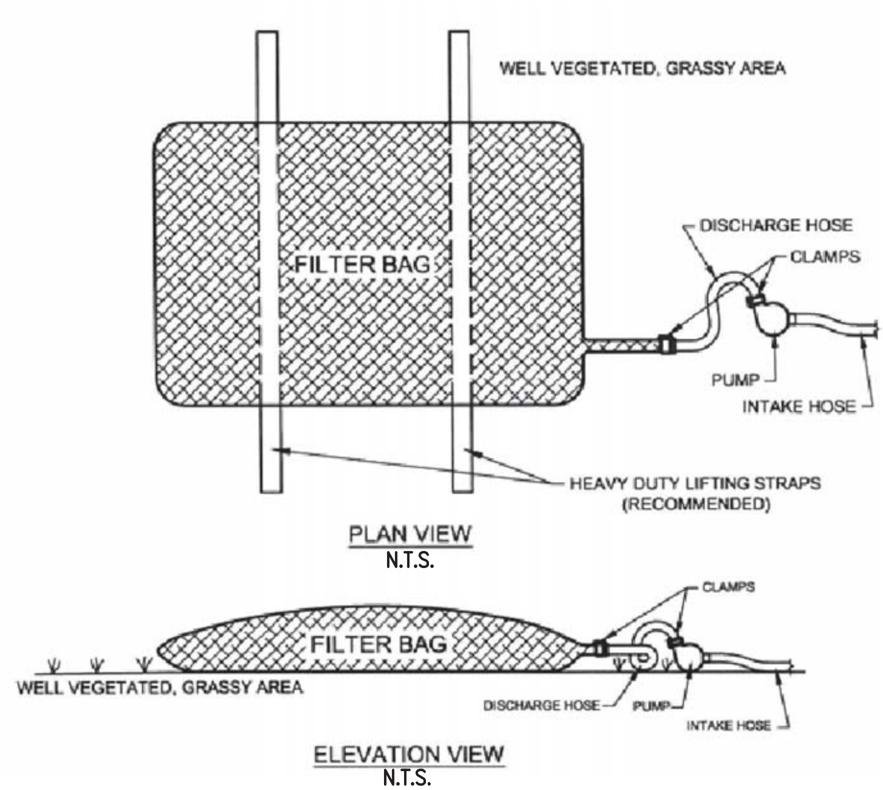
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

TSC.2

TEMPORARY STREAM CROSSING
MULTI PIPES

Williams.

3



LOW VOLUME FILTER BAGS SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH, DOUBLE STITCHED "J" TYPE THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS. HIGH VOLUME FILTER BAGS MAY BE MADE FROM WOVEN GEOTEXTILES THAT MEET THE FOLLOWING STANDARDS:

PROPERTY	TEST METHOD	MINIMUM STANDARD
AVG. WIDE WIDTH STRENGTH	ASTM D-4884	60 LB/IN
GRAB TENSILE	ASTM D-4632	205 LB
PUNCTURE	ASTM D-4833	110 LB
MULLEN BURST	ASTM D-3786	350 PSI
UV RESISTANCE	ASTM D-4355	70%
AOS % RETAINED	ASTM D-4751	80 SIEVE

A SUITABLE MEANS OF ACCESSING THE BAG WITH MACHINERY REQUIRED FOR DISPOSAL PURPOSES MUST BE PROVIDED. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME ½ FULL OF SEDIMENT. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FILLED. BAGS TO BE PLACED ON STRAPS TO FACILITATE REMOVAL UNLESS BAGS COME WITH LIFTING STRAPS ALREADY ATTACHED.

BAGS SHALL BE LOCATED IN WELL-VEGETATED (GRASSY) AREA, AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE UNDERLAYMENT AND FLOW PATH SHALL BE PROVIDED. BAGS MAY BE PLACED ON FILTER STONE TO INCREASE DISCHARGE CAPACITY. BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%. FOR SLOPES EXCEEDING 5%, CLEAN ROCK OR OTHER NON-ERODIBLE AND NON-POLLUTING MATERIAL MAY BE PLACED UNDER THE BAG TO REDUCE SLOPE STEEPNESS.

NO DOWNSLOPE SEDIMENT BARRIER IS REQUIRED FOR MOST INSTALLATIONS. COMPOST BERM OR COMPOST FILTER SOCK TO BE INSTALLED BELOW BAGS LOCATED IN HQ OR EV WATERSHEDS, WITHIN 50 FEET OF ANY RECEIVING SURFACE WATER OR WHERE GRASSY AREA IS NOT AVAILABLE.

THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED. A PIECE OF PVC PIPE IS RECOMMENDED FOR THIS PURPOSE.

THE PUMPING RATE SHALL BE NO GREATER THAN 750 GPM OR ½ THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHALL BE FLOATING AND SCREENED.

FILTER BAGS SHALL BE INSPECTED DAILY. IF ANY PROBLEM IS DETECTED, PUMPING SHALL CEASE IMMEDIATELY AND NOT RESUME UNTIL THE PROBLEM IS CORRECTED.

ADAPTED FROM PA DEP

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

PWB PUMP WATER FILTER BAG

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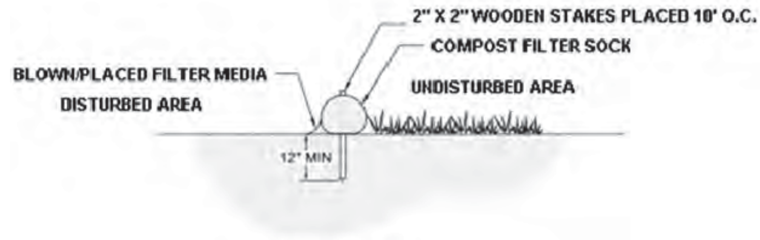
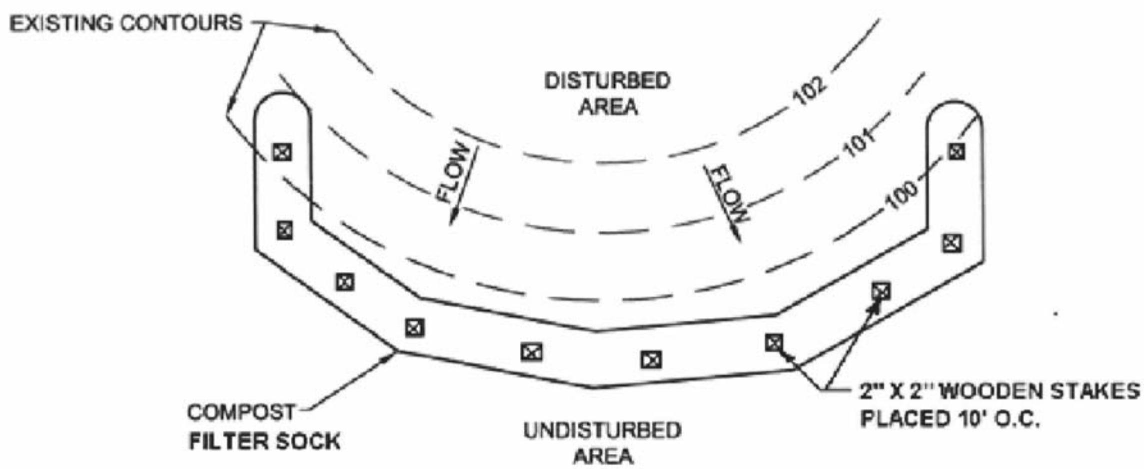
4



SECTION VIEW
NTS



PLAN VIEW
NOT TO SCALE

1. COMPOST FILTER SOCK SHALL BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE SOCK SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN SOCK ALIGNMENT (FIGURE 4.1, PA DEP BMP MANUAL MARCH 2012). MAXIMUM SLOPE LENGTH ABOVE ANY SOCK SHALL NOT EXCEED THAT SHOWN ON FIGURE 4.2. (FIGURE 4.1, PA DEP BMP MANUAL MARCH 2012). STAKES MAY BE INSTALLED IMMEDIATELY DOWNSLOPE OF THE SOCK IF SO SPECIFIED BY THE MANUFACTURER.

2. TRAFFIC SHALL NOT BE PERMITTED TO CROSS COMPOST SOCKS.

3. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES $\frac{1}{2}$ THE ABOVE GROUND HEIGHT OF THE SOCK AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN.

4. SOCKS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED SOCKS SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION.

5. BIODEGRADABLE COMPOST SOCKS SHALL BE REPLACED AFTER 6 MONTHS; PHOTODEGRADABLE SOCKS AFTER 1 YEAR. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

6. UPON STABILIZATION OF THE AREA TRIBUTARY TO THE SOCK, STAKES SHALL BE REMOVED. THE SOCK MAY BE LEFT IN PLACE AND VEGETATED OR REMOVED. IN THE LATTER CASE, THE MESH SHALL BE CUT OPEN AND THE MULCH SPREAD AS A SOIL SUPPLEMENT

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

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CFS STANDARD CONSTRUCTION DETAIL # 4–1
COMPOST FILTER SOCK

5a
1 OF 2

TABLE 4.1.
COMPOST SOCK FABRIC MINIMUM SPECIFICATIONS

Material Type	3 mil HDPE	5 mil HDPE	5 mil HDPE	Multi-Filament Polypropylene (MFPP)	Heavy Duty Multi-Filament Polypropylene (HDMFPP)
Material Characteristics	Photo-degradable	Photo-degradable	Bio-degradable	Photo-degradable	Photo-degradable
Sock Diameters	12" 18"	12" 18" 24" 32"	12" 18" 24" 32"	12" 18" 24" 32"	12" 18" 24" 32"
Mesh Opening	3/8"	3/8"	3/8"	3/8"	1/8"
Tensile Strength		26 psi	26 psi	44 psi	202 psi
Ultraviolet Stability % Original Strength (ASTM G-155)	23% at 1000 hr.	23% at 1000 hr.		100% at 1000 hr.	100% at 1000 hr.
Minimum Functional Longevity	6 months	9 months	6 months	1 year	2 years
Two-ply systems					
Inner Containment Netting	HDPE biaxial net				
	Continuously wound				
	Fusion-welded junctures				
	3/4" X 3/4" Max. aperture size				
Outer Filtration Mesh	Composite Polypropylene Fabric (Woven layer and non-woven fleece mechanically fused via needle punch)				
	3/16" Max. aperture size				
Sock fabrics composed of burlap may be used on projects lasting 6 months or less.					

SOCK FABRIC SHALL MEET STANDARDS OF TABLE 4.1.
COMPOST SHALL MEET THE FOLLOWING STANDARDS:

ORGANIC MATTER CONTENT	80%–100% (DRY WEIGHT BASIS
ORGANIC PORTION	FIBROUS AND ELONGATED
pH	5.5 – 8.0
MOISTURE CONTENT	35% – 55%
PARTICLE SIZE	98% PASS THROUGH 1" SCREEN
SOLUBLE SALT CONCENTRATION	5.0 DS/M (MMHOS/CM) MAXIMUM

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STANDARD ENVIRONMENTAL DETAIL

CFS STANDARD CONSTRUCTION DETAIL # 4–1
COMPOST FILTER SOCK

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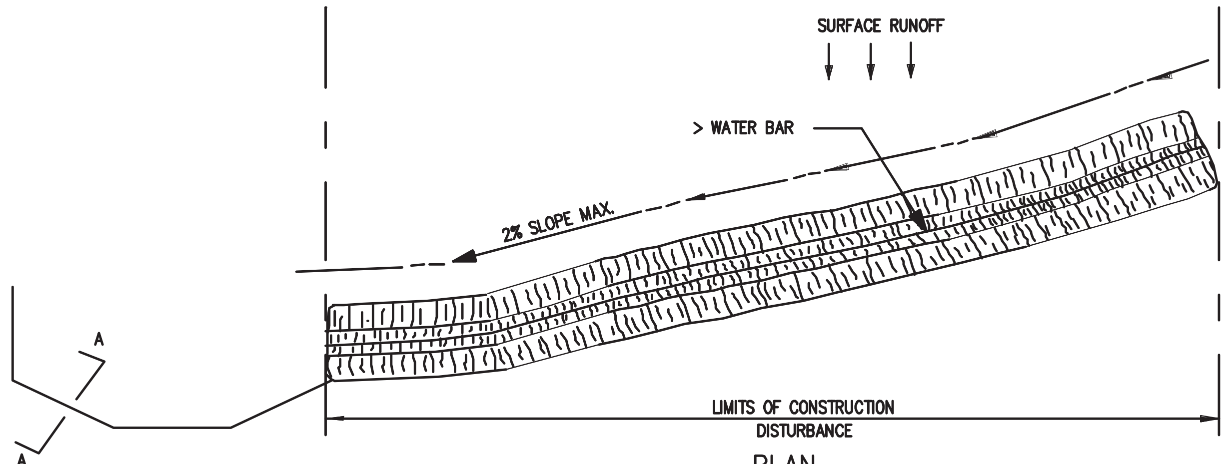
5b
2 OF 2



PLAN
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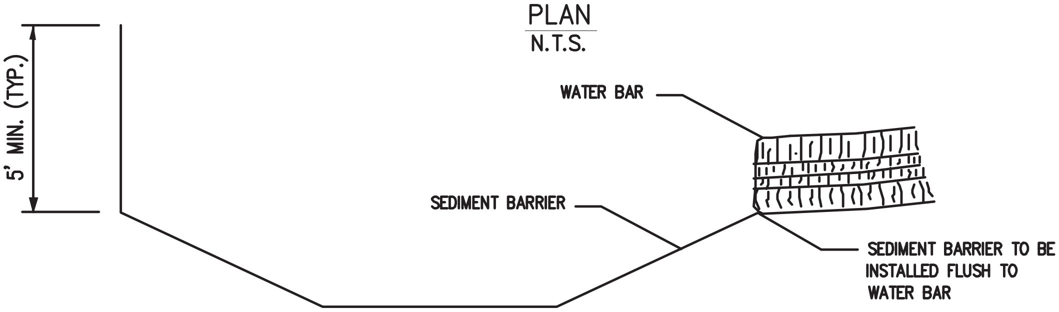

PLAN DETAIL
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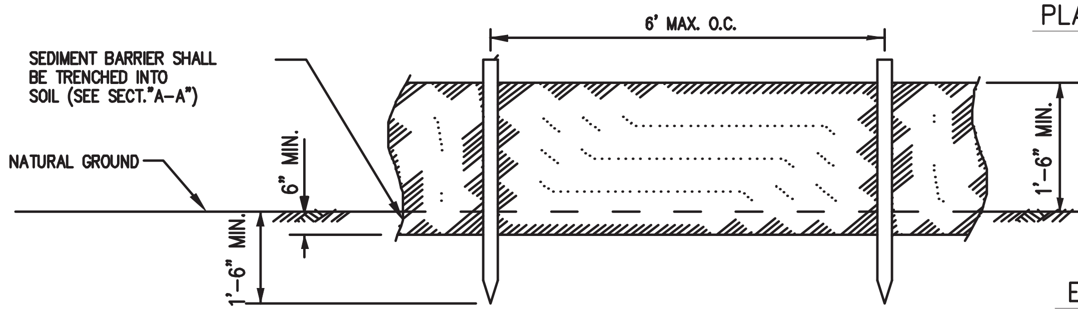
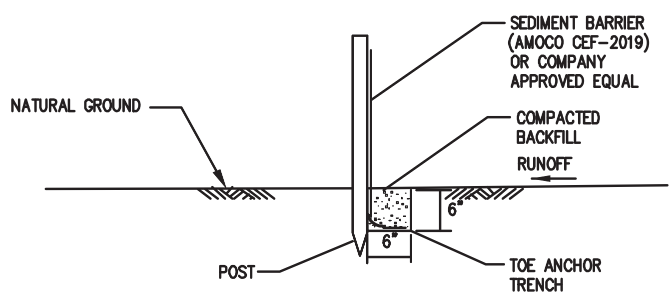


ELEVATION
N.T.S.



SEDIMENT BARRIER
VERTICAL SECTION A–A
N.T.S.

NOTES:

1. SEDIMENT BARRIER HOOKS SHALL BE PLACED AT THE OUTLET OF WATER BARS AS SHOWN ON THE PLAN.

2. ONCE THE DISTURBED AREA IS STABILIZED, THE SEDIMENT BARRIER HOOK SHALL BE REMOVED AND ANY DISTURBED AREAS CAUSED BY REMOVAL SHALL BE RETURNED TO ORIGINAL CONDITION AND REVEGETATED.

3. SEDIMENT SHALL BE REMOVED WHEN IT REACHES 15" OR 1/2 THE HEIGHT OF THE SEDIMENT BARRIER.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

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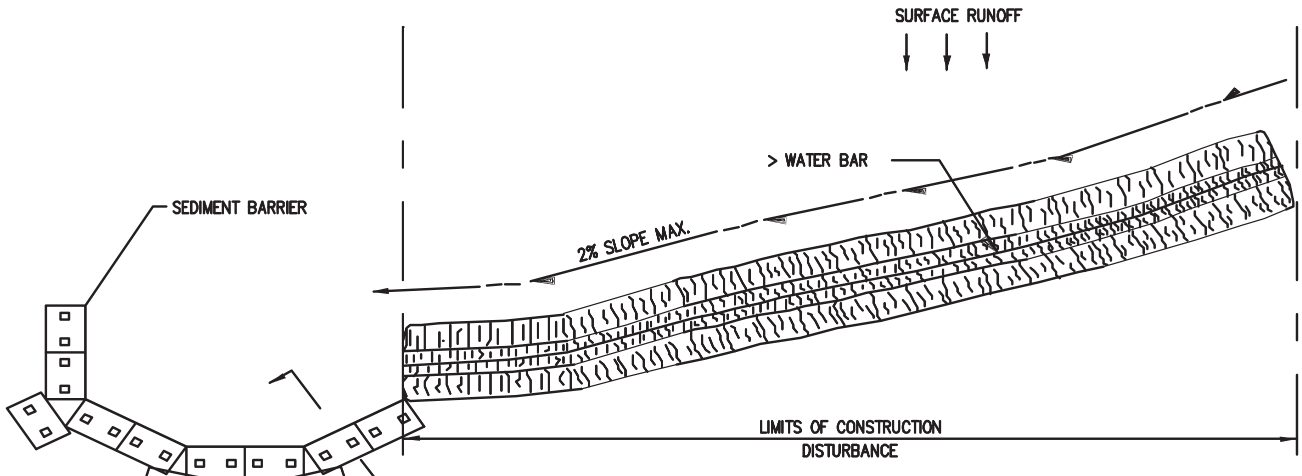
OS1 SEDIMENT BARRIER

6



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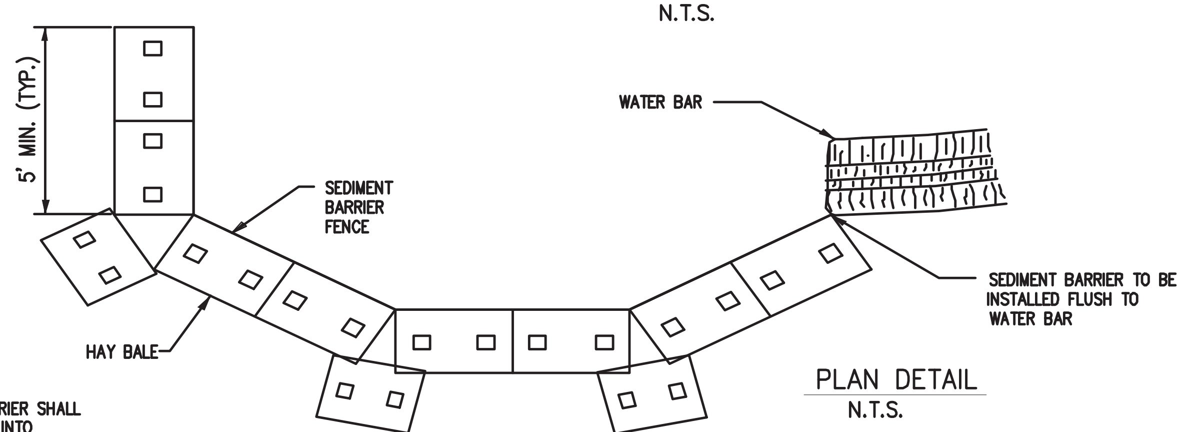

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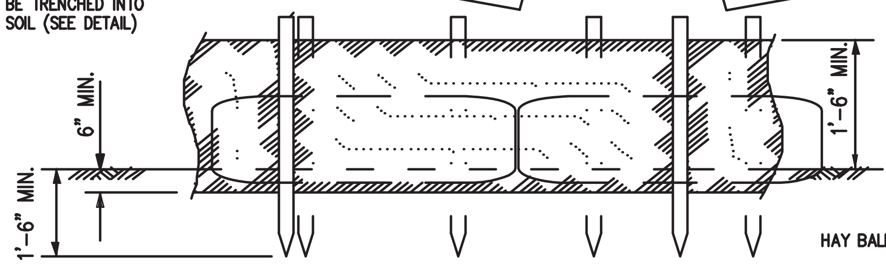
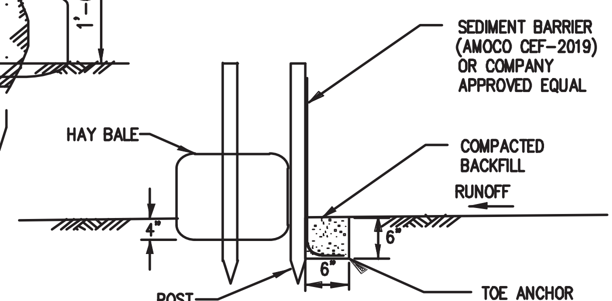


ELEVATION
N.T.S.



TRENCH DETAIL
N.T.S.

NOTES:

1. REINFORCED SEDIMENT BARRIER HOOKS SHALL BE PLACED AT THE OUTLET OF WATER BARS AS SHOWN ON THE PLAN.
2. ONCE THE DISTURBED AREA IS STABILIZED, THE REINFORCED SEDIMENT BARRIER HOOK SHALL BE REMOVED AND ANY DISTURBED AREAS CAUSED BY REMOVAL SHALL BE RETURNED TO ORIGINAL CONDITION AND REVEGETATED.
3. SEDIMENT SHALL BE REMOVED WHEN IT REACHES ONE-THIRD THE HEIGHT OF THE SEDIMENT BARRIER.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

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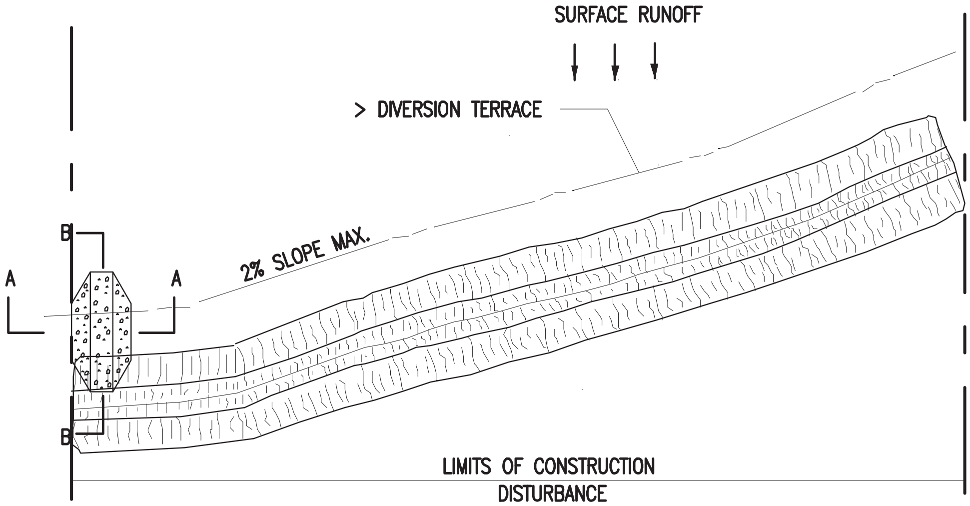
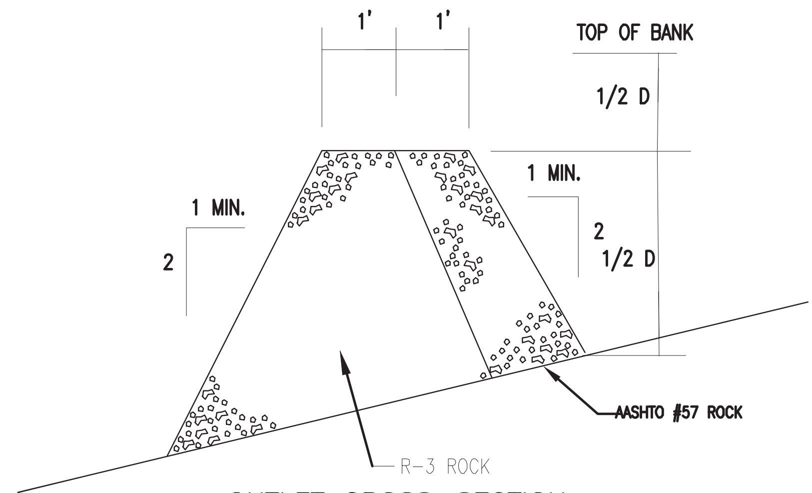
OS2 REINFORCED SEDIMENT BARRIER
HOOK OUTLET STRUCTURE

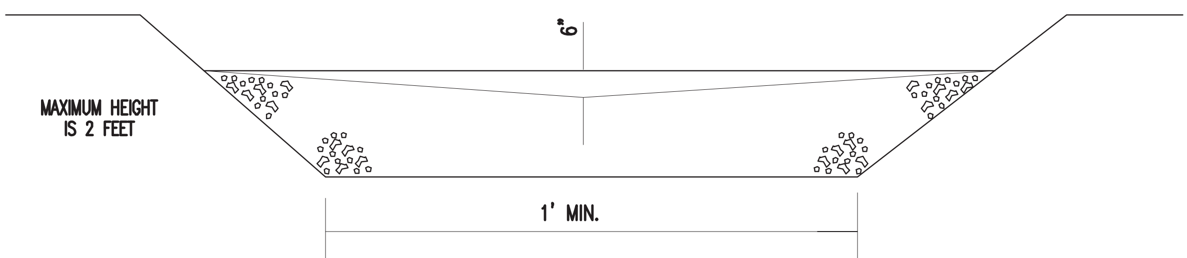
7





OUTLET CROSS-SECTION

SECTION A-A



UP-SLOPE FACE

SECTION B-B

NOTES:

1. ROCK FILTER OUTLETS SHALL BE PLACED WITHIN THE DIVERSION CHANNEL AS SHOWN ON THE PLAN. THE ROCK FILTER OUTLET IS NOT INTENDED TO BE PLACED IN STEAMS, RIVERS, CREEKS OR DITCHES WHICH NORMALLY HAVE FLOWING WATER.
2. ONCE THE DISTURBED AREA IS STABILIZED, THE ROCK FILTER OUTLET SHALL BE REMOVED AND ANY DISTURBED AREAS CAUSED BY REMOVAL SHALL BE RETURNED TO ORIGINAL CONDITION AND REVEGETATED.
3. SEDIMENT MUST BE REMOVED FROM THE ROCK FILTER OUTLET WHEN ACCUMULATIONS REACH 1/3 THE HEIGHT OF THE OUTLET.
4. INSTALL NSA-R3 ROCK AT THE OUTLET SIDE OF THE DIVERSION TERRACE AS SHOWN IN THE DETAIL. AFTER INSTALLING NAS-R2 ROCK, INSTALL AASHTO #57 ROCK AT THE INLET SIDE OF THE ROCK FILTER OUTLET TO CREATE AN ADEQUATE FILTER STONE FACE FOR THE OUTLET STRUCTURE.
5. REFER TO DIVERSION TERRACE DETAIL FOR ADDITIONAL INFORMATION.

ROCK FILTER OUTLET
OUTLET STRUCTURE

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

OS3 ROCK FILTER OUTLET

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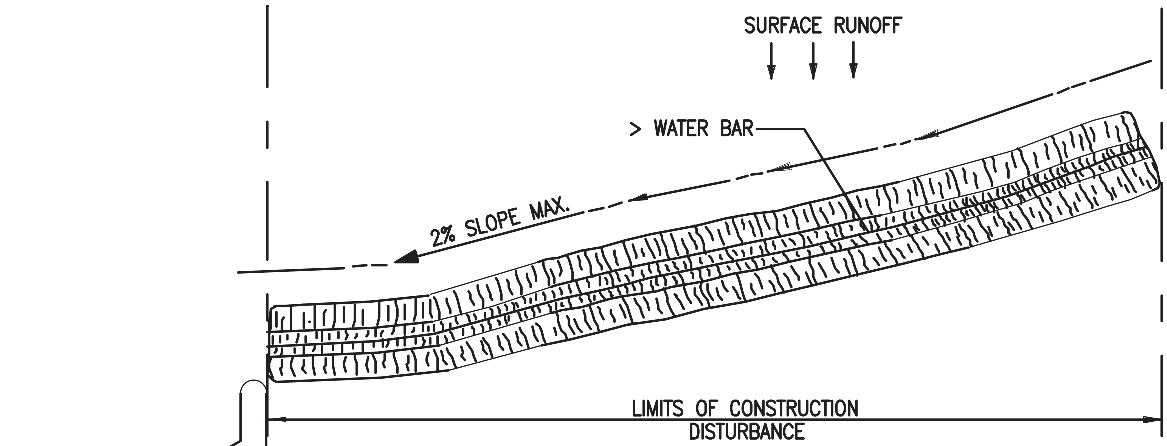

PLAN
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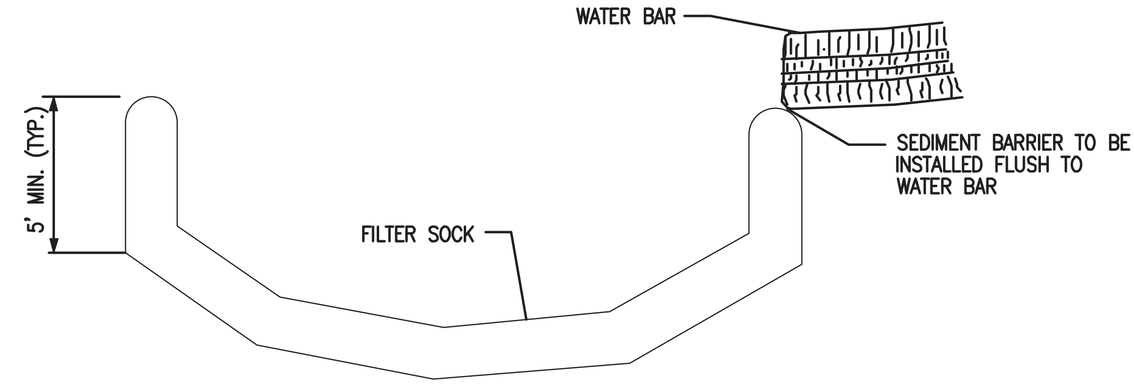
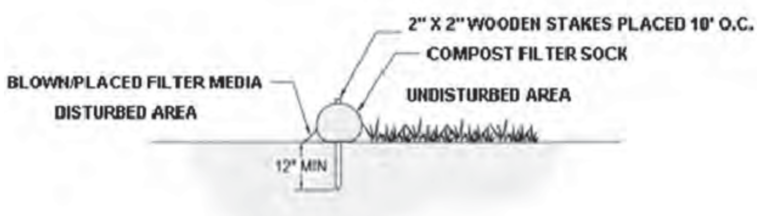


PLAN DETAIL
N.T.S.



SECTION VIEW
NTS

FILTER SOCK
VERTICAL SECTION A–A
N.T.S.

NOTES:

1. SEDIMENT BARRIER HOOKS SHALL BE PLACED AT THE OUTLET OF DIVERSION TERRACES AS SHOWN ON THE PLAN.
2. ONCE THE DISTURBED AREA IS STABILIZED, THE SEDIMENT BARRIER HOOK SHALL BE REMOVED AND ANY DISTURBED AREAS CAUSED BY REMOVAL SHALL BE RETURNED TO ORIGINAL CONDITION AND REVEGETATED.
3. SEDIMENT SHALL BE REMOVED WHEN IT REACHES 15" OR 1/2 THE HEIGHT OF THE SEDIMENT BARRIER.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

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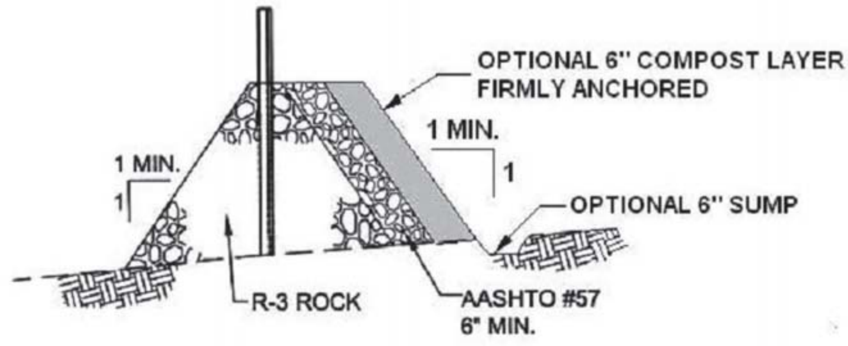
OS4 FILTER SOCK
HOOK OUTLET STRUCTURE

9



OUTLET CROSS-SECTION

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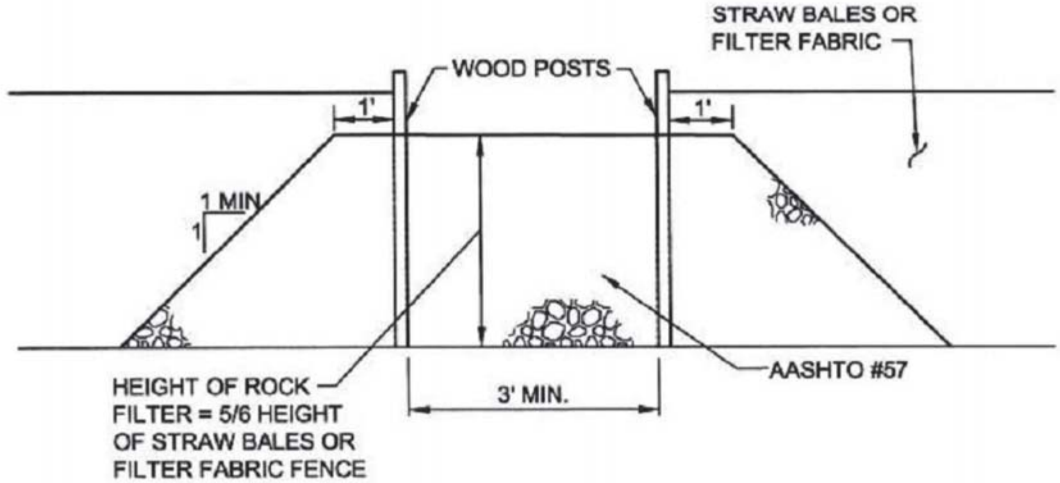

UP-SLOPE FACE

N.T.S.

1. A ROCK FILTER OUTLET SHALL BE INSTALLED WHERE FAILURE OF A STRAW BALE BARRIER OR FILTER FABRIC FENCE HAS OCCURRED DUE TO CONCENTRATED FLOW.

2. SEDIMENT MUST BE REMOVED WHEN ACCUMULATIONS REACH 1/3 THE HEIGHT OF THE OUTLET.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

RFO STANDARD CONSTRUCTION DETAIL # 4-6
ROCK FILTER OUTLET

Williams.

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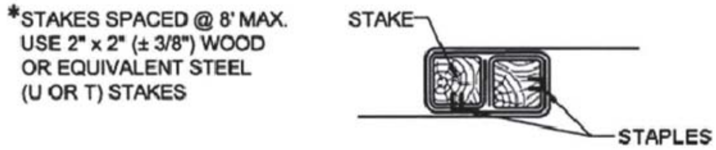
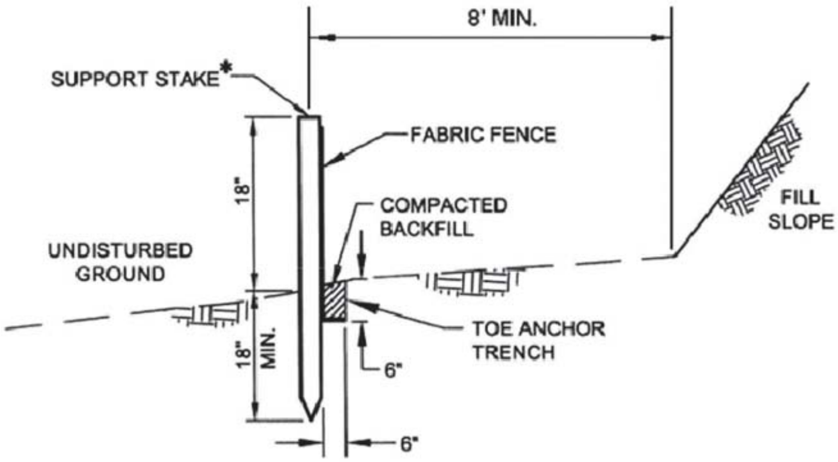


JOINING FENCE SECTIONS



ELEVATION VIEW

N.T.S.

AT A MINIMUM, THE FABRIC SHALL HAVE THE FOLLOWING PROPERTIES:

FABRIC PROPERTY	MINIMUM ACCEPTABLE VALUE	TEST METHOD
GRAB TENSILE STRENGTH (LB)	120	ASTM D1682
ELONGATION AT FAILURE (%)	20% MAX.	ASTM D1682
MULLEN BURST STRENGTH (PSI)	200	ASTM D 3786
TRAPEZOIDAL TEAR STRENGTH (LB)	50	
PUNCTURE STRENGTH (LB)	40	ASTM D 751 (MODIFIED)
SLURRY FLOW RATE (GAL/MIN/SF)	0.3	
EQUIVALENT OPENING SIZE	30	US STD. SIEVE CW-02215
ULTRAVIOLET RADIATION STABILITY (%)	80	ASTM G-26

ADAPTED FROM NEW YORK DEC AND PENN-DOT PUB 408

MAXIMUM SLOPE LENGTHS FOR SILT FENCE

SLOPE-PERCENT	MAXIMUM SLOPE LENGTH (FT)
2 (OR LESS)	150
5	100
10	50
15	35
20	25
25	20
30	15
35	15
40	15
45	10
50	10

ADAPTED FROM PA DEP

1. FABRIC WIDTH SHALL BE 30" MINIMUM. STAKES SHALL BE HARDWOOD OR EQUIVALENT STEEL (U OR T) STAKES.
2. SILT FENCE MUST BE PLACED AT LEVEL EXISTING GRADE. BOTH ENDS OF THE FENCE SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT (SEE FIGURE 4.1).
3. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH ½ THE ABOVE GROUND HEIGHT OF THE FENCE.
4. ANY SECTION OF SILT FENCE WHICH HAS BEEN UNDERMINED OR TOPPED SHALL BE IMMEDIATELY REPLACED WITH A ROCK FILTER OUTLET (STANDARD CONSTRUCTION DETAIL # 4-6).
5. FENCE SHALL BE REMOVED AND PROPERLY DISPOSED OF WHEN TRIBUTARY AREA IS PERMANENTLY STABILIZED.
6. SILT FENCE SHOULD BE PLACED ON CONTOURS TO THE EXTENT PRACTICAL. SILT FENCE SHOULD NOT BE USED TO DELINEATE THE LIMITS OF THE CONSTRUCTION RIGHT-OF-WAY.
7. SILT FENCE IS NOT ALLOWED IN CERTAIN SPECIAL PROTECTION WATERSHEDS; SILT SOCKS SHALL BE USED.

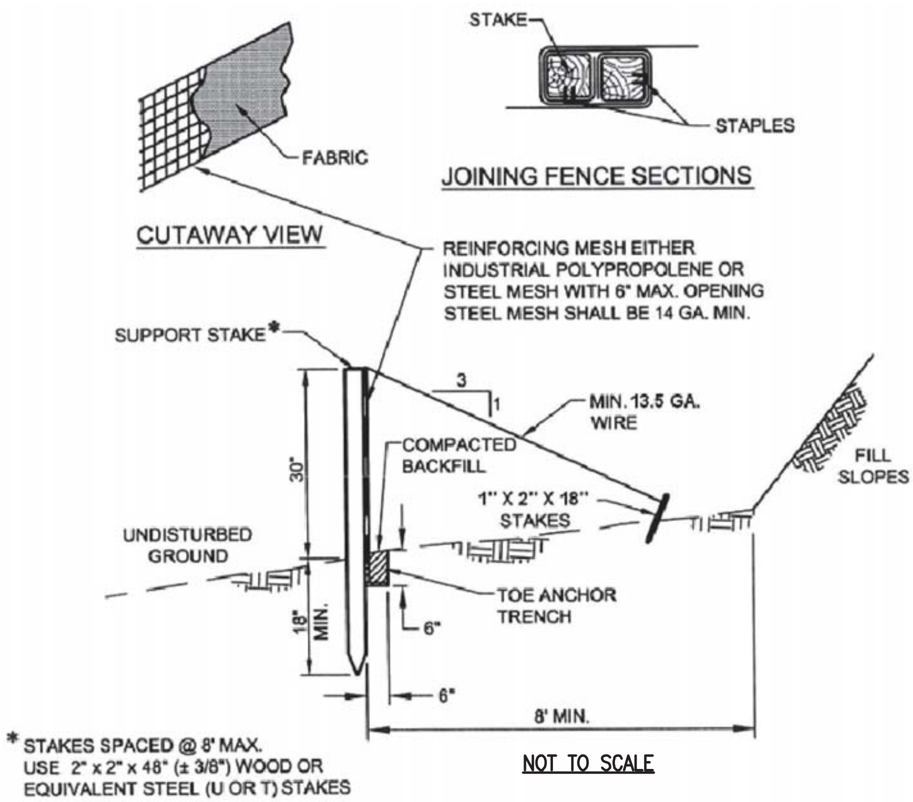
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	03/24/15	MF	ISSUED FOR FERC FILING	1161503	EL	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

SF STANDARD CONSTRUCTION DETAIL #4-7
STANDARD SILT FENCE (18" HIGH)

Williams.

11



* STAKES SPACED @ 8' MAX.
USE 2" x 2" x 48" (± 3/8") WOOD OR EQUIVALENT STEEL (U OR T) STAKES

NOT TO SCALE

AT A MINIMUM, THE FABRIC SHALL HAVE THE FOLLOWING PROPERTIES:

FABRIC PROPERTY	MINIMUM ACCEPTABLE VALUE	TEST METHOD
GRAB TENSILE STRENGTH (LB)	120	ASTM D1682
ELONGATION AT FAILURE (%)	20% MAX.	ASTM D1682
MULLEN BURST STRENGTH (PSI)	200	ASTM D 3786
TRAPEZOIDAL TEAR STRENGTH (LB)	50	
PUNCTURE STRENGTH (LB)	40	ASTM D 751 (MODIFIED)
SLURRY FLOW RATE (GAL/MIN/SF)	0.3	
EQUIVALENT OPENING SIZE	30	US STD. SIEVE CW-02215
ULTRAVIOLET RADIATION STABILITY (%)	80	ASTM G-26

ADAPTED FROM NEW YORK DEC AND PENN-DOT PUB 408

MAXIMUM SLOPE LENGTHS FOR REINFORCED SILT FENCE

SLOPE-PERCENT	MAXIMUM SLOPE LENGTH (FT)
2 (OR LESS)	500
5	250
10	150
15	100
20	70
25	55
30	45
35	40
40	35
45	30
50	25

ADAPTED FROM PA DEP

1. FABRIC WIDTH SHALL BE 42" MINIMUM. STAKES SHALL BE HARDWOOD OR EQUIVALENT STEEL (U OR T) STAKES. 18" SUPPORT STAKE SHALL BE DRIVEN 12" MIN. INTO UNDISTURBED GROUND.
2. SILT FENCE SHALL BE INSTALLED AT EXISTING LEVEL GRADE. BOTH ENDS OF EACH FENCE SECTION SHALL BE EXTENDED AT LEAST 8 FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT (FIGURE 4.1).
3. SEDIMENT SHALL BE REMOVED WHERE ACCUMULATIONS REACH ½ THE ABOVE GROUND HEIGHT OF THE FENCE.
4. ANY SECTION OF SILT FENCE WHICH HAS BEEN UNDERMINED OR TOPPED SHALL BE IMMEDIATELY REPLACED WITH A ROCK FILTER OUTLET (STANDARD CONSTRUCTION DETAIL # 4-6).
5. FENCE SHALL BE REMOVED AND PROPERLY DISPOSED OF WHEN TRIBUTAR AREA IS PERMANENTLY STABILIZED.
6. SILT FENCE SHOULD BE PLACED ON CONTOURS TO THE EXTENT PRACTICAL. SILT FENCE SHOULD NOT BE USED TO DELINEATE THE LIMITS OF THE CONSTRUCTION RIGHT-OF-WAY.
7. SILT FENCE IS NOT ALLOWED IN CERTAIN SPECIAL PROTECTION WATERSHEDS; SILT SOCKS SHALL BE USED.

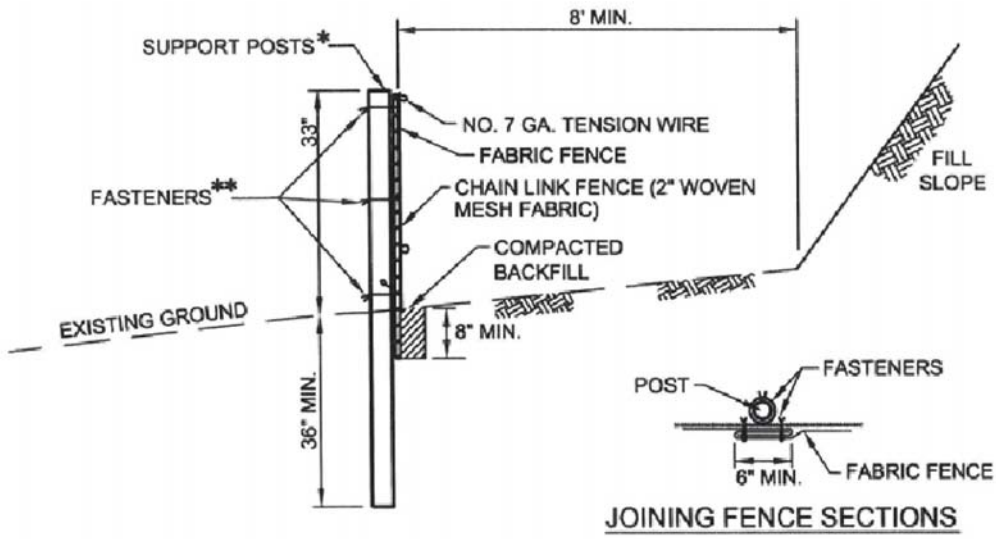
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	03/24/15	MF	ISSUED FOR FERC FILING	1161503	EL	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

Williams.

RSF STANDARD CONSTRUCTION DETAIL #4-8
REINFORCED SILT FENCE (30" HIGH)

12



NOT TO SCALE

* POSTS SPACED @ 10' MAX. USE 2 1/2" DIA. HEAVY DUTY GALVANIZED OR ALUMINUM POSTS.

** CHAIN LINK TO POST FASTENERS SPACED @ 14" MAX. USE NO. 9 GA. ALUMINUM WIRE OR NO. 9 GALVANIZED STEEL PRE-FORMED CLIPS. CHAIN LINK TO TENSION WIRE FASTENERS SPACED @ 60" MAX. USE NO. 13.5 GA. GALVANIZED STEEL WIRE. FABRIC TO CHAIN FASTENERS SPACED @ 24" MAX C. TO C.

AT A MINIMUM, THE FABRIC SHALL HAVE THE FOLLOWING PROPERTIES:

FABRIC PROPERTY	MINIMUM ACCEPTABLE VALUE	TEST METHOD
GRAB TENSILE STRENGTH (LB)	120	ASTM D1682
ELONGATION AT FAILURE (%)	20% MAX.	ASTM D1682
MULLEN BURST STRENGTH (PSI)	200	ASTM D 3786
TRAPEZOIDAL TEAR STRENGTH (LB)	50	
PUNCTURE STRENGTH (LB)	40	ASTM D 751 (MODIFIED)
SLURRY FLOW RATE (GAL/MIN/SF)	0.3	
EQUIVALENT OPENING SIZE	30	US STD. SIEVE CW-02215
ULTRAVIOLET RADIATION STABILITY (%)	80	ASTM G-26

ADAPTED FROM NEW YORK DEC
AND PENN-DOT PUB 408

MAXIMUM SLOPE LENGTHS FOR SUPER SILT FENCE

SLOPE-PERCENT	MAXIMUM SLOPE LENGTH (FT)
2 (OR LESS)	1000
5	550
10	325
15	215
20	175
25	135
30	100
35	85
40	75
45	60
50	50

ADAPTED FROM PA DEP

1. FILTER FABRIC WIDTH SHALL BE 42" MINIMUM.
2. POSTS SHALL BE INSTALLED USING A POSTHOLE DRILL.
3. CHAIN LINK SHALL BE GALVANIZED NO. 11.5 GA. STEEL WIRE WITH 2¼" OPENING, NO. 11 GA. ALUMINUM COATED STEEL WIRE IN ACCORDANCE WITH ASTM-A-491, OR GALVANIZED NO. 9 GA. STEEL WIRE TOP AND BOTTOM WITH GALVANIZED NO. 11 GA. STEEL INTERMEDIATE WIRES. NO. 7 GAGE
4. TENSION WIRE TO BE INSTALLED HORIZONTALLY THROUGH HOLES AT TOP AND BOTTOM OF CHAIN-LINK FENCE OR ATTACHED WITH HOG RINGS AT 5' (MAX.) CENTERS.
5. SILT FENCE SHALL BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE FENCE SHALL BE EXTENDED AT LEAST 8 FEET UPSLOPE AT 45 DEGREES TO MAIN BARRIER ALIGNMENT (FIGURE 4.1).
6. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH ½ THE ABOVE GROUND HEIGHT OF THE FENCE.
7. FENCE SHALL BE REMOVED AND PROPERLY DISPOSED OF WHEN TRIBUTARY AREA IS PERMANENTLY STABILIZED.
8. SILT FENCE SHOULD BE PLACED ON CONTOURS TO THE EXTENT PRACTICAL. SILT FENCE SHOULD NOT BE USED TO DELINEATE THE LIMITS OF THE CONSTRUCTION RIGHT-OF-WAY.
9. SILT FENCE IS NOT ALLOWED IN CERTAIN SPECIAL PROTECTION WATERSHEDS; SILT SOCKS SHALL BE USED.

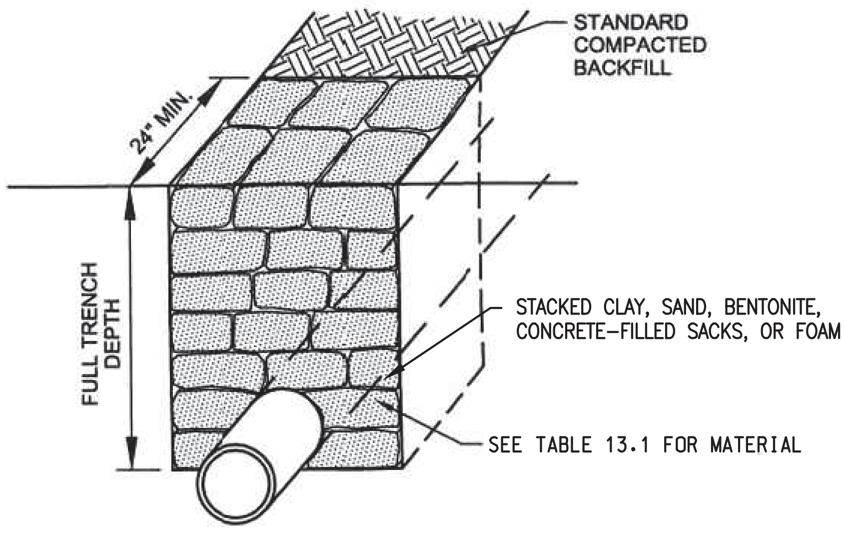
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	03/24/15	MF	ISSUED FOR FERC FILING	1161503	EL	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

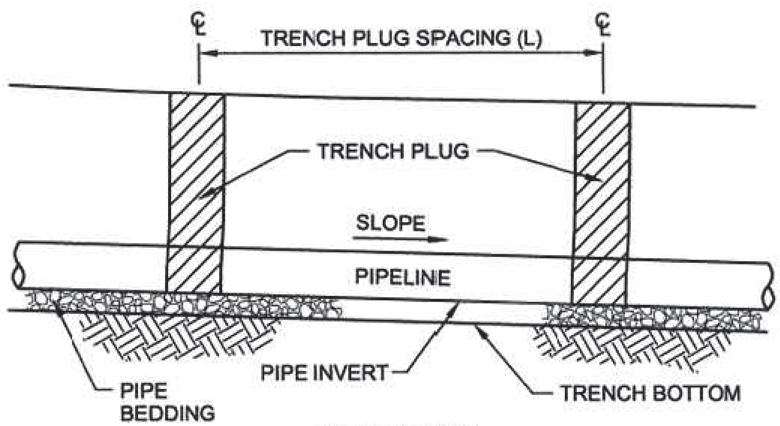
Williams.

SSF STANDARD CONSTRUCTION DETAIL #4-10
SUPER SILT FENCE (30" HIGH)

13



SECTION VIEW
NOT TO SCALE



ELEVATION
NOT TO SCALE

TABLE 13.1
MAXIMUM SPACING AND MATERIALS FOR TRENCH PLUGS

SEE TABLE 13.1 FOR MATERIAL

TRENCH SLOPE (%)	SPACING L (FT)	
<5	1,000	
5 – 15	500	
15 – 25	300	
25 – 35	200	
35 – 100	100	
>100	50	

*TOPSOIL MAY NOT BE USED TO FILL SACKS.

IMPERVIOUS TRENCH PLUGS ARE REQUIRED FOR ALL STREAM, RIVER, WETLAND, OR OTHER WATER BODY CROSSINGS.

ADAPTED FROM MARYLAND DOE

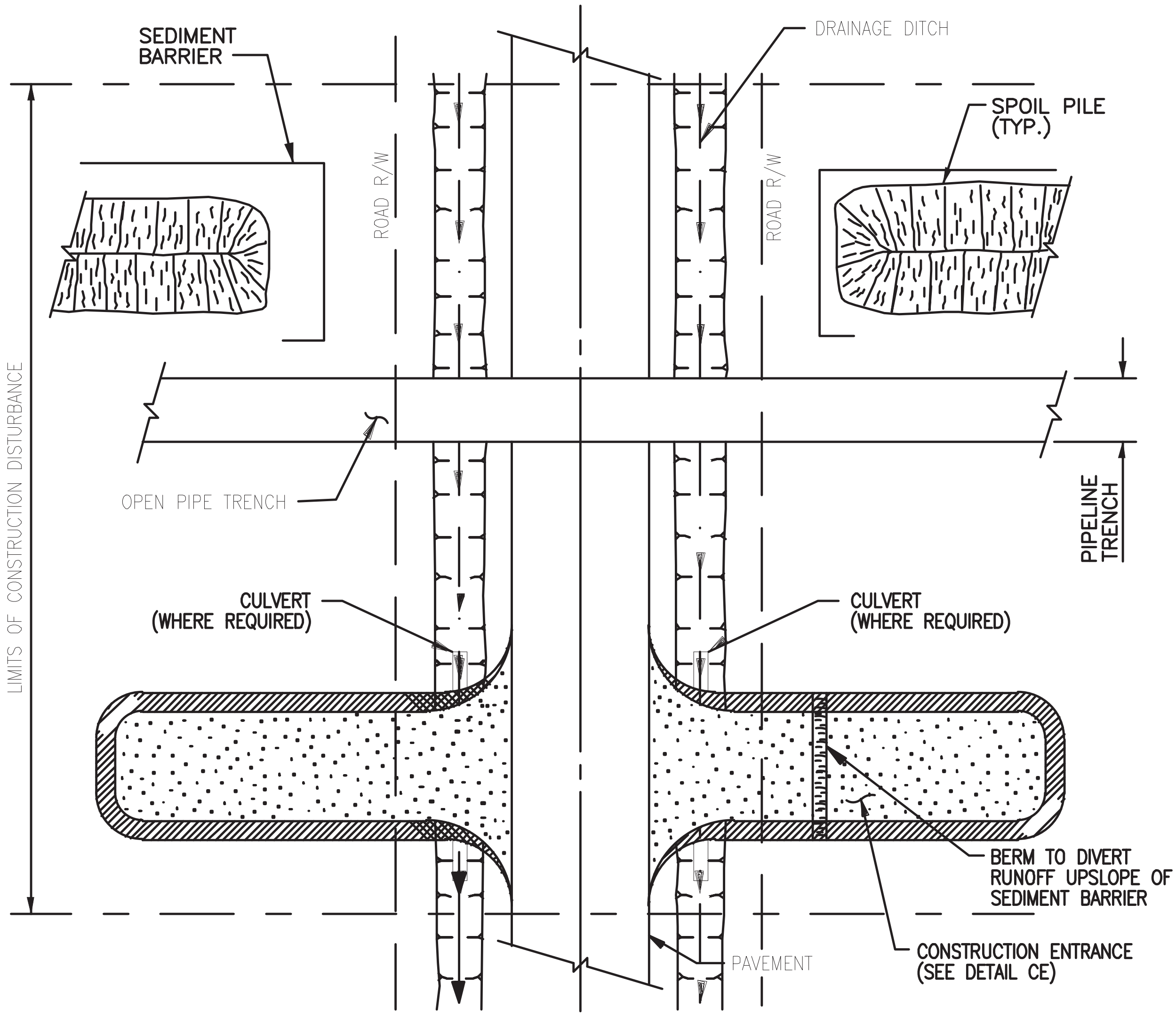
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	03/24/15	MF	ISSUED FOR FERC FILING	1161503	EL	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

Williams.

TP TRENCH PLUG INSTALLATION

14



PLAN

N.T.S.

NOTES:

1. SEDIMENT BARRIER SHALL BE INSTALLED AT THE BASE OF SLOPES ADJACENT TO ROAD CROSSINGS WHERE VEGETATION IS DISTURBED, TO INTERCEPT SURFACE RUNOFF.
2. PROTECTION FOR SPOIL PILES SHALL BE INSTALLED ONLY WHERE SEDIMENT BARRIERS ACROSS THE ENTIRE DISTURBED AREA ARE NOT REQUIRED.
3. SEDIMENT BARRIERS SHALL REMAIN IN PLACE UNTIL PERMANENT REVEGETATION IS ESTABLISHED.
4. CULVERTS TO BE SIZED AND PLACED WHERE REQUIRED TO MAINTAIN WATER FLOW.
5. CONTRACTOR SHALL BE REQUIRED TO KEEP THE ROAD CLEAN OF DEBRIS AT ALL TIMES.
6. CONTRACTOR MAY ELECT TO UTILIZE SHEET PILING IN ORDER TO STABILIZE PIPE TRENCH.
7. CONTRACTOR MAY ELECT TO UTILIZE WELL-POINTS IN ORDER TO REDUCE THE WATER TABLE PRIOR TO COMMENCING EXCAVATION.
8. DEPENDING ON TOPOGRAPHY AND STATE REQUIREMENTS, SEDIMENT BARRIER MAY BE REQUIRED ACROSS THE ENTIRE CONSTRUCTION RIGHT-OF-WAY AT THE EDGE OF ROAD. IN ADDITION TO THIS DETAIL, REFER TO THE ENVIRONMENTAL ALIGNMENT DRAWINGS FOR PLACEMENT OF SEDIMENT BARRIERS.
9. CONSTRUCTION ENTRANCE NEEDED AS SHOWN ON SPECIFIC PLAN.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	03/24/15	MF	ISSUED FOR FERC FILING	1161503	EL	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

RX.1 TRENCHED ROAD CROSSING

Williams.

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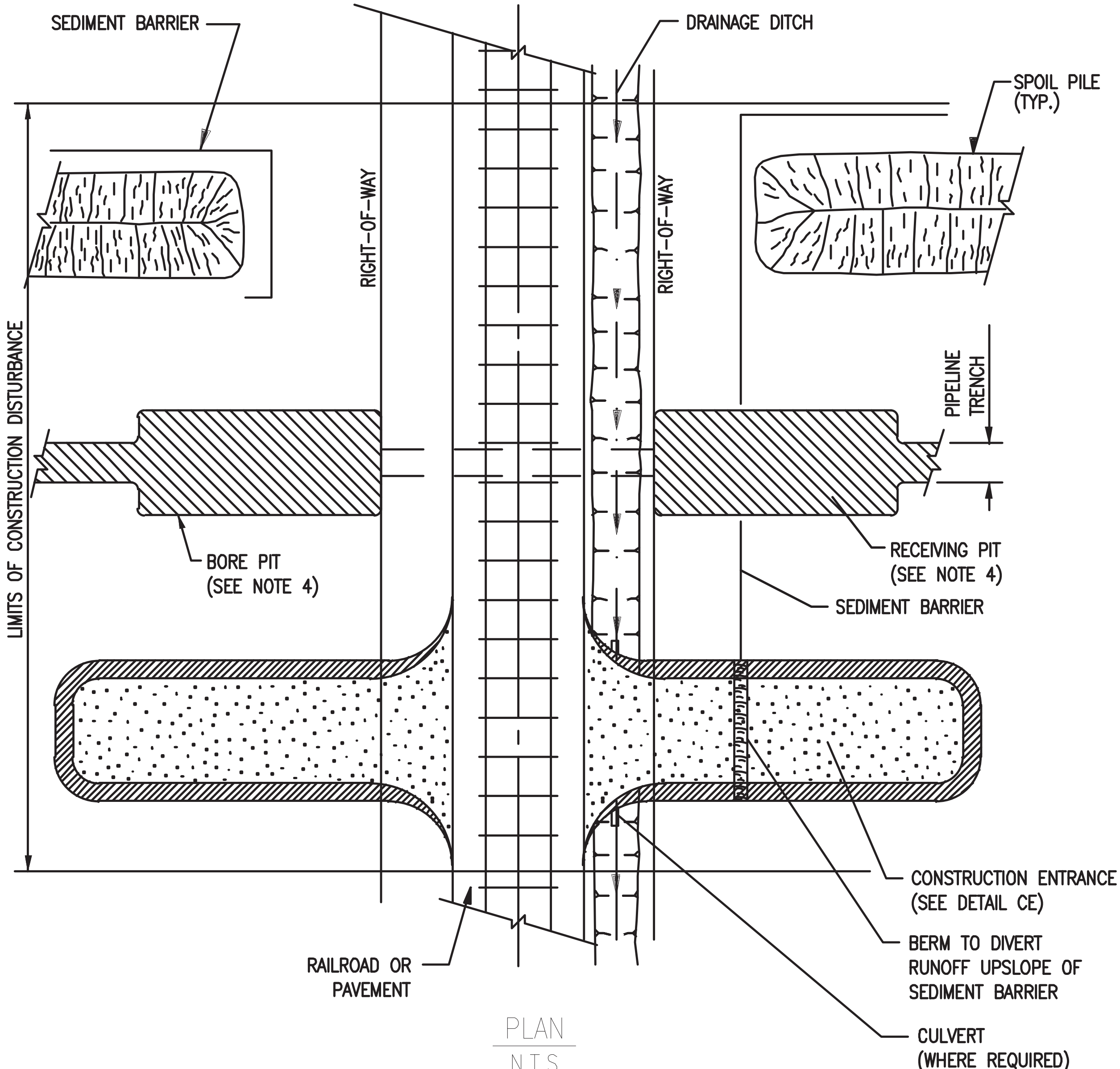


PLAN
N.T.S.

NOTES:

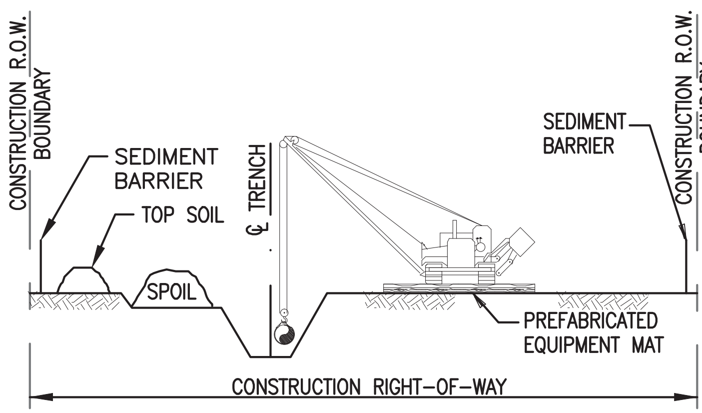
1. SEDIMENT BARRIER SHALL BE INSTALLED AT THE BASE OF SLOPES ADJACENT TO ROAD CROSSINGS WHERE VEGETATION IS DISTURBED, TO INTERCEPT SURFACE RUNOFF.
2. PROTECTION FOR SPOIL PILES SHALL BE INSTALLED ONLY WHERE SEDIMENT BARRIERS ACROSS THE ENTIRE DISTURBED AREA ARE NOT REQUIRED.
3. SEDIMENT BARRIERS SHALL REMAIN IN PLACE UNTIL PERMANENT REVEGETATION IS ESTABLISHED.
4. WATER REMOVED FROM BORE PIT AND RECEIVING PIT SHALL BE FILTERED THROUGH A DEWATERING STRUCTURE OR FILTER BAG.
5. IF WELL POINTING IS REQUIRED PRIOR TO EXCAVATING BORE PITS, CONTRACTOR SHALL CONSULT WITH COMPANY'S ENVIRONMENTAL INSPECTOR PRIOR TO COMMENCEMENT OF WORK IN ORDER TO DETERMINE PROPER DEWATERING LOCATION.
6. CONTRACTOR SHALL BE REQUIRED TO KEEP THE ROAD CLEAN OF DEBRIS AT ALL TIMES.
7. CONTRACTOR MAY ELECT TO UTILIZE SHEET PILING IN ORDER TO STABILIZE BORE PITS.
8. DEPENDING ON TOPOGRAPHY AND STATE REQUIREMENTS, SEDIMENT BARRIER MAY BE REQUIRED ACROSS THE ENTIRE CONSTRUCTION RIGHT OF WAY AT THE EDGE OF ROAD. IN ADDITION TO THIS DETAIL, REFER TO THE ENVIRONMENTAL ALIGNMENT DRAWINGS FOR PLACEMENT OF SEDIMENT BARRIERS.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	03/24/15	MF	ISSUED FOR FERC FILING	1161503	EL	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

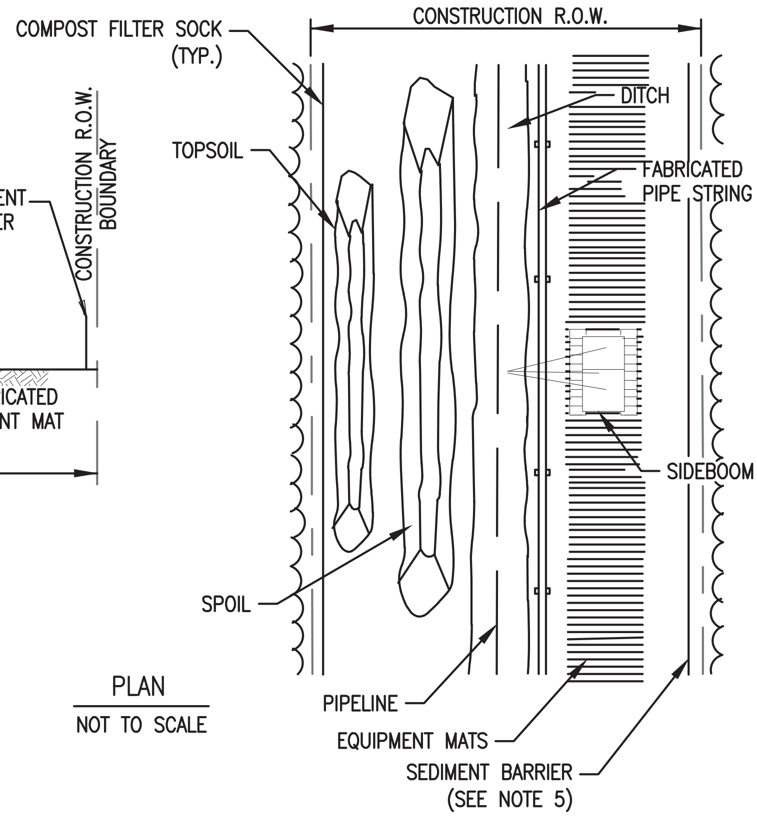
RX.2 BORED ROAD/RAILROAD CROSSING

16



CROSS SECTION

NOT TO SCALE



PLAN

NOT TO SCALE

CONSTRUCTION PROCEDURE NOTES:

1. FLAG WETLAND BOUNDARIES AND INSTALL BOUNDARY SIGNS PRIOR TO CLEARING.
2. NO OVERNIGHT PARKING OR REFUELING OF MOBILE EQUIPMENT IS ALLOWED WITHIN 100 FEET OF WETLAND. PLACE "NO FUELING" SIGN POSTS 100 FEET BACK FROM WETLAND BOUNDARY. REFUEL STATIONARY EQUIPMENT AS PER SPCC PLAN.
3. INSTALL TEMPORARY SLOPE BREAKERS UPSLOPE OF WETLAND BOUNDARIES AS SHOWN ON DRAWINGS AND SPECIFICATIONS.
4. INSTALL PREFABRICATED EQUIPMENT MATS THROUGH ENTIRE WETLAND AREA ON THE WORKING SIDE OF THE CONSTRUCTION CORRIDOR.
5. AVOID ADJACENT WETLANDS. INSTALL SEDIMENT BARRIERS AT OUTER BOUNDARIES OF THE WETLAND. INSTALL SEDIMENT BARRIERS ALONG THE EDGE OF THE SPOIL SIDE OF THE CONSTRUCTION CORRIDOR THROUGH THE WETLAND AND ALONG THE DOWN SLOPE EDGE OF THE WETLAND. IF THE DOWN SLOPE EDGE OF THE WETLAND IS THE SPOIL SIDE, THEN SEDIMENT BARRIERS ARE NOT REQUIRED ON THE WORKING SIDE OF THE CORRIDOR UNLESS EQUIPMENT TRAVERSING THROUGH THE WETLAND CAUSES SPOIL AND SEDIMENT TO EXIT THE CONSTRUCTION CORRIDOR.
6. LIMIT PULLING OF TREE STUMPS AND GRADING ACTIVITIES TO DIRECTLY OVER THE TRENCH LINE. DO NOT GRADE OR REMOVE STUMPS OR ROOT SYSTEMS FROM THE REST OF THE RIGHT-OF-WAY IN WETLANDS UNLESS THE CHIEF INSPECTOR AND COMPANY ENVIRONMENTAL INSPECTOR DETERMINE THAT SAFETY RELATED CONSTRUCTION CONSTRAINTS REQUIRE REMOVAL OF TREE STUMPS FROM UNDER THE WORKING SIDE OF THE RIGHT-OF-WAY.
7. CONDUCT TRENCH LINE TOPSOIL STRIPPING (IF TOPSOIL IS NOT SATURATED). SALVAGE TOPSOIL TO ACTUAL DEPTH OR A MAXIMUM DEPTH OF 12 INCHES, AS DETERMINED BY THE COMPANY ENVIRONMENTAL INSPECTOR. SEGREGATED TOPSOIL PILE MAY BE LOCATED ON SPOIL SIDE, AS REQUIRED.
8. LEAVE HARD PLUGS AT THE EDGES OF WETLAND UNTIL JUST PRIOR TO TRENCHING.
9. TRENCHING THROUGH WETLANDS MAY PROCEED WHEN THE PIPE SECTION IS FABRICATED AND READY TO LAY. ONCE TRENCHING COMMENCES, CONSTRUCTION THROUGH THE WETLAND IS TO PROCEED CONTINUOUSLY UNTIL THE CROSSING IS COMPLETED, BACK FILLED AND RESTORED IN ORDER TO MINIMIZE THE LENGTH OF TIME THE TRENCH IS OPEN.
10. PIPE SECTION MAY BE FABRICATED WITHIN THE WETLAND ADJACENT TO PIPE TRENCH, OR IN STAGING AREA OUTSIDE THE WETLAND AND WALKED IN. NO CONCRETE COATING ACTIVITY WITHIN 100 FEET OF WETLAND BOUNDARY UNLESS APPROVED BY COMPANY ENVIRONMENTAL INSPECTOR.
11. LOWER-IN PIPE. PRIOR TO BACK FILLING TRENCH, INSTALL TRENCH PLUGS IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS.
12. RESTORE GRADE TO NEAR PRE-CONSTRUCTION TOPOGRAPHY, REPLACE TOPSOIL AND INSTALL PERMANENT EROSION CONTROL.
13. REMOVE PREFABRICATED MATS FROM WETLANDS UPON COMPLETION.
14. SEED DISTURBED WETLANDS AREA AS DETERMINED BY THE ENVIRONMENTAL INSPECTOR AND AS SHOWN ON DRAWINGS.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	03/24/15	MF	ISSUED FOR FERC FILING	1161503	EL	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

WCC.1 "UNSATURATED WETLAND" INSTALLATION PROCEDURE

Williams.

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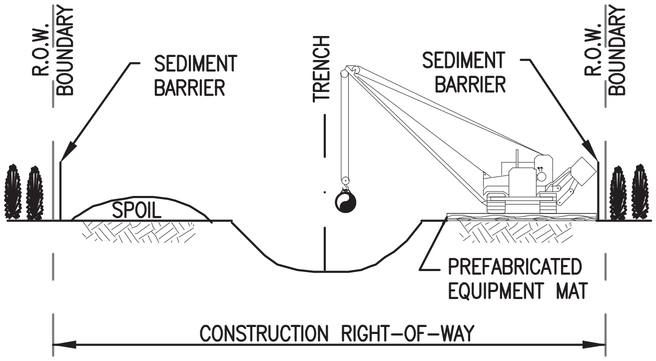
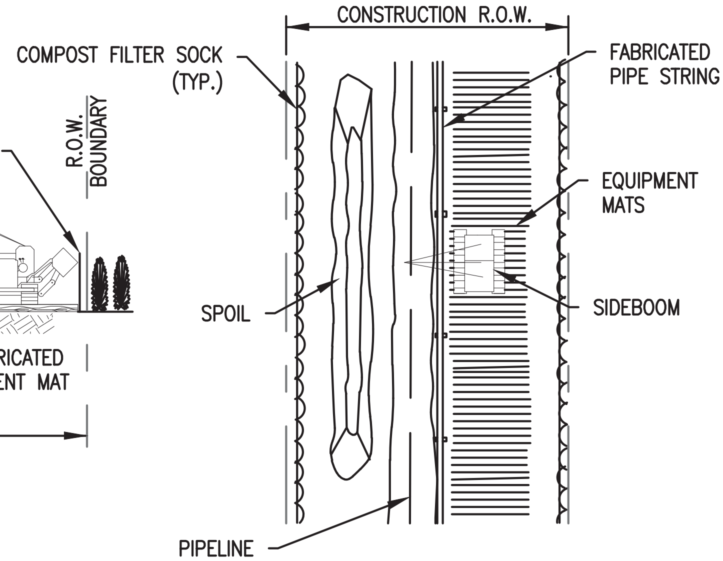


CROSS SECTION

NOT TO SCALE



PLAN

NOT TO SCALE

CONSTRUCTION PROCEDURE NOTES:

1. FLAG WETLAND BOUNDARIES AND INSTALL BOUNDARY SIGNS PRIOR TO CLEARING.
2. NO OVERNIGHT PARKING OR REFUELING OF MOBILE EQUIPMENT IS ALLOWED WITHIN 100 FEET OF WETLAND. PLACE "NO FUELING" SIGN POSTS 100 FEET BACK FROM WETLAND BOUNDARY. REFUEL STATIONARY EQUIPMENT AS PER SPCC PLAN.
3. INSTALL TEMPORARY SLOPE BREAKERS UP SLOPE OF WETLAND BOUNDARIES AS SHOWN ON DRAWINGS AND SPECIFICATIONS.
4. INSTALL PREFABRICATED EQUIPMENT MATS THROUGH ENTIRE WETLAND AREA ON THE WORKING SIDE OF THE CONSTRUCTION CORRIDOR.
5. AVOID ADJACENT WETLANDS. INSTALL SEDIMENT BARRIERS AT OUTER BOUNDARIES OF WETLAND AND ALONG BOTH WETLAND EDGES.
6. LIMIT PULLING OF TREE STUMPS AND GRADING ACTIVITIES TO DIRECTLY OVER THE TRENCH LINE. DO NOT GRADE OR REMOVE STUMPS OR ROOT SYSTEMS FROM THE REST OF THE RIGHT-OF-WAY IN WETLANDS UNLESS THE CHIEF INSPECTOR AND COMPANY ENVIRONMENTAL INSPECTOR DETERMINE THAT SAFETY RELATED CONSTRUCTION CONSTRAINTS REQUIRE REMOVAL OF TREE STUMPS FROM UNDER THE WORKING SIDE OF THE RIGHT-OF-WAY.
7. TOPSOIL STRIPPING SHALL NOT BE REQUIRED IN SATURATED SOIL CONDITIONS.
8. LEAVE HARD PLUGS AT THE EDGES OF WETLAND UNTIL JUST PRIOR TO TRENCHING.
9. TRENCHING THROUGH WETLANDS MAY PROCEED WHEN THE PIPE SECTION IS FABRICATED AND READY TO LAY. ONCE TRENCHING COMMENCES, CONSTRUCTION THROUGH THE WETLAND IS TO PROCEED CONTINUOUSLY UNTIL THE CROSSING IS COMPLETED, BACK FILLED AND RESTORED IN ORDER TO MINIMIZE THE LENGTH OF TIME THE TRENCH IS OPEN.
10. PIPE SECTION MAY BE FABRICATED WITHIN THE WETLAND ADJACENT TO PIPE TRENCH, OR IN STAGING AREA OUTSIDE THE WETLAND AND WALKED IN. NO CONCRETE COATING ACTIVITY WITHIN 100 FEET OF WETLAND BOUNDARY, UNLESS APPROVED BY COMPANY ENVIRONMENTAL INSPECTOR.
11. LOWER-IN PIPE. PRIOR TO BACKFILLING, INSTALL TRENCH PLUGS IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS.
12. RESTORE GRADE TO NEAR PRE-CONSTRUCTION TOPOGRAPHY AND INSTALL PERMANENT EROSION CONTROL.
13. REMOVE PREFABRICATED MATS FROM WETLANDS UPON COMPLETION.
14. SEED DISTURBED WETLAND AREA AS DETERMINED BY THE ENVIRONMENTAL INSPECTOR AND AS SHOWN ON DRAWINGS.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	03/24/15	MF	ISSUED FOR FERC FILING	1161503	EL	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL
"SATURATED WETLAND"
WCC.2 INSTALLATION PROCEDURE

Williams.

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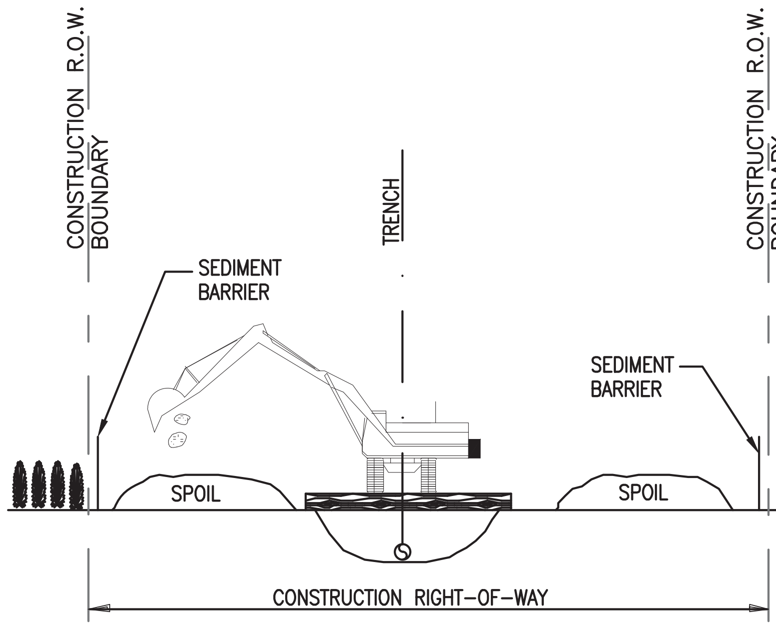
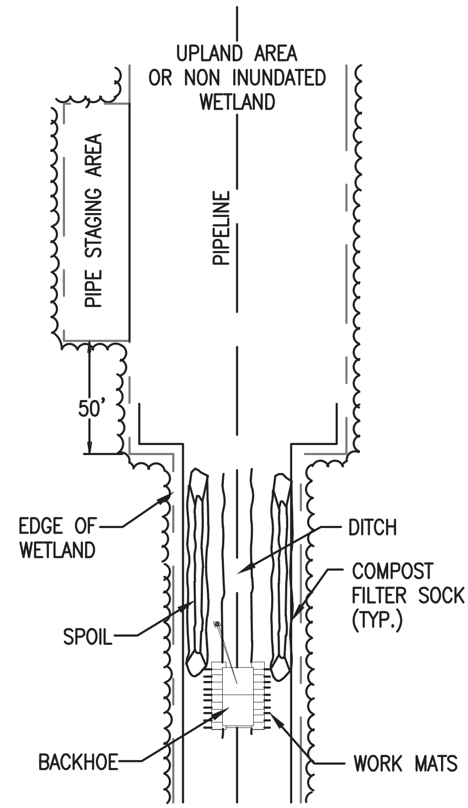


CROSS SECTION

NOT TO SCALE



PLAN

NOT TO SCALE

CONSTRUCTION PROCEDURE NOTES:

1. FLAG WETLAND BOUNDARIES AND INSTALL WETLAND BOUNDARY SIGNS PRIOR TO CLEARING.
2. NO OVERNIGHT PARKING OR REFUELING OF MOBILE EQUIPMENT IS ALLOWED WITHIN 100 FEET OF WETLAND. PLACE "NO FUELING" SIGN POSTS 100 FEET BACK FROM WETLAND BOUNDARY. REFUEL STATIONARY EQUIPMENT AS PER SPCC PLAN.
3. INSTALL TEMPORARY SLOPE BREAKERS UPSLOPE OF WETLAND BOUNDARIES AS SHOWN ON DRAWINGS AND SPECIFICATIONS.
4. AVOID ADJACENT WETLANDS. INSTALL SEDIMENT BARRIERS AT OUTER BOUNDARIES OF WETLAND AND ALONG BOTH WETLAND EDGES.
5. LIMIT PULLING OF TREE STUMPS AND GRADING ACTIVITIES TO DIRECTLY OVER TRENCH LINE. DO NOT GRADE OR REMOVE STUMPS OR ROOT SYSTEMS FROM THE REST OF THE RIGHT-OF-WAY IN WETLANDS UNLESS THE CHIEF INSPECTOR AND COMPANY ENVIRONMENTAL INSPECTOR DETERMINE THAT SAFETY RELATED CONSTRUCTION CONSTRAINTS REQUIRE REMOVAL OF TREE STUMPS FROM UNDER THE WORKING SIDE OF THE RIGHT-OF-WAY.
6. TOPSOIL STRIPPING SHALL NOT BE REQUIRED IN SATURATED SOIL CONDITIONS.
7. UTILIZE AMPHIBIOUS EXCAVATORS (PONTOON MOUNTED BACKHOES) OR TRACKED BACKHOES SUPPORTED BY PREFABRICATED EQUIPMENT MATS OR FLOATS, TO EXCAVATE TRENCH. IF PREFABRICATED EQUIPMENT MATS ARE USED FOR STABILIZATION, THE BACKHOE SHALL GRADUALLY MOVE ACROSS THE WETLAND BY MOVING THE MATS FROM IMMEDIATELY BEHIND TO IMMEDIATELY IN FRONT OF THE BACKHOE'S PATH.
8. FABRICATE PIPE IN A STAGING AREA OUTSIDE THE TYPE III WETLAND AS INDICATED ON THE CONSTRUCTION DRAWINGS. NO CONCRETE COATING ACTIVITY WITHIN 100 FEET OF WETLAND BOUNDARY, UNLESS APPROVED BY COMPANY ENVIRONMENTAL INSPECTOR.
9. LEAVE HARD PLUGS AT THE EDGE OF "INUNDATED WETLAND UNTIL JUST PRIOR TO PIPE PLACEMENT.
10. FLOAT PIPE IN PLACE, LOWER-IN, INSTALL TRENCH PLUGS IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS, AND BACKFILL.
11. RESTORE GRADE TO NEAR PRE-CONSTRUCTION TOPOGRAPHY AND INSTALL PERMANENT EROSION CONTROL.
12. REMOVE ANY MATS UTILIZED TO SUPPORT AMPHIBIOUS EQUIPMENT FROM WETLANDS UPON COMPLETION.
13. WETLANDS CROSSED USING PUSH/PULL METHOD TEND TO BE TOO WET FOR EFFECTIVE SEEDING. HOWEVER, IF THE SITE IS DRY ENOUGH AND IF DIRECTED BY THE ENVIRONMENTAL INSPECTOR, THE RIGHT-OF-WAY SHALL BE SEEDED IN ACCORDANCE WITH DRAWINGS.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

WCC.3 "INUNDATED WETLAND" INSTALLATION PROCEDURE

Williams.

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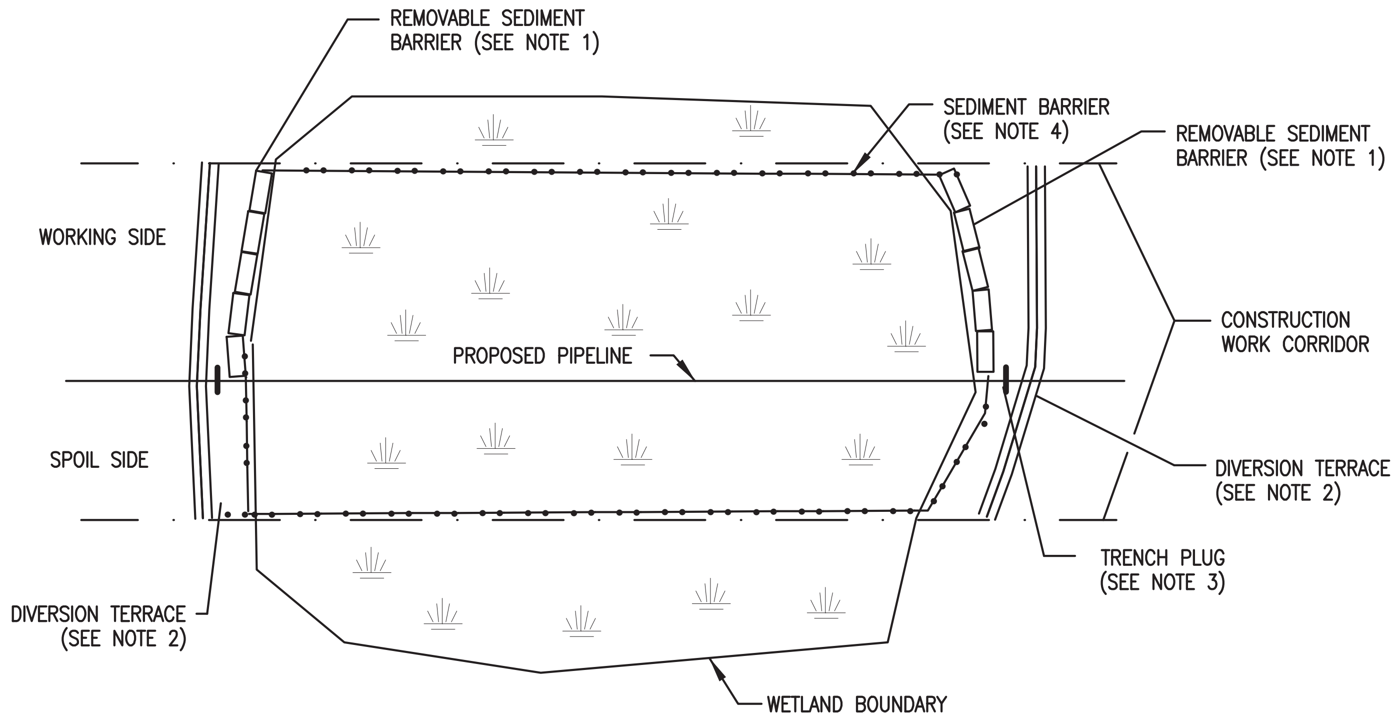

PLAN

NOT TO SCALE

NOTES:

1. INSTALL REMOVABLE SEDIMENT BARRIERS (COMPOST FILTER SOCK) OR DRIVEABLE BERMS ACROSS THE TRAVEL LANE AT BOTH WETLAND BOUNDARIES. THE REMOVABLE SEDIMENT BARRIERS CAN BE REMOVED DURING THE CONSTRUCTION DAY, BUT MUST BE RE-INSTALLED AFTER CONSTRUCTION HAS STOPPED FOR THE DAY AND/OR WHEN HEAVY PRECIPITATION IS IMMINENT.

2. INSTALL DIVERSION TERRACES IMMEDIATELY UPSLOPE OF BOTH WETLAND BOUNDARIES TO PREVENT SEDIMENT FROM ENTERING THE WETLAND.

3. INSTALL TRENCH PLUGS AT BOTH WETLAND BOUNDARIES TO PREVENT DIVERSION OF WATER INTO UPLAND PORTIONS OF THE PIPELINE TRENCH AND TO KEEP ANY ACCUMULATED UPLAND TRENCH WATER OUT OF WETLAND.

4. INSTALL SEDIMENT BARRIERS AT WETLAND BOUNDARIES, ALONG THE EDGE OF THE SPOIL SIDE OF THE CONSTRUCTION CORRIDOR AND ALONG THE DOWNSLOPE EDGE OF THE WETLAND. IF THE DOWNSLOPE EDGE OF THE WETLAND IS THE SPOIL SIDE, THEN SEDIMENT BARRIERS ARE NOT REQUIRED ON THE WORKING SIDE OF THE CORRIDOR UNLESS EQUIPMENT TRAVERSING THROUGH THE WETLAND CAUSES SPOIL AND SEDIMENT TO EXIT THE CONSTRUCTION CORRIDOR.

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STANDARD ENVIRONMENTAL DETAIL

WCC

WETLAND CROSSING CONFIGURATION

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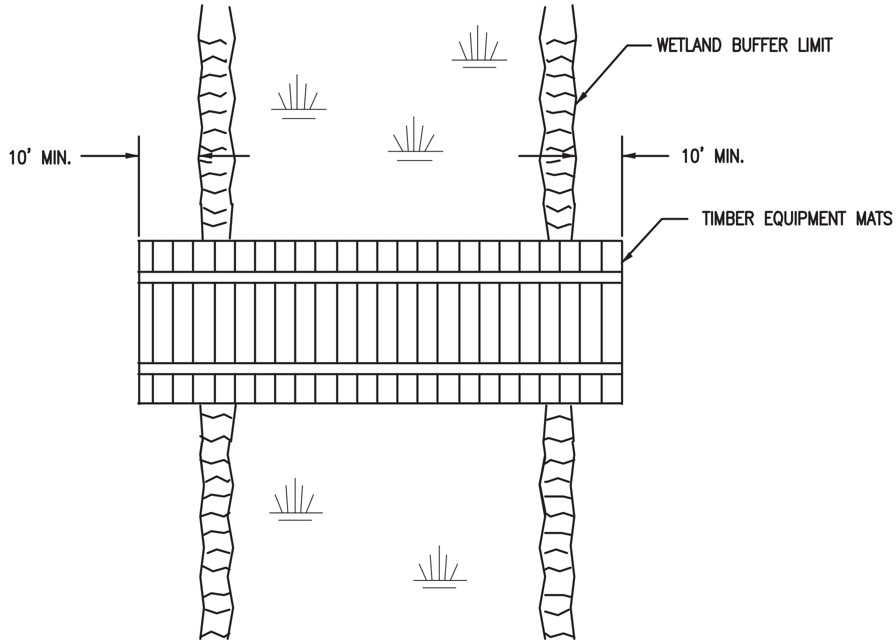

PLAN

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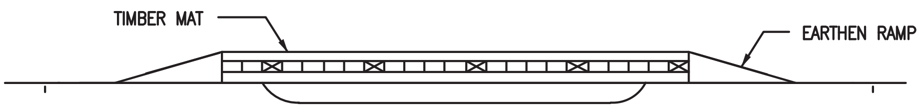

PROFILE

NOT TO SCALE

NOTES:

1. PERIODICALLY CHECK INSTALLATION AND REMOVE BUILD-UP OF SEDIMENT OR DEBRIS.
2. MATERIALS PLACED IN WETLANDS SHALL BE COMPLETELY REMOVED DURING FINAL CLEAN-UP. REMOVAL OF THIS STRUCTURE IS NOT CONTINGENT UPON ESTABLISHMENT OF PERMANENT VEGETATION.
3. IF A WATERBODY IS LOCATED WITHIN A WETLAND SYSTEM, EXTEND TIMBER EQUIPMENT MATS TO THE BRIDGE EQUIPMENT CROSSING (BEC) USED TO CROSS THE WATERBODY IN ORDER TO ALLOW FOR CONTINUOUS TIMBER EQUIPMENT MAT COVERAGE THROUGH THE WETLAND AND WATERBODY AREA.
4. USE ADDITIONAL TIMBER MAT LAYERS TO RAISE CROSSING ABOVE GRADE WHERE POOR SOIL CONDITIONS EXIST.
5. TIMBER EQUIPMENT MATS SHALL EXTEND A MINIMUM OF 10 FEET OUTSIDE OF THE WETLAND BOUNDARIES.
6. INSTALL EARTHEN RAMP APPROACHES TO TIMBER EQUIPMENT MATS. EARTHEN RAMPS TO BE CONSTRUCTED OF UPLAND MATERIAL, TOP SOIL SHALL NOT BE USED TO CONSTRUCT EARTHEN RAMPS.

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STANDARD ENVIRONMENTAL DETAIL

WEC WETLAND EQUIPMENT CROSSING

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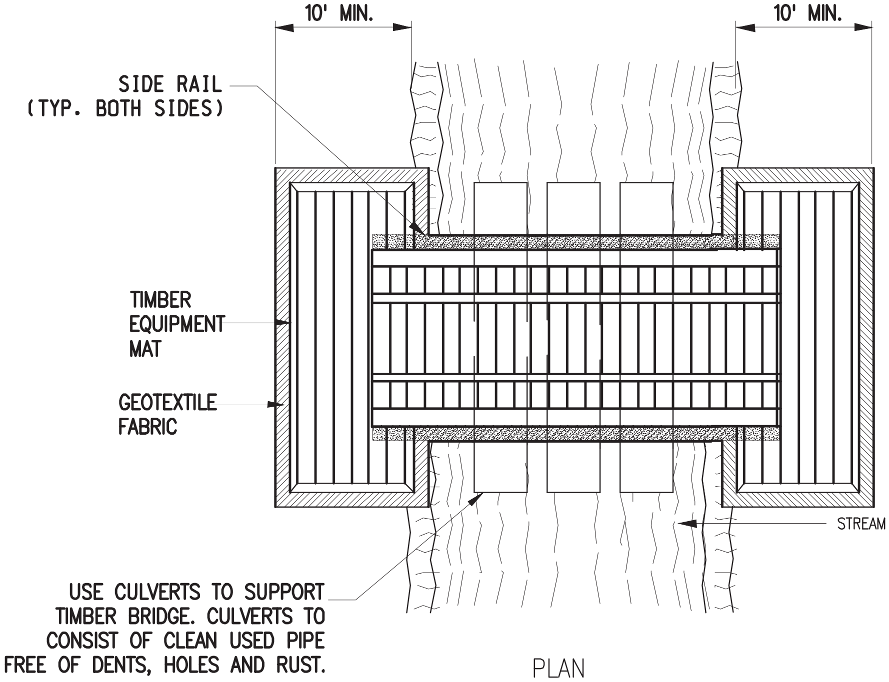
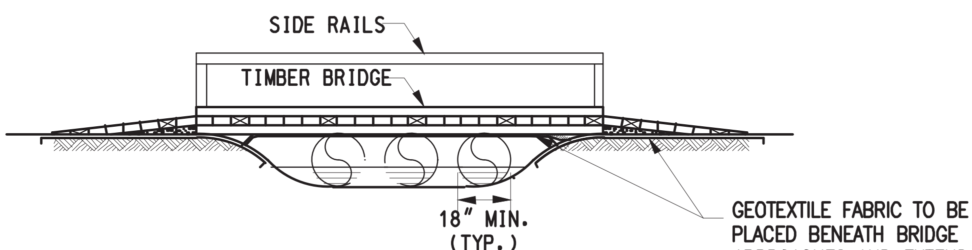


PLAN

SCALE: N.T.S.



PROFILE

SCALE: N.T.S.

NOTES:

1. TIMBER BRIDGES SHALL BE ADEQUATELY ANCHORED AT BOTH ENDS.
2. PERIODICALLY CHECK BRIDGE INSTALLATION AND REMOVE BUILD-UP OF SEDIMENT OR DEBRIS ON BRIDGE.
3. BRIDGE APPROACHES SHALL BE TIMBER EQUIPMENT MATS.
4. MATERIALS PLACED ALONG STREAM CHANNEL SHALL BE COMPLETELY REMOVED DURING FINAL CLEAN-UP. REMOVAL OF THIS STRUCTURE IS NOT CONTINGENT UPON ESTABLISHMENT OF PERMANENT VEGETATION.
5. CULVERTS SHALL BE USED TO SUPPORT THE TIMBER BRIDGE TO PREVENT SETTLEMENT OF THE BRIDGE, IF THE GEOMETRY OF THE STREAM ALLOWS FOR SUCH INSTALLATION. THE TIMBER BRIDGE AND GEOTEXTILE FABRIC SHALL REMAIN ABOVE THE WATER SURFACE ELEVATION AT ALL TIMES. THE GRADE OF THE CULVERT PIPE SHALL BE AT LEAST 0.25" PER FOOT.
6. SIDE RAILS SHALL BE INSTALLED ON BOTH SIDES OF THE BRIDGE EQUIPMENT CROSSING IN ORDER TO PREVENT SEDIMENT FROM ENTERING THE WATERBODY. SIDE RAILS TO BE CONSTRUCTED OF PLYWOOD NAILED TO THE OUTER EDGES OF THE TIMBER EQUIPMENT MATS.
7. TIMBER EQUIPMENT MATS SHALL EXTEND A MINIMUM OF 10 FEET OUTSIDE OF THE WATERBODY OR WETLAND BOUNDARIES.
8. THE STRUCTURE SHALL BE LARGE ENOUGH TO CONVEY FLOW EXPECTED FROM A 2-YEAR FREQUENCY, 24-HOUR DURATION STORM WITHOUT APPRECIABLY ALTERING THE STREAM FLOW CHARACTERISTICS.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

BEC BRIDGE EQUIPMENT CROSSING

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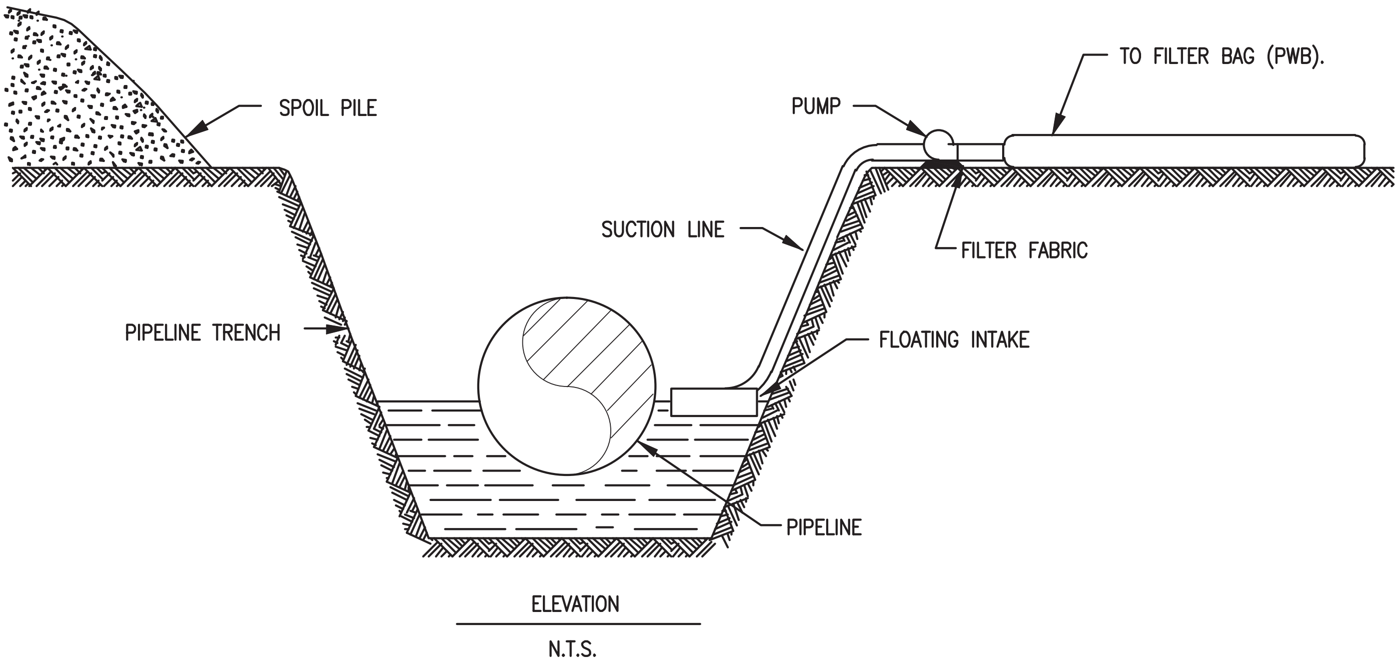

NOTES:

1. WATER PUMPED OUT OF TRENCH SHALL NOT BE DISCHARGED INTO WATERWAYS. WATER SHALL BE DISCHARGED INTO A FILTER BAG OR DEWATERING STRUCTURE.

2. PUMP SHALL BE CONTROLLED SO THAT DISCHARGE DOES NOT OVERFLOW DEWATERING STRUCTURE.

3. PUMP SUCTION HOSE MUST NOT BE ALLOWED TO COME IN CONTACT WITH TRENCH BOTTOM. PROVISIONS MUST BE MADE TO ELEVATE THE SUCTION HOSE TO AT LEAST ONE FOOT ABOVE THE BOTTOM OF THE PIPE TRENCH UNTIL BOTTOM DEWATERING IS NECESSARY.

4. DEWATERING SHALL NOT OCCUR DURING TIMES OF HEAVY RAINFALL EXCEPT AS REQUIRED TO PREVENT FLOODING OF CONSTRUCTION EQUIPMENT LOCATED IN BORE PITS AND TRENCHES.

5. PUMPS UTILIZED DURING DEWATERING SHALL BE PLACED WITHIN SECONDARY CONTAINMENT IF POSITIONED WITHIN 100 FEET OF A WETLAND OR WATERBODY.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

TD TRENCH DEWATERING

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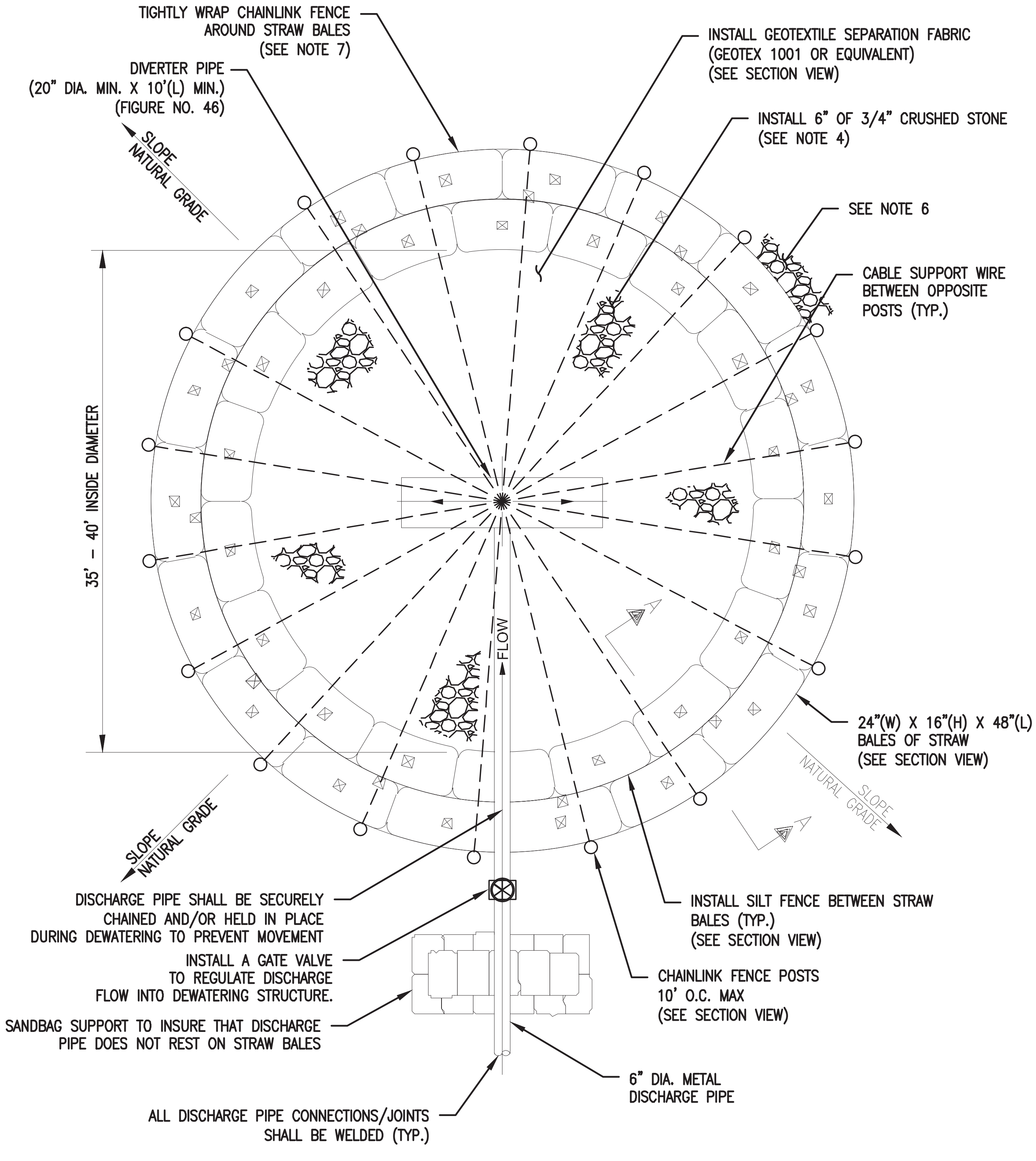

PLAN VIEW

SCALE: N.T.S.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

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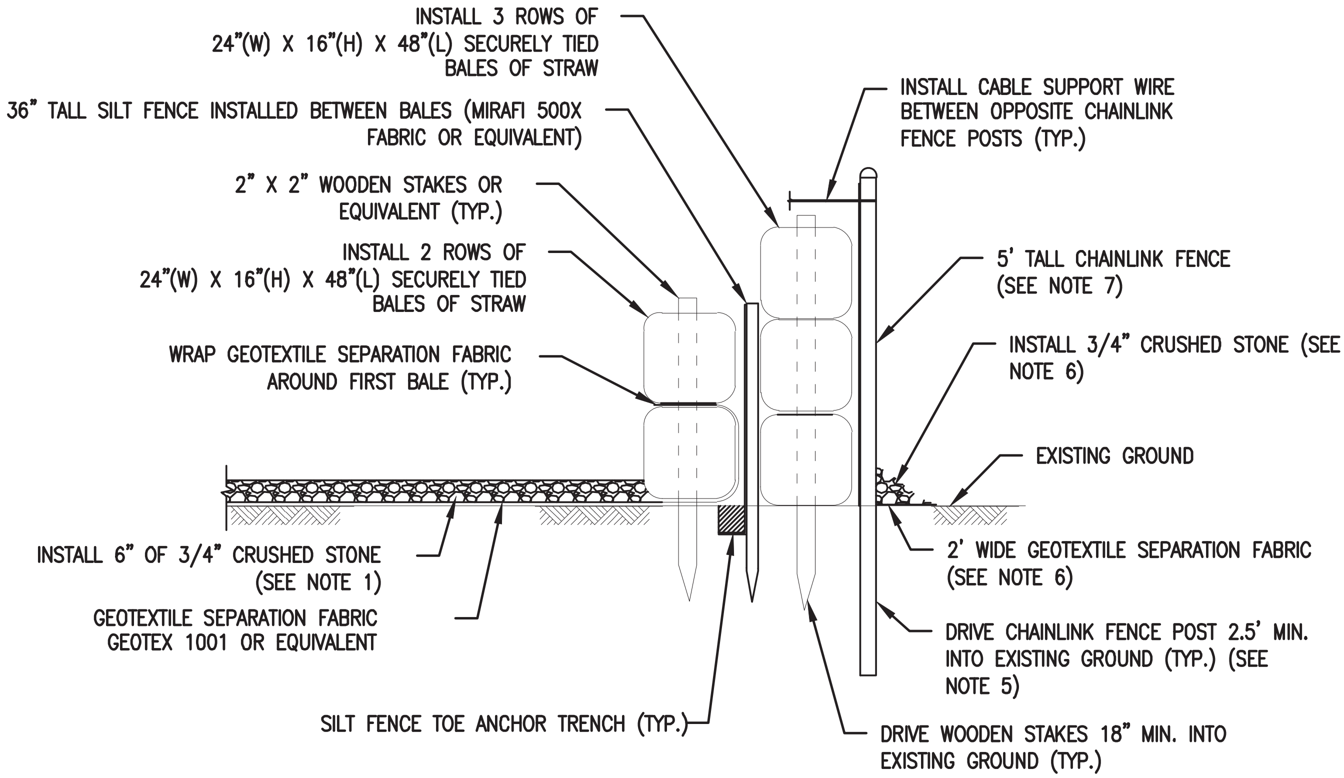
DS HYDROSTATIC DEWATERING STRUCTURE

24a

1 OF 2



SECTION A–A

SCALE: N.T.S.

NOTES:

1. STRUCTURE SHALL BE PLACED ON A LEVEL WELL VEGETATED SITE SUCH THAT WATER WILL FLOW AWAY FROM STRUCTURE AND WORK AREAS AND MINIMIZE EROSION OF THE SURROUNDING AREA TO THE EXTENT PRACTICABLE.
2. AT THE DISCRETION OF THE ENVIRONMENTAL INSPECTOR, ADDITIONAL EROSION AND SEDIMENTATION CONTROL DEVICES (E.G. RIPRAP CHECK DAMS, COMPOST FILTER SOCKS, ETC.) MAY BE REQUIRED TO BE INSTALLED DOWNSTREAM OF THE STRUCTURE IF EROSION BECOMES APPARENT DURING DEWATERING.
3. FLOW RATES THROUGH DISCHARGE AND DIVERTER PIPES SHALL BE SUCH THAT STRUCTURE WILL NOT OVERFLOW. A MINIMUM FREEBOARD OF 3", MEASURED FROM THE TOP OF THE THIRD ROW OF STRAW BALES TO THE WATER SURFACE ELEVATION, SHALL BE MAINTAINED AT ALL TIMES.
4. THE 3/4" CRUSHED STONE INSTALLED WITHIN THE BASIN SHALL BE WASHED TO REMOVE ALL DIRT/FINE PARTICLES PRIOR TO INSTALLATION.
5. THE CHAINLINK FENCE POSTS SHALL BE DRIVEN A MINIMUM OF 2.5 FT. INTO STABLE, EXISTING GROUND. THE CONTRACTOR MAY BE REQUIRED TO INSTALL THE POLES DEEPER IF STABLE SUBSOILS ARE NOT ACHIEVED WITHIN 2.5 FT.
6. AT THE DISCRETION OF THE ENVIRONMENTAL INSPECTOR, ADDITIONAL GEOTEXTILE SEPARATION FABRIC AND 3/4" CRUSHED STONE MAY BE REQUIRED TO BE INSTALLED AROUND THE OUTSIDE EDGE OF THE DEWATERING STRUCTURE.
7. CHAINLINK FENCE SHALL INSTALLED TIGHTLY AGAINST THE STRAW BALES AND SECURELY FASTENED TOGETHER AT ALL JOINTS WITH CABLE TENSION WIRE AND STRETCHER BARS.
8. THE ENVIRONMENTAL INSPECTOR SHALL HAVE THE AUTHORITY TO MODIFY THE DESIGN AS REQUIRED TO PREVENT EROSION AND SEDIMENTATION DOWNSTREAM OF THE STRUCTURE.
9. STRAW BALES SHALL BE STACKED SUCH THAT THE JOINTS ARE STAGGERED.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

DS

HYDROSTATIC DEWATERING STRUCTURE

Williams.

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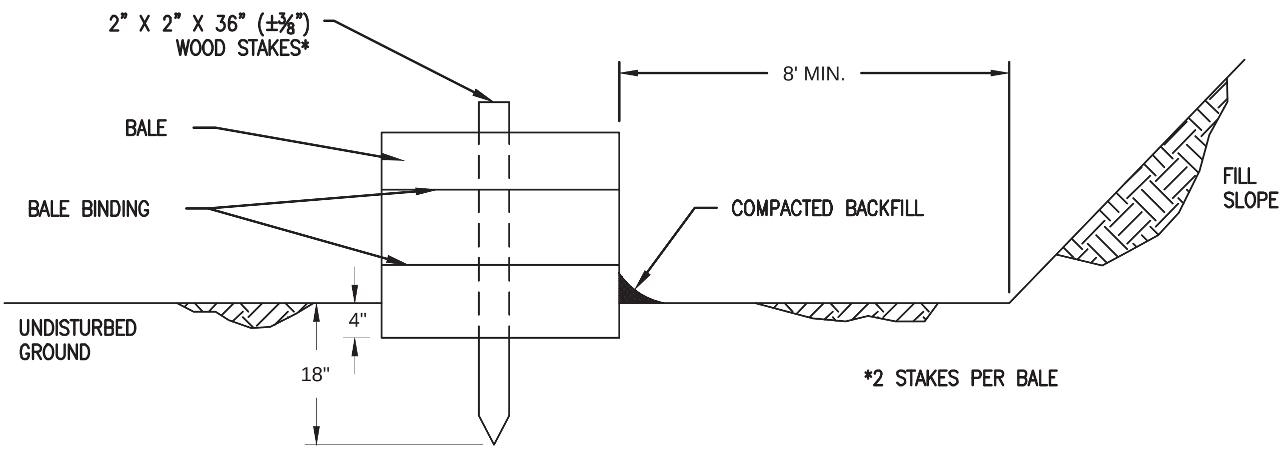
TABLE 4.5
Maximum Slope Length for Straw Bale Barriers and Wood Chip Filter Berms

Slope - Percent	Maximum Slope Length (ft) Above Barrier
2 (or less)	150
5	100
10	50
15	35
20	25
25	20
30	15
35	15
40	15
45	10
50	10
> 50	Not Permitted

PA DEP



NOTES:

1. STRAW BALE BARRIERS SHALL NOT BE USED FOR PROJECTS EXTENDING MORE THAN 3 MONTHS.

2. STRAW BALE BARRIERS SHALL BE PLACED AT EXISTING LEVEL GRADE WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES. FIRST STAKE OF EACH BALE SHALL BE ANGLED TOWARD ADJACENT BALE TO DRAW BALES TOGETHER. STAKES SHALL BE DRIVEN FLUSH WITH THE TOP OF THE BALE. BOTH ENDS OF THE BARRIER SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT.

3. COMPACTED BACKFILL SHALL EXTEND APPROXIMATELY 4 INCHES ABOVE GROUND LEVEL.

4. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH 1/3 THE ABOVEGROUND HEIGHT OF THE BARRIER. DAMAGED OR DETERIORATED BALES SHALL BE REPLACED IMMEDIATELY UPON INSPECTION.

5. ANY SECTION OF STRAW BALE BARRIER WHICH HAS BEEN UNDERMINED OR TOPPED SHALL BE IMMEDIATELY REPLACED WITH A ROCK FILTER OUTLET.

6. BALES SHALL BE REMOVED WHEN THE TRIBUTARY AREA HAS BEEN PERMANENTLY STABILIZED.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

SEC STRAW BALE EROSION CONTROL

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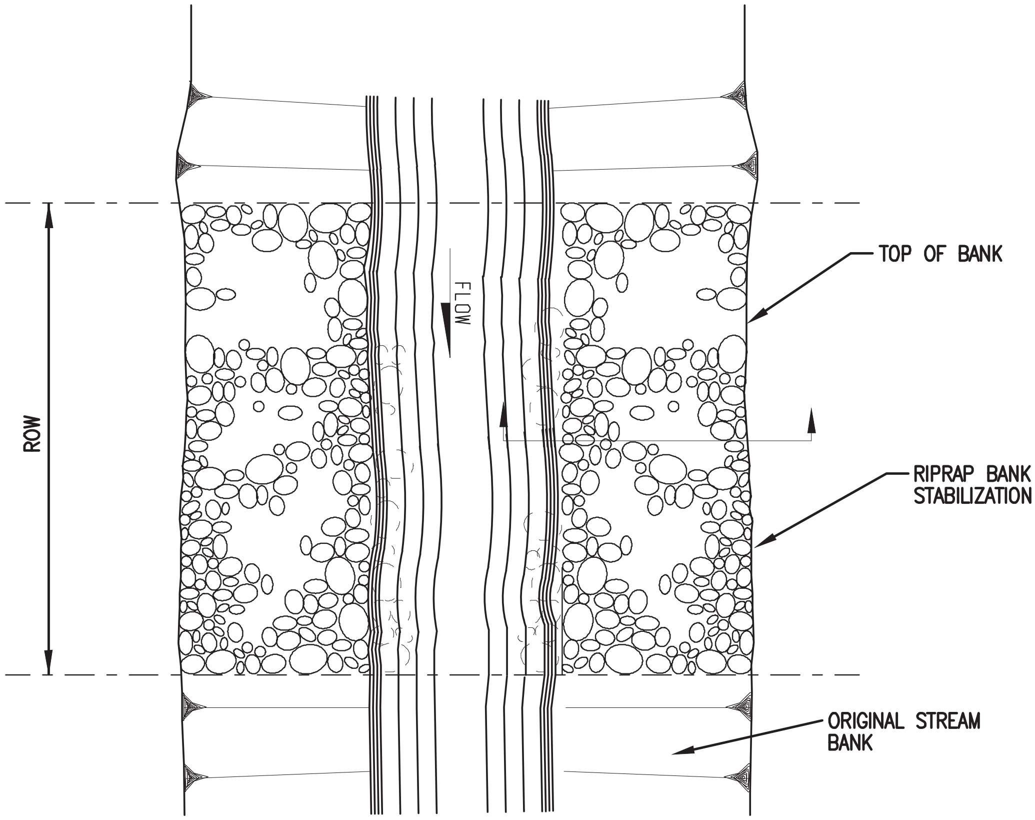
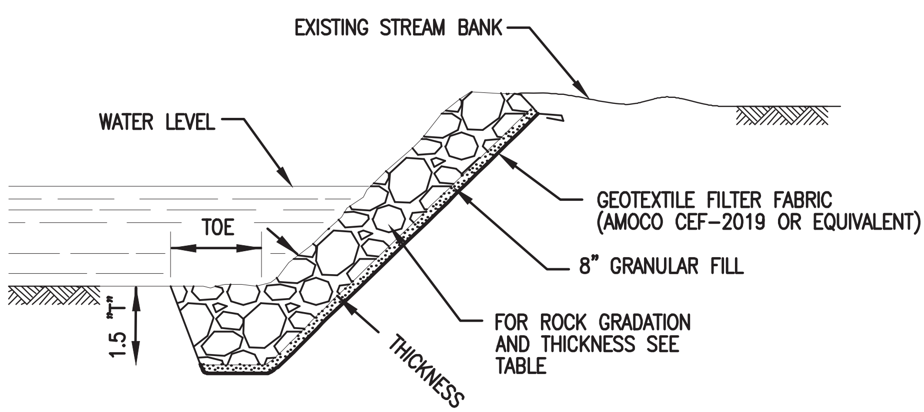


PLAN VIEW
N.T.S.



SECTION
SCALE: N.T.S.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

RSS STREAM BANK STABILIZATION

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1 OF 2

RIPRAP GRADATION TABLE					
NATIONAL STONE ASSOCIATION NUMBER	SIZE OF ROCKS (INCHES)			MIN. THICKNESS OF RIPRAP LAYER (IN.) "T"	TOE (FEET)
	MAXIMUM	d50 AVERAGE *	MINIMUM **		
R-1	1.5	0.75	NO. 8	2	1
R-2	3	1.5	1	4	1.25
R-3	6	3	2	8	1.5
R-4	12	6	3	15	2.5
R-5	18	9	5	23	4
R-6	24	12	7	30	4
R-7	30	15	12	38	5
R-8	48	24	15	60	6

* THE "AVERAGE SIZE", OR d50, IS DEFINED AS A SIZE THAT IS EXCEEDED BY AT LEAST 50% OF THE TOTAL WEIGHT SHIPPED. (I.E. 50% OF THE TONNAGE SHIPPED CONSISTS OF PIECES LARGER THAN THE "AVERAGE SIZE" SHOWN IN CHART.)

** PIECES SMALLER THAN THE "MINIMUM SIZE" SHOWN SHALL NOT EXCEED 15% OF THE TONNAGE SHIPPED.

NOTES:

1. ROCK UTILIZED FOR RIPRAP SHALL CONSIST OF SOUND, DURABLE ROCK, INSOLUBLE IN WATER, AND RESISTANT TO WEATHERING.
2. ALL MATERIAL SHALL BE FREE OF STRUCTURAL DEFECTS, SHALE SEAMS AND ORGANIC MATTER.
3. INDIVIDUAL PIECES SHOULD BE SHARPLY ANGULAR, BLOCK SHAPED AND HAVE A MINIMUM SPECIFIC GRAVITY OF 2.5.
4. NO PIECE SHALL HAVE A LENGTH EXCEEDING THREE (3) TIMES ITS WIDTH OR DEPTH.
5. EACH LOAD OF ROCK SHALL BE OF WELL-GRADED MIXTURE. A WELL-GRADED MIXTURE, AS USED HEREIN, IS DEFINED AS A MIXTURE COMPOSED PRIMARILY OF LARGER STONE, BUT WITH A SUFFICIENT MIXTURE OF SMALLER SIZES TO FILL THE VOIDS.
6. MATERIAL SHALL MEET NSA SPECIFICATIONS - SEE TABLE ABOVE.
7. IF STREAM WIDTH IS EQUAL TO OR LESS THAN 2 TIMES THE TOE WIDTH, RIPRAP SHALL BE PLACED ACROSS THE ENTIRE STREAM WIDTH.
8. RIPRAP SHALL BE PLACED TO THE FULL COURSE THICKNESS IN ONE CONTINUOUS OPERATION. OPERATIONS WHICH CAUSE SEGREGATION OF THE MATERIALS SHALL NOT BE PERMITTED. INDIVIDUAL ROCKS MAY BE REARRANGED, AND THE VOIDS FILLED WITH HAND PLACED SMALLER ROCK IN ORDER TO ACHIEVE THE DESIRED UNIFORM ARMOR.
9. SLOPE SHALL BE GRADED TO 2:1 OR FLATTER PRIOR TO PLACING GRANULAR FILL, FILTER FABRIC, OR RIPRAP.
10. ENDS OF THE RIPRAP SHALL BE KEYED INTO A STABLE BANK. WHEN TYING INTO OTHER STRUCTURES, LARGER RIPRAP CAN BE LAID IN STEPS OR STACKED AS NEEDED TO FIT. STONES LARGER THAN THOSE DESIGNED FOR FLOW SHALL BE USED FOR THIS PURPOSE.
11. REMAINING DISTURBED AREAS SHALL BE GRADED AND PERMANENTLY SEEDED AND MULCHED.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

RSS

STREAM BANK STABILIZATION

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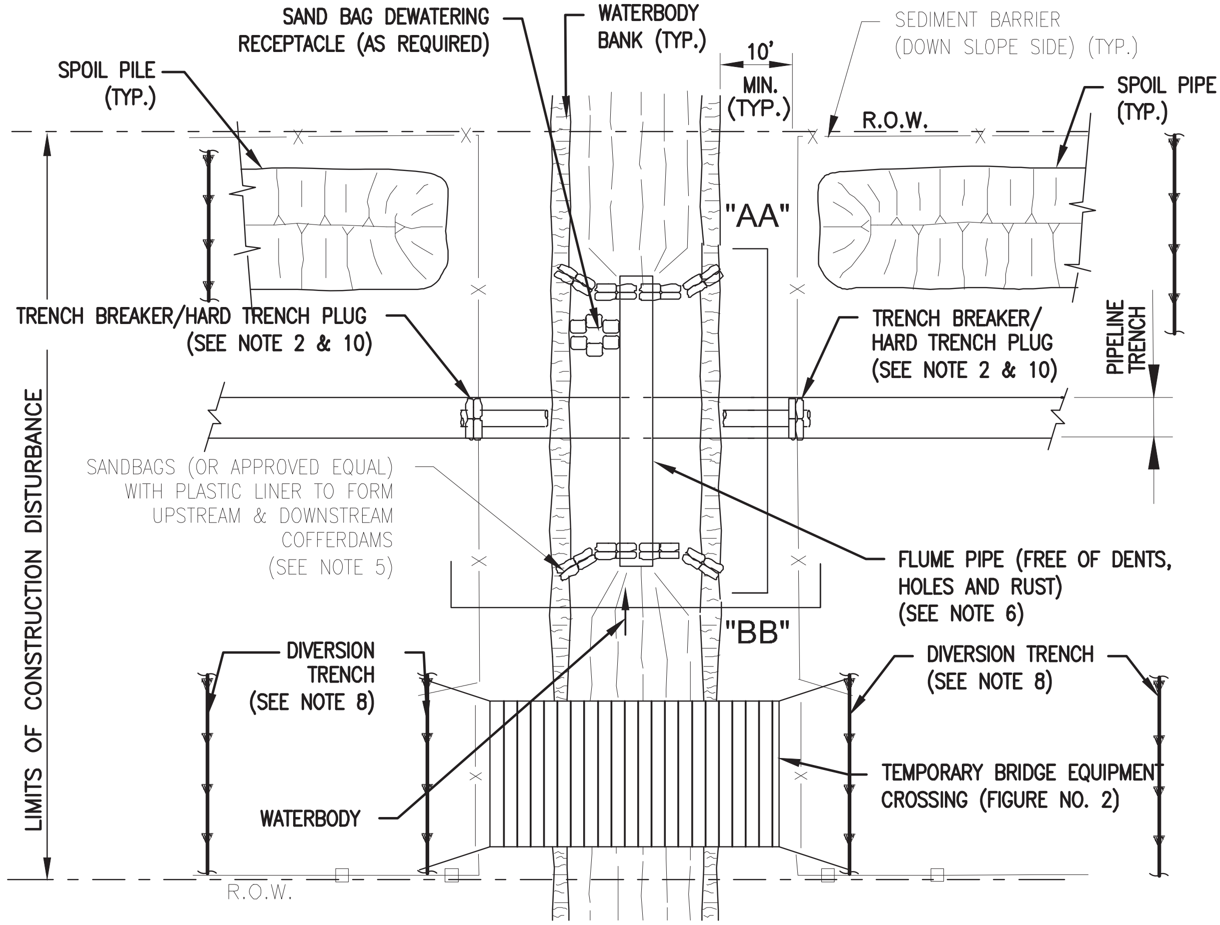

PLAN
SCALE: N.T.S.

NOTES:

1. SEDIMENT BARRIERS SHALL BE INSTALLED AS DEPICTED AND ALONG DOWN GRADIENT SIDES OF WORK AREAS AND STAGING AREAS SUCH THAT NO HEAVY SILT LADEN WATER ENTERS THE WATERBODY OR LEAVES THE CONSTRUCTION RIGHT-OF-WAY.

2. HARD TRENCH PLUGS MUST REMAIN IN PLACE AT CONVENIENT LOCATIONS TO SEPARATE THE MAINLINE DITCH FROM THE WATERBODY CROSSING UNTIL THE WATERBODY CROSSING IS INSTALLED AND BACKFILLED.

3. EQUIPMENT OPERATING IN THE WATERBODY SHALL BE LIMITED TO THAT NEEDED TO PERFORM CONSTRUCTION. IF OTHER TYPES OF EQUIPMENT MUST CROSS THE WATERBODY, THE CONTRACTOR SHALL PROVIDE AND USE A TEMPORARY BRIDGE EQUIPMENT CROSSING.

4. STAGING AREA(S) FOR WATERBODY CROSSING(S), WHEN REQUIRED, SHALL BE LOCATED AT LEAST 50 FEET FROM THE WATER'S EDGE AND SHALL BE OF A MINIMUM SIZE NEEDED FOR CONVENIENT PREPARATION.

5. FLUME CROSSING METHOD REQUIREMENTS INCLUDE:
   (A) INSTALL FLUME PIPE(S) AFTER BLASTING (IF NECESSARY), BUT BEFORE ANY TRENCHING.
   (B) USE SAND BAG OR SAND BAG AND PLASTIC SHEETING DIVERSION STRUCTURES OR EQUIVALENT TO DEVELOP AN EFFECTIVE SEAL AND TO DIVERT WATERBODY FLOW THROUGH THE FLUME PIPE (SOME MINOR MODIFICATIONS TO THE WATERBODY BOTTOM MAY BE REQUIRED TO ACHIEVE AN EFFECTIVE SEAL).
   (C) PROPERLY ALIGN FLUME PIPE(S) TO PREVENT BANK EROSION AND WATERBODY CHANNEL BED SCOUR.
   (D) DO NOT REMOVE FLUME PIPE DURING TRENCHING, PIPE LAYING, OR BACKFILLING ACTIVITIES, OR INITIAL STREAM BED RESTORATION EFFORTS.
   (E) REMOVE ALL FLUME PIPES AND DAMS THAT ARE NOT ALSO PART OF THE EQUIPMENT BRIDGE AS SOON AS FINAL CLEANUP OF THE STREAM BED AND BANK IS COMPLETE.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

FX FLUME CROSSING

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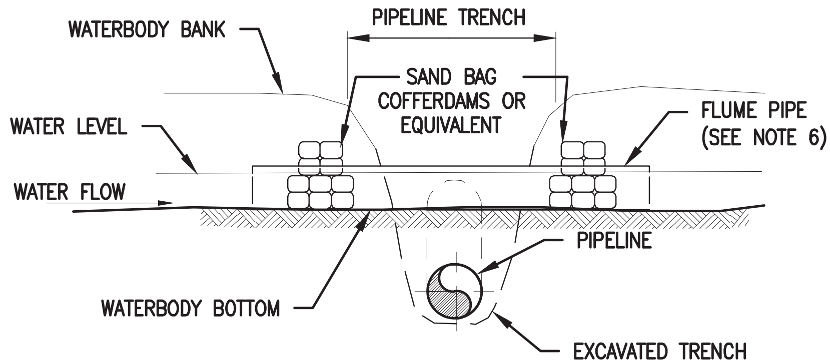
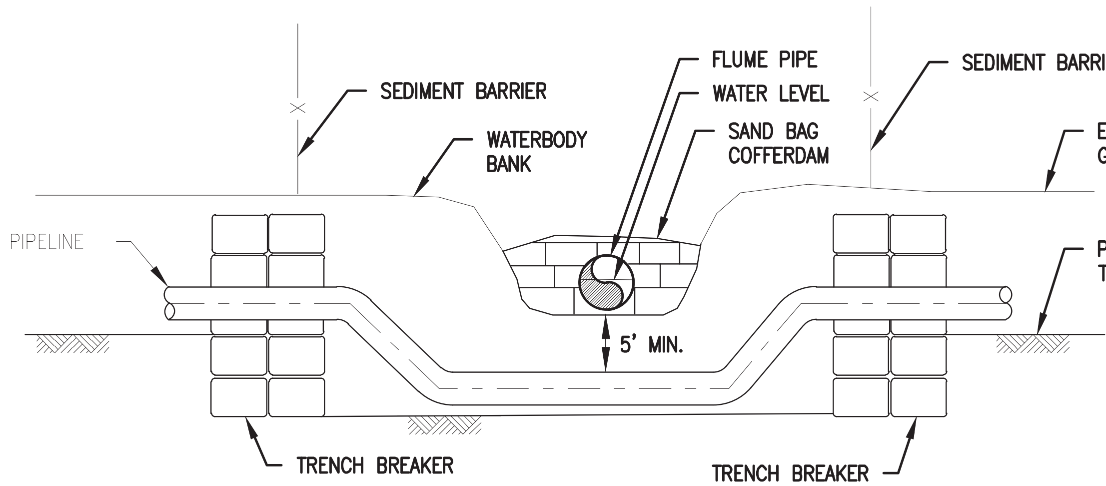
27a
1 OF 2



SECTION "A-A"

SCALE: N.T.S.



SECTION "B-B"

SCALE: N.T.S.

6. THE FLUME PIPE MUST BE SIZED TO ADEQUATELY CONVEY MAXIMUM ANTICIPATED FLOW RATES AT THE TIME OF THE CROSSING WITHOUT FLOODING THE TRENCH, WHILE TO MAINTAINING ADEQUATE FLOW RATES TO PROTECT AQUATIC LIFE AND PREVENT THE INTERRUPTION OF EXISTING DOWNSTREAM USES.

7. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED DAILY AND REPAIRED IF NECESSARY.

8. INSTALL DIVERSION TRENCHES AT THE BASE OF ALL SLOPES ADJACENT TO THE WATERBODY AND AT 50' FROM WATERBODY BANKS.

9. CHEMICALS, FUELS AND LUBRICATING OILS SHALL NOT BE STORED AND EQUIPMENT SHALL NOT BE REFUELED WITHIN 100 FEET OF THE WATERBODY UNLESS OTHERWISE APPROVED BY THE ENVIRONMENTAL INSPECTOR.

10. ANY WATER ACCUMULATING IN THE WORK SPACE SHALL BE PUMPED TO A FILTER BAG PRIOR TO DISCHARGE TO A WATERBODY.

11. INSTALL TRENCH BREAKERS ON BOTH SIDES OF THE WATERBODY TO PREVENT DIVERSION OF WATER INTO UPLAND PORTIONS OF THE PIPELINE TRENCH AND TO KEEP ANY ACCUMULATED TRENCH WATER OUT OF THE WATERBODY.

13. EXCEPT FOR BLASTING AND OTHER ROCK BREAKING MEASURES, THE CONTRACTOR SHALL COMPLETE IN WATERBODY CONSTRUCTION ACTIVITIES (INCLUDING TRENCHING, PIPE INSTALLATION, BACKFILL, AND RESTORATION OF THE WATERBODY CHANNEL CONTOURS) WITHIN 24 HOURS. WATERBODY BANKS AND UNCONSOLIDATED WATERBODY CHANNELS MAY REQUIRE ADDITIONAL RESTORATION AFTER THIS PERIOD.

14. THE CONTRACTOR SHALL COORDINATE THE ENVIRONMENTAL INSPECTOR TO DETERMINE THE APPROPRIATE DRY CROSSING METHOD THAT SHOULD BE UTILIZED DURING CONSTRUCTION.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

FX FLUME CROSSING

Williams.

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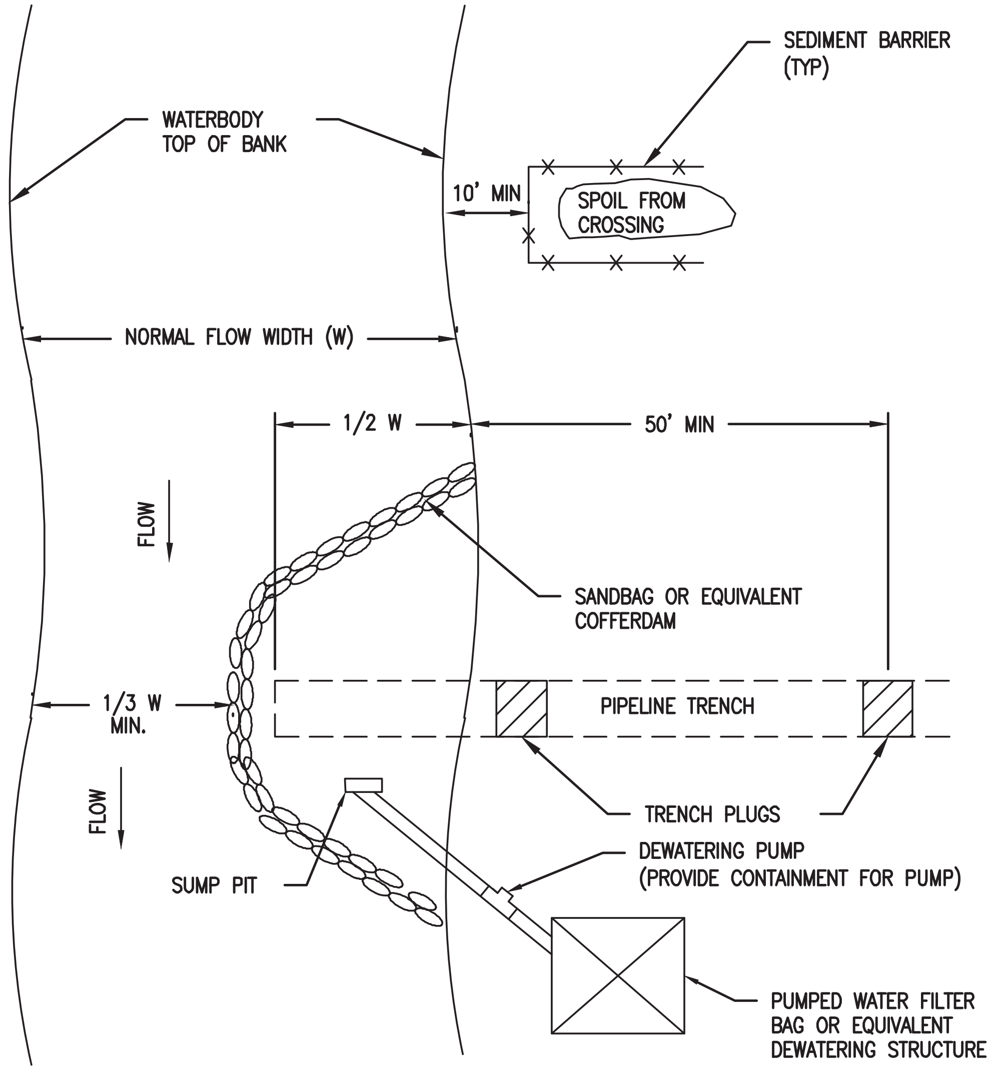

PLAN VIEW
N.T.S

NOTES:

1. TRENCH BREAKER SHALL BE INSTALLED WITHIN THE TRENCH ON BOTH SIDES OF THE WATERBODY CHANNEL.
2. WATER ACCUMULATING WITHIN THE WORK AREA SHALL BE PUMPED TO A PUMPED WATER FILTER BAG OR SEDIMENT TRAP PRIOR TO DISCHARGING INTO ANY SURFACE WATER.
3. HAZARDOUS OR POLLUTANT MATERIAL STORAGE AREAS SHALL BE LOCATED AT LEAST 100 FEET BACK FROM THE TOP OF WATERBODY BANK.
4. ALL EXCESS EXCAVATED MATERIAL SHALL BE IMMEDIATELY REMOVED FROM THE WATERBODY CROSSING AREA.
5. ALL DISTURBED AREAS WITHIN 50 FEET OF TOP-OF-BANK SHALL BE BLANKETED OR MATTED WITHIN 24 HOURS OF INITIAL DISTURBANCE FOR MINOR WATERBODIES OR 48 HOURS OF INITIAL DISTURBANCE FOR INTERMEDIATE WATERBODIES UNLESS OTHERWISE AUTHORIZED.
6. APPROPRIATE WATERBODY BANK PROTECTION SHALL BE PROVIDED WITHIN THE CHANNEL.
7. THE WATERBODY CROSSING WILL GENERALLY BE COMPLETED IN 2 STAGES. THE DETAIL DEPICTS STAGE 1. STAGE 2 WILL GENERALLY BE COMPLETED USING THE SAME CONFIGURATION FROM THE OPPOSITE BANK.

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STANDARD ENVIRONMENTAL DETAIL

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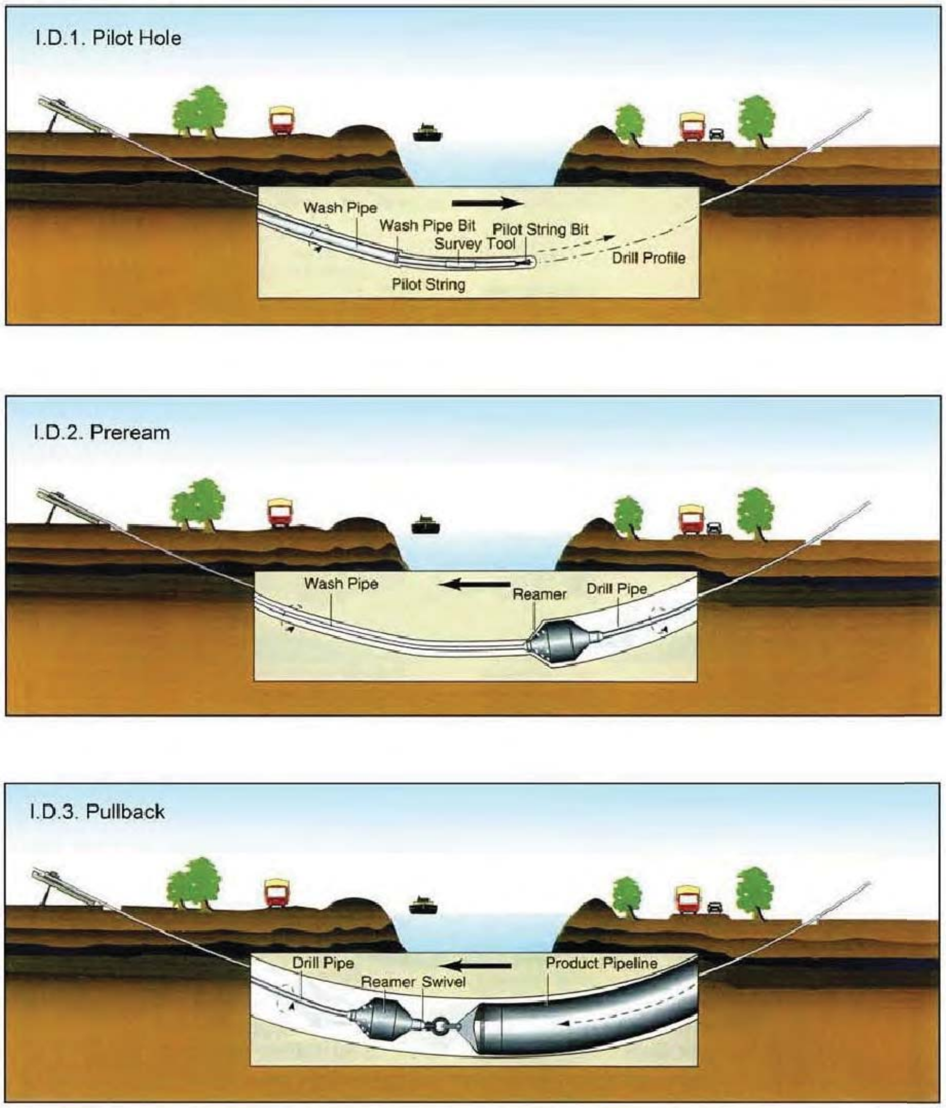
Figure 1. Technique



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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

HDD HORIZONTAL DIRECTIONAL DRILL

Williams.

29a
1 OF 2

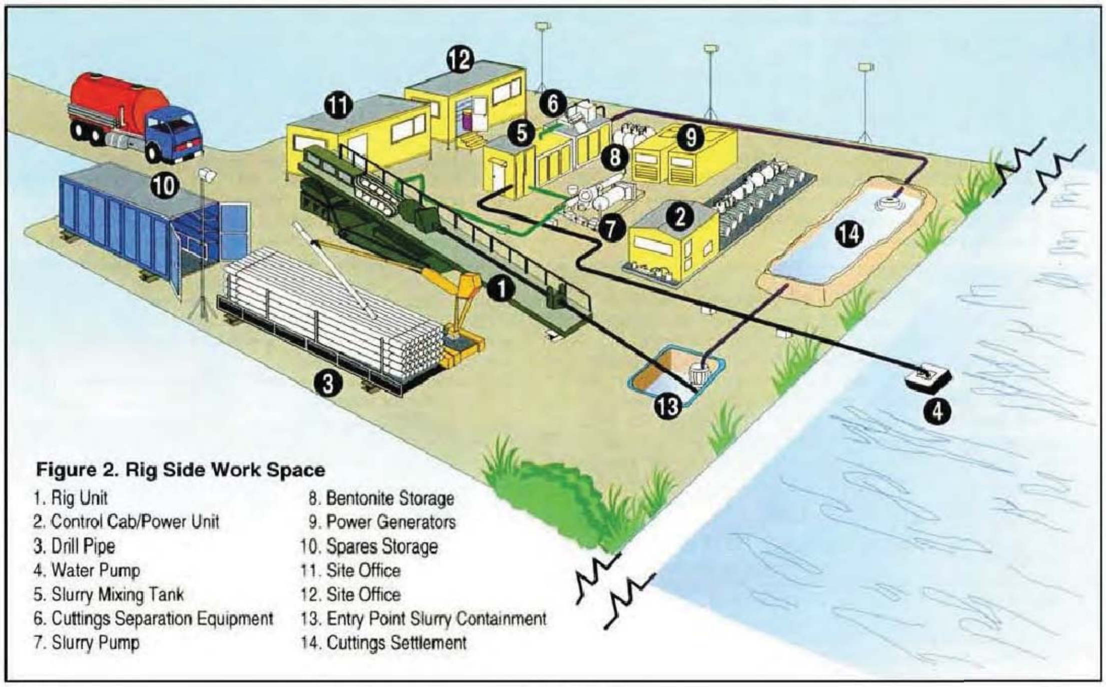

Figure 2. Rig Side Work Space

1. Rig Unit
2. Control Cab/Power Unit
3. Drill Pipe
4. Water Pump
5. Slurry Mixing Tank
6. Cuttings Separation Equipment
7. Slurry Pump
8. Bentonite Storage
9. Power Generators
10. Spares Storage
11. Site Office
12. Site Office
13. Entry Point Slurry Containment
14. Cuttings Settlement

DCCA4 PIPELINE DIGEST AUGUST 1995

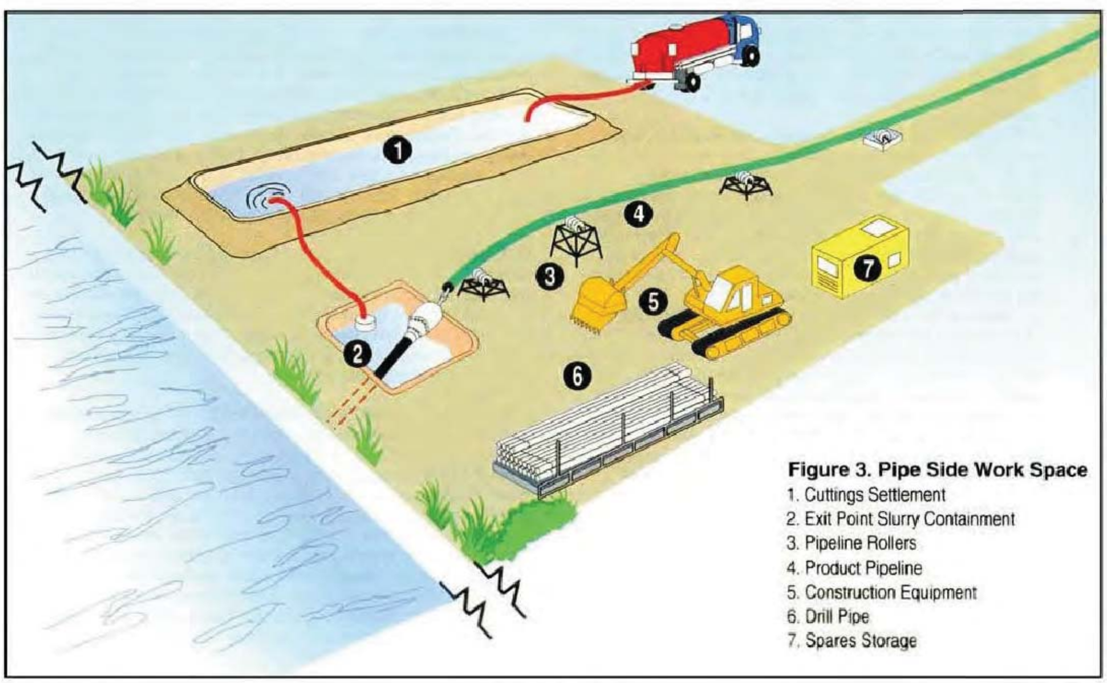

Figure 3. Pipe Side Work Space

1. Cuttings Settlement
2. Exit Point Slurry Containment
3. Pipeline Rollers
4. Product Pipeline
5. Construction Equipment
6. Drill Pipe
7. Spares Storage

AUGUST 1995 PIPELINE DIGEST DCCA5

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

HDD HORIZONTAL DIRECTIONAL DRILL

Williams.

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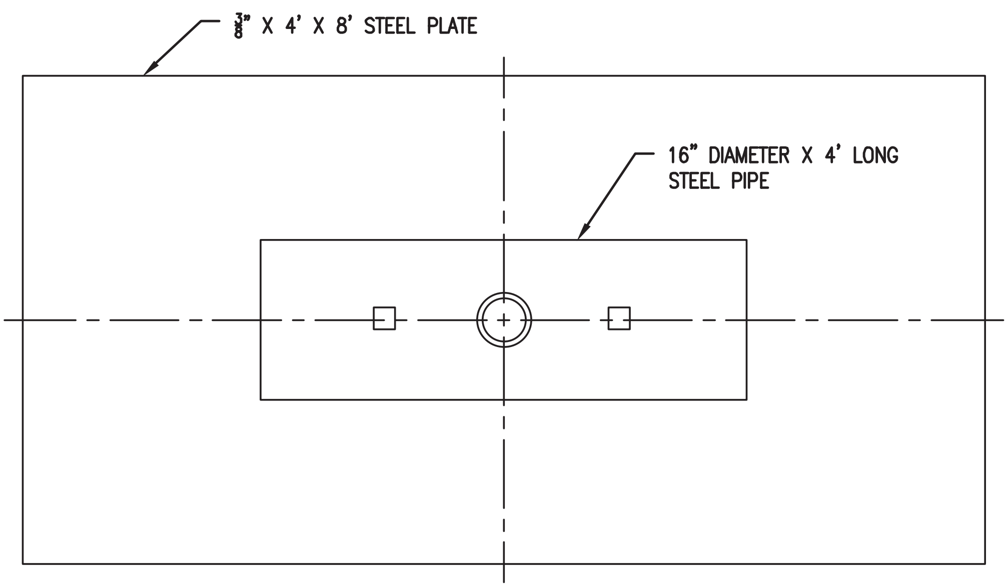
2 OF 2



PLAN VIEW

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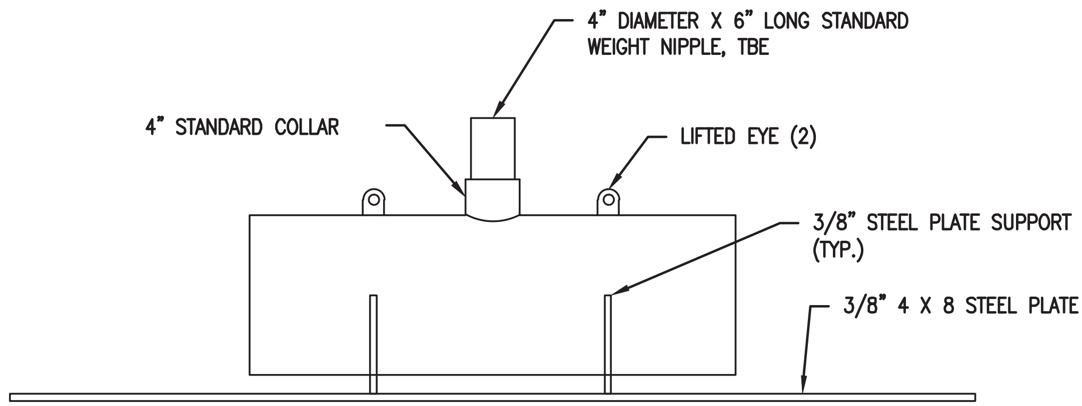
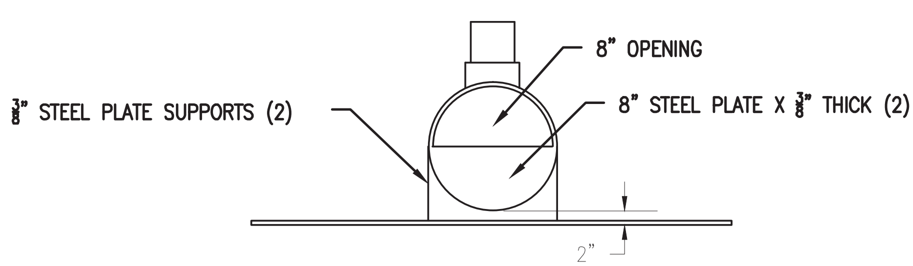


SECTION VIEW

N.T.S.



PROFILE VIEW

N.T.S.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

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ENERGY DISSIPATER

Williams.

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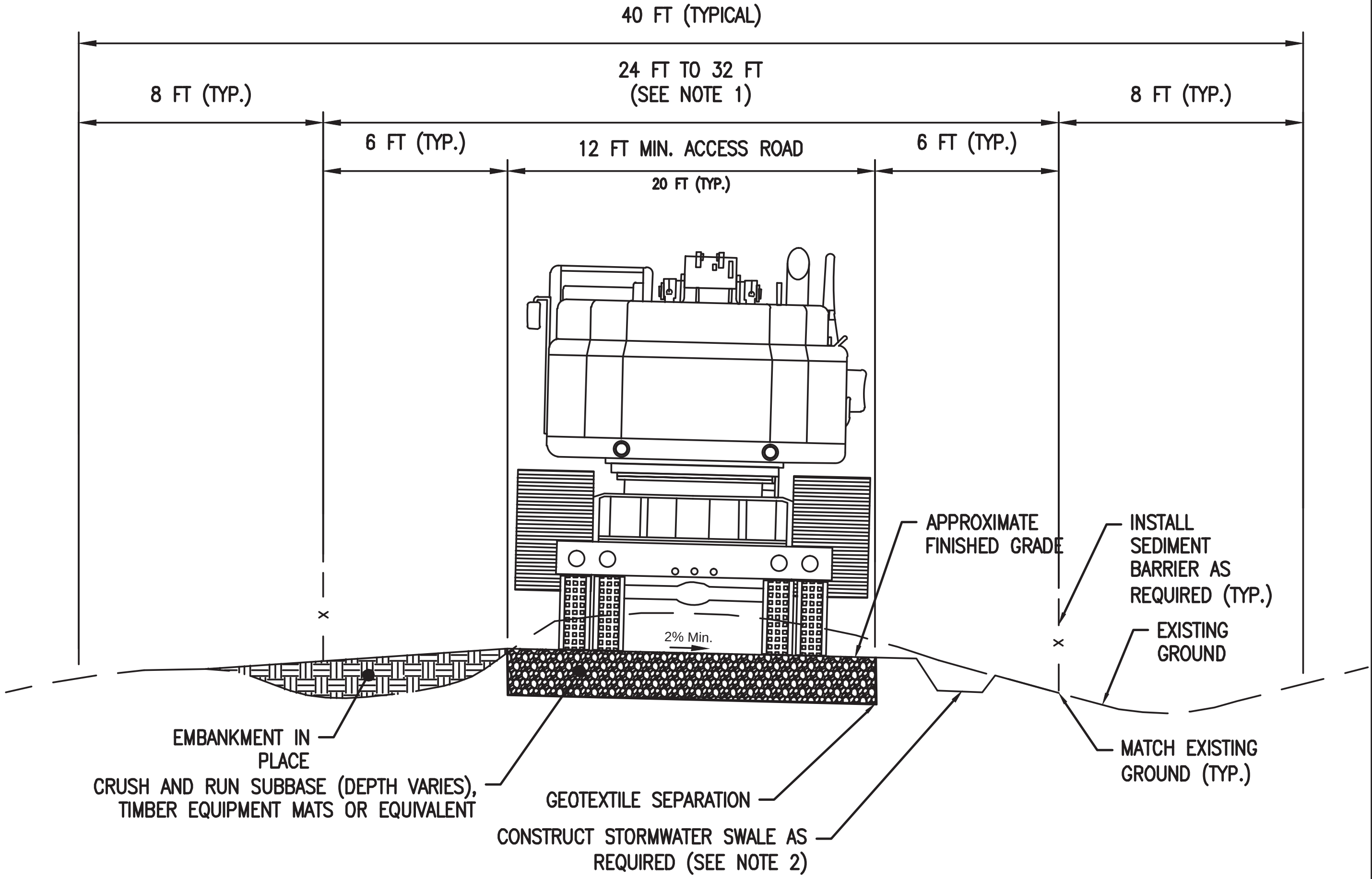

NOTES:

1. ACCESS ROADS WILL TYPICALLY INCLUDE A 12 FT TO 20 FT TRAVEL LANE AND 12 FT OF GRADING DISTURBANCE. THE GRADING DISTURBANCE WILL BE REQUIRED TO MATCH INTO EXISTING GROUND AND CONSTRUCT REQUIRED EROSION CONTROL MEASURES AND SEDIMENT CONTROL DEVICES. ADDITIONAL CONSTRUCTION WIDTH MAY BE REQUIRED IN AREAS THAT REQUIRED TRUCK PULL OFFS, TRUCK TURNAROUNDS, AND AROUND SHARP CURVES WHERE EQUIPMENT TRAILERS HAVE LARGE TURNING RADII.

2. REFER TO THE STORMWATER SWALE TABLES FOR LOCATIONS AND SIZES OF ALL SWALES REQUIRED ALONG ACCESS ROADS.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

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TYPICAL ACCESS ROAD
CROSSING SECTION

Williams.

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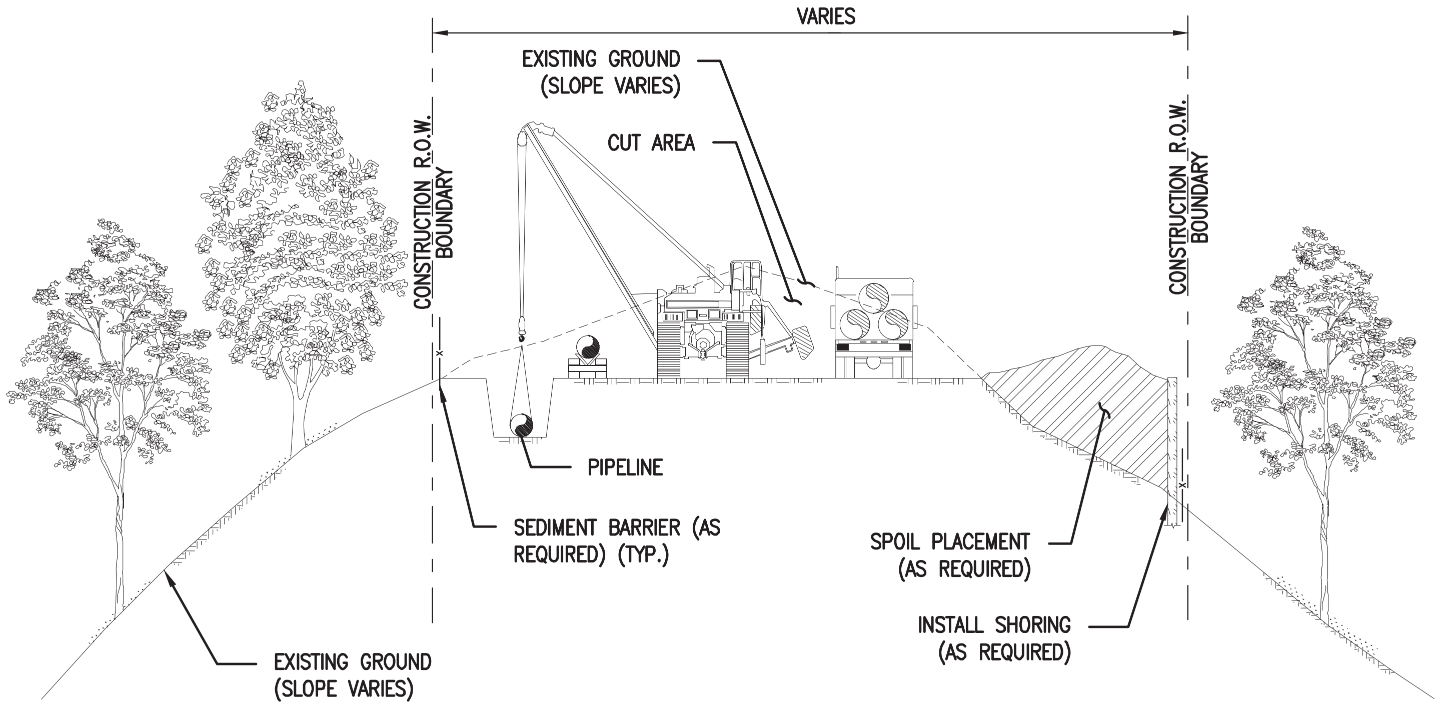

CROSS SECTION

N.T.S.

NOTES:

1. EMPLOY EROSION CONTROL MEASURES SUCH AS WATERBARS, CROSS DITCHES, TEMPORARY DRAINAGE PIPES, TEMPORARY SWALES, TEMPORARY OUTLET PROTECTION, ETC. AS REQUIRED TO PREVENT EROSION AND SEDIMENTATION OUTSIDE OF THE CONSTRUCTION RIGHT-OF-WAY. CLEAR AND STAKE ADDITIONAL RIGHT-OF-WAY TO ALLOW FOR EXTRA SPOIL.
2. ENSURE SIDE BOOM TRACTORS ARE EQUIPPED WITH BOOM EXTENDERS AND COUNTERWEIGHTS IF REQUIRED.
3. USE BACKHOE TO ASSIST BULLDOZERS WITH REPLACING CUTS.
4. RESTORE GRADE TO NEAR PRE-CONSTRUCTION TOPOGRAPHY, REPLACE TOPSOIL AND INSTALL PERMANENT EROSION CONTROL MEASURES AS REQUIRED.
5. REVEGETATE / SEED DISTURBED AREAS AS NOTED IN THE CONSTRUCTION DOCUMENTS OR AS DETERMINED BY THE ENVIRONMENTAL INSPECTOR.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

Williams.

RTC RIDGE TOP CONSTRUCTION PROCEDURE

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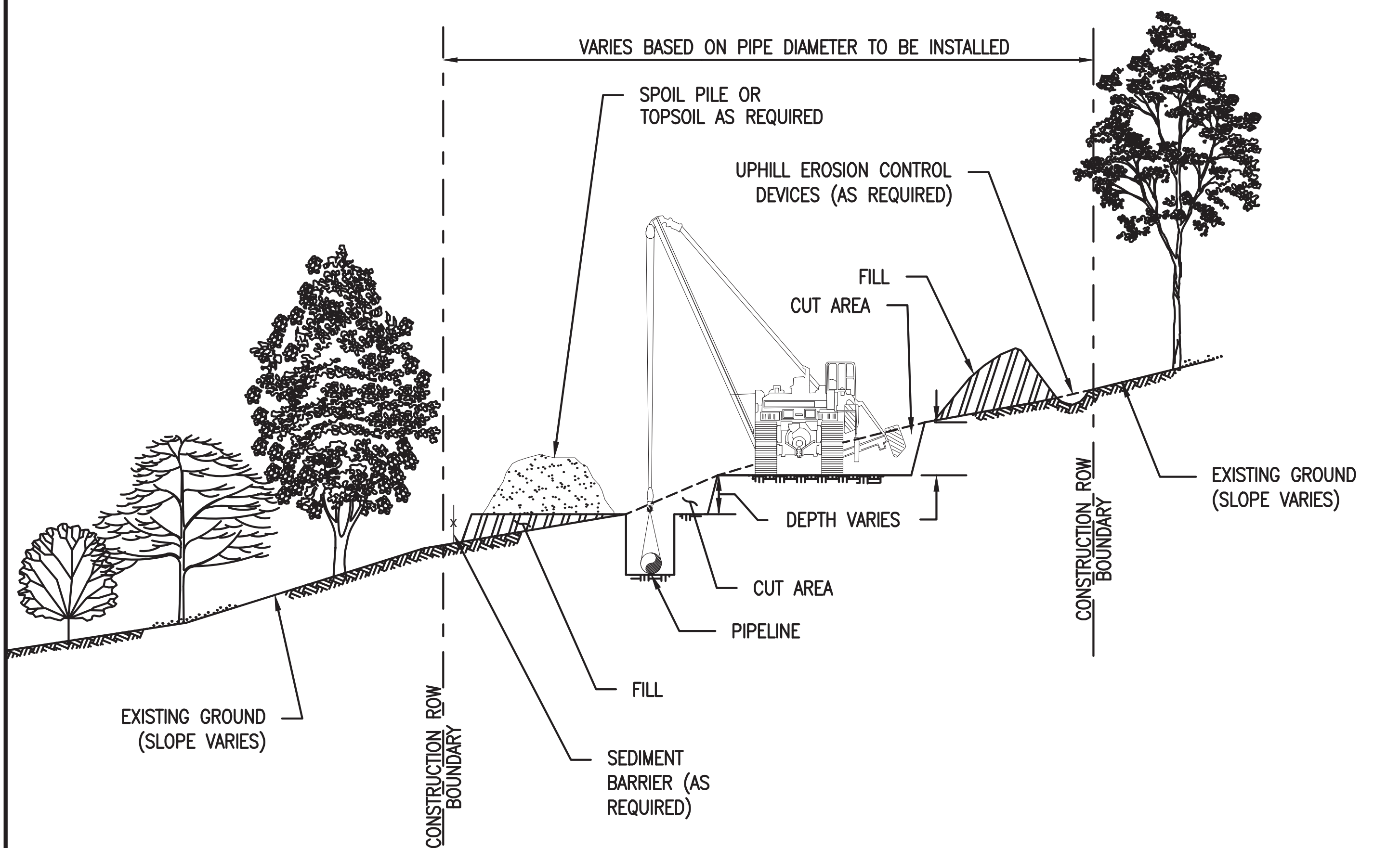

CROSS SECTION

SCALE: N.T.S.

NOTES:

1. TWO-TONE THE RIGHT-OF-WAY TO LIMIT THE NEED FOR DEEP CUTS AND ADDITIONAL RIGHT-OF-WAY ON STEEP SLOPES. THE MINIMUM WORKSPACE WIDTH ALONG STEEP SIDE SLOPES WILL VARY DEPENDING ON THE DIAMETER OF PIPE TO BE INSTALLED. ADDITIONAL TEMPORARY WORKSPACE MAY BE REQUIRED FOR WORKER SAFETY DEPENDING ON THE SEVERITY OF THE GRADE.

2. EMPLOY EROSION CONTROL MEASURES SUCH AS WATERBARS, CROSS DITCHES, TEMPORARY DRAINAGE PIPES, TEMPORARY SWALES, TEMPORARY OUTLET PROTECTION, ETC. AS REQUIRED TO PREVENT EROSION AND SEDIMENTATION OUTSIDE OF THE CONSTRUCTION RIGHT-OF-WAY. CLEAR AND STAKE ATWS TO ALLOW FOR EXTRA SPOIL.

3. ENSURE SIDE BOOM TRACTORS ARE EQUIPPED WITH BOOM EXTENDERS AND COUNTERWEIGHTS IF REQUIRED.

4. USE BACKHOE TO ASSIST BULLDOZERS WITH REPLACING CUTS.

5. RESTORE GRADE TO NEAR PRE-CONSTRUCTION TOPOGRAPHY, REPLACE TOPSOIL AND INSTALL PERMANENT EROSION CONTROL MEASURES AS REQUIRED.

6. REVEGETATE / SEED DISTURBED AREAS AS NOTED IN THE CONSTRUCTION DOCUMENTS OR AS DETERMINED BY THE ENVIRONMENTAL INSPECTOR.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

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SIDE SLOPE (TWO-TONE)
CONSTRUCTION PROCEDURE

Williams.

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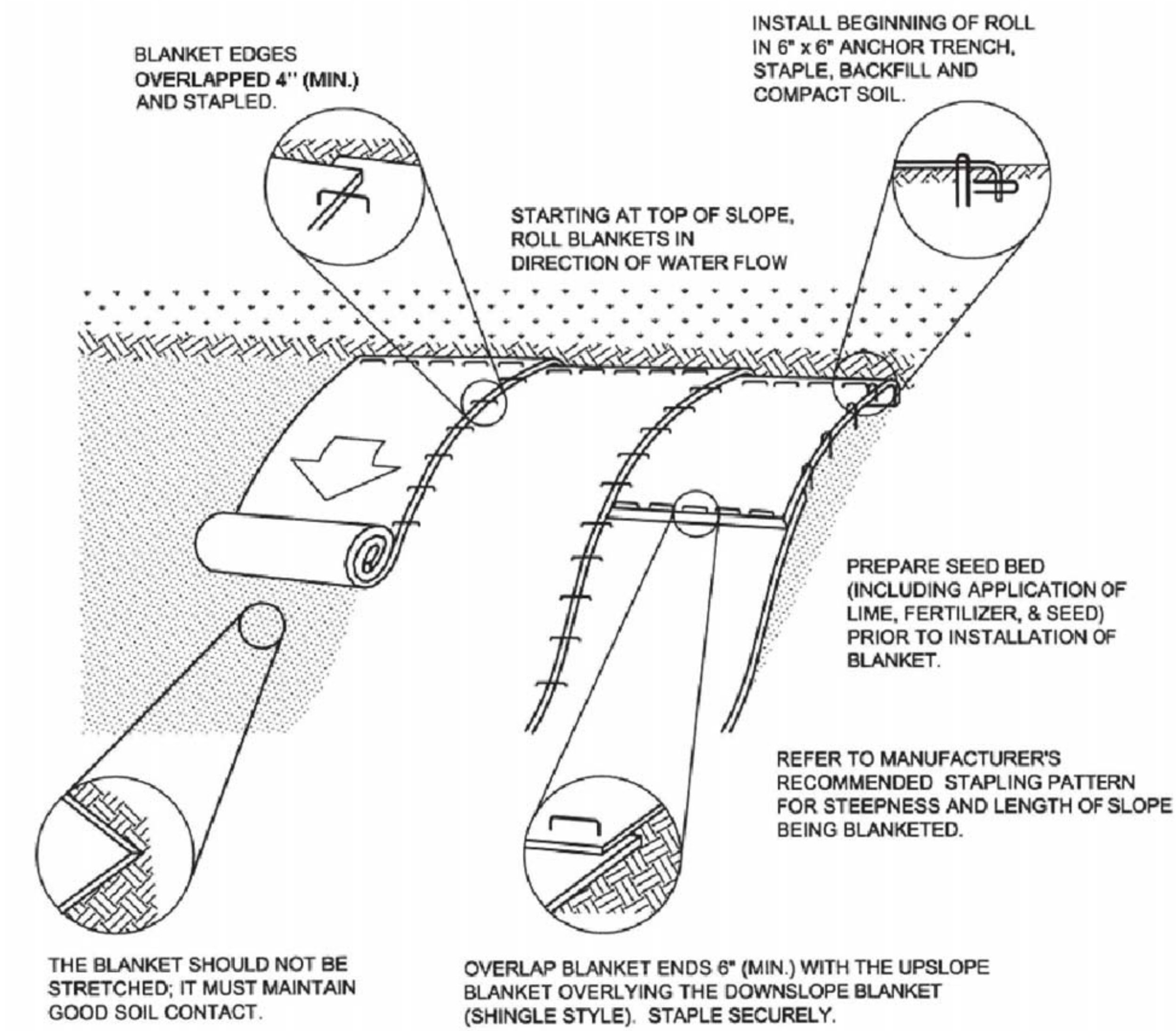

NOT TO SCALE

1. SEED AND SOIL AMENDMENTS SHALL BE APPLIED ACCORDING TO THE RATES IN THE PLAN DRAWINGS PRIOR TO INSTALLING THE BLANKET.

2. PROVIDE ANCHOR TRENCH AT TOE OF SLOPE IN SIMILAR FASHION AS AT TOP OF SLOPE.

3. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS, AND GRASS.

4. BLANKET SHALL HAVE GOOD CONTINUOUS CONTACT WITH UNDERLYING SOIL THROUGHOUT ENTIRE LENGTH. LAY BLANKET LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH SOIL. DO NOT STRETCH BLANKET.

5. STAPLING OF THE BLANKET SHALL BE DONE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

6. BLANKETED AREAS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT UNTIL PERENNIAL VEGETATION IS ESTABLISHED TO A MINIMUM UNIFORM 70% COVERAGE THROUGHOUT THE BLANKETED AREA. DAMAGED OR DISPLACED BLANKETS SHALL BE RESTORED OR REPLACED WITHIN 4 CALENDAR DAYS.

7. BIODEGRADABLE STAPLES SHALL BE USED.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

ECB STANDARD CONSTRUCTION DETAIL #11-1
EROSION CONTROL BLANKET INSTALLATION

Williams.

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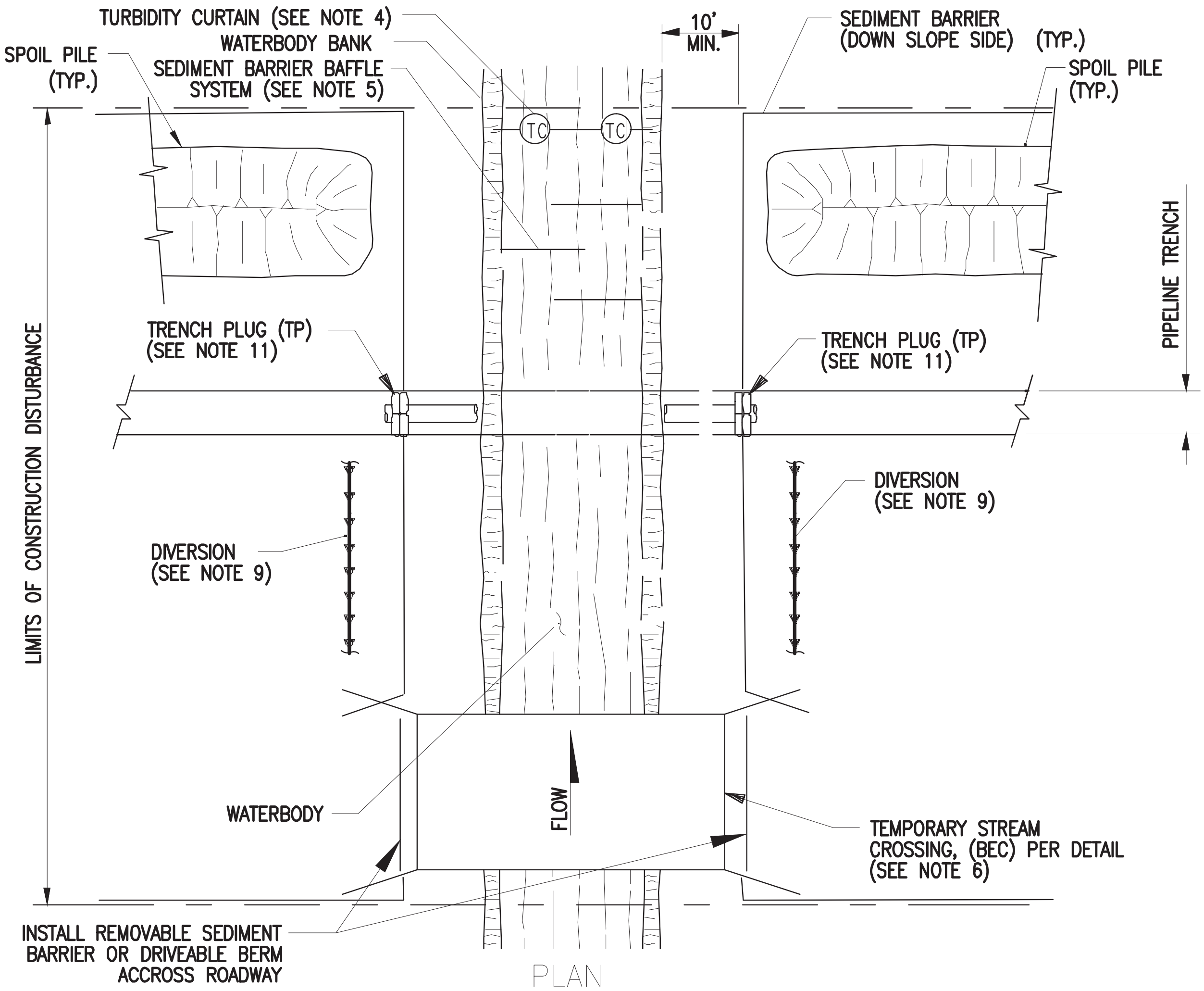

PLAN

SCALE: N.T.S.

NOTES:

1. THIS METHOD APPLIES TO INTERMEDIATE WATERBODY CROSSINGS THAT ARE DEFINED AS WATERBODIES THAT ARE GREATER THAN 10 FEET WIDE BUT LESS THAN OR EQUAL TO 100 FEET WIDE AT THE WATERS EDGE AT THE TIME OF CONSTRUCTION.
2. SEDIMENT BARRIERS SHALL BE INSTALLED AS DEPICTED AND ALONG DOWN GRADIENT SIDES OF WORK AREAS AND STAGING AREAS SUCH THAT NO HEAVILY SILT LADEN WATER ENTERS THE WATERBODY OR LEAVES THE CONSTRUCTION RIGHT OF WAY.
3. HARD DITCH PLUGS MUST REMAIN IN PLACE AT CONVENIENT LOCATIONS TO SEPARATE MAINLINE DITCH FROM THE WATERBODY CROSSING UNTIL THE WATERBODY IS INSTALLED AND BACK FILLED.
4. INSTALL TURBIDITY CURTAINS DOWNSTREAM OF CROSSING AT EDGE OF WORK CORRIDOR IF STREAM FLOW IS CONDUCIVE TO SUCH AN INSTALLATION.
5. IF FLOW OF WATERBODY IS SUCH THAT TURBIDITY CURTAIN CAN NOT BE INSTALLED, THEN INSTALL DOWNSTREAM SEDIMENT BARRIER BAFFLE SYSTEM AS DEPICTED.
6. EQUIPMENT OPERATING IN THE WATERBODY SHALL BE LIMITED TO THAT NEEDED TO PERFORM CONSTRUCTION. IF OTHER TYPES OF EQUIPMENT MUST CROSS THE WATERBODY, CONTRACTOR SHALL PROVIDE AND USE TEMPORARY STREAM CROSSING (BEC).
7. STAGING AREA(S) FOR WATERBODY CROSSING(S), WHEN REQUIRED, SHALL BE LOCATED AT LEAST 50 FEET FROM WATER'S EDGE AND SHALL BE OF A MINIMUM SIZE NEEDED FOR CONVENIENT PREPARATION.
8. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED DAILY AND REPAIRED IF NECESSARY.
9. INSTALL DIVERSION TRENCHES AT THE BASE OF ALL SLOPES ADJACENT TO THE WATERBODY.
10. CHEMICALS, FUELS AND LUBRICATING OILS SHALL NOT BE STORED AND EQUIPMENT SHALL NOT BE REFUELED WITHIN 100 FEET OF THE WATERBODY.
11. INSTALL TRENCH PLUGS ON BOTH SIDES OF THE WATERBODY TO PREVENT DIVERSION OF WATER INTO UPLAND PORTIONS OF THE PIPELINE TRENCH AND TO KEEP ANY ACCUMULATED TRENCH WATER OUT OF THE WATERBODY.
12. CONTRACTOR SHALL POSTPONE GRADING OF RIGHT-OF-WAY ADJACENT TO WATERBODY UNTIL STAGING AREA IS PREPARED AND WORK IN THE WATERBODY IS READY TO COMMENCE.
13. COMPLETE IN STREAM CONSTRUCTION ACTIVITIES (NOT INCLUDING BLASTING AND OTHER ROCK BREAKING MEASURES) WITHIN 24 HOURS, UNLESS SITE SPECIFIC CONDITIONS MAKE COMPLETION WITHIN 48 HOURS INFEASIBLE.

(APPLIES TO WATERBODIES GREATER THAN 10' WIDE BUT LESS THAN 100' WIDE AT WATERS EDGE AT TIME OF CROSSING)

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

IWC WET INTERMEDIATE WATERBODY CROSSING

Williams.

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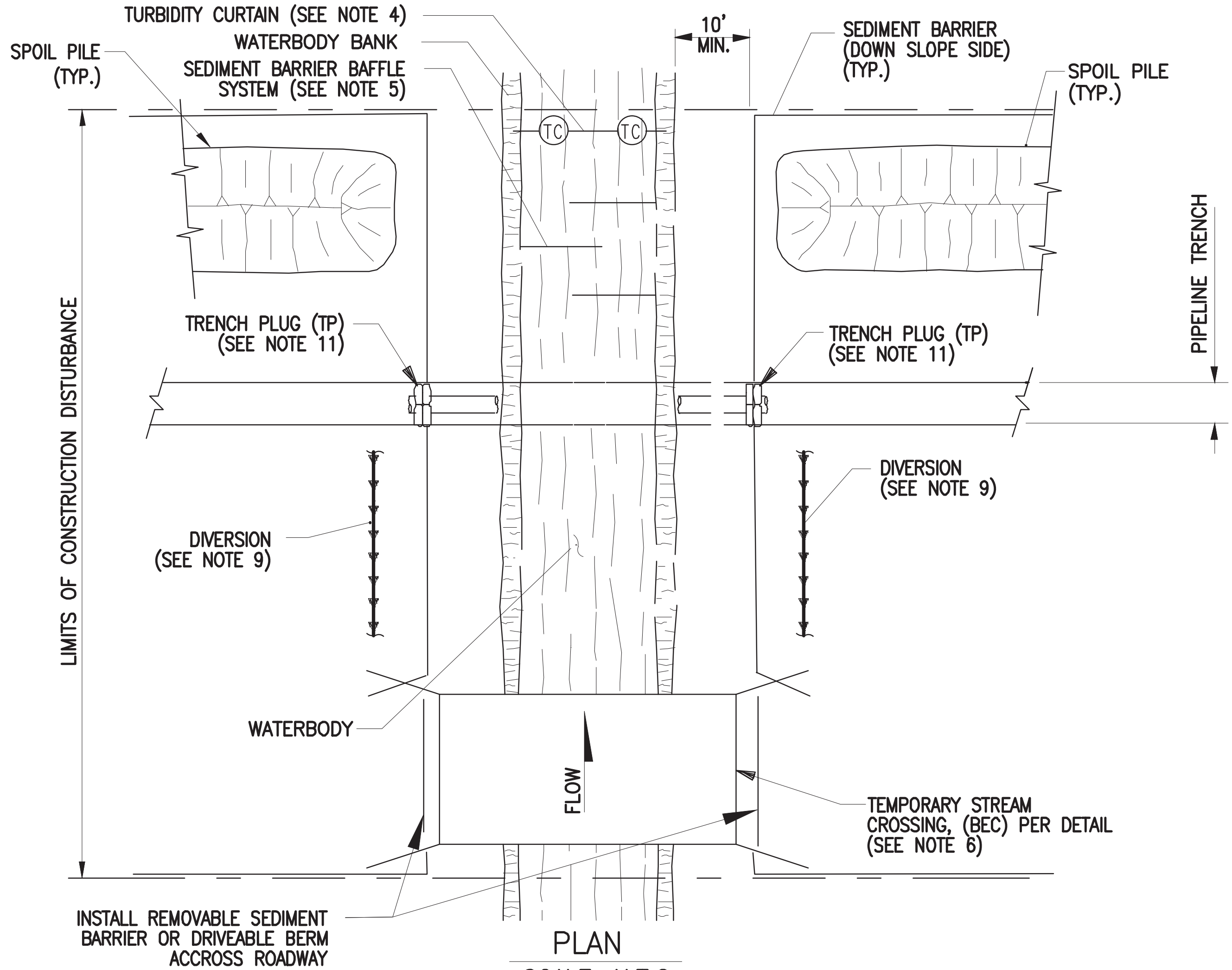

PLAN

SCALE: N.T.S.

NOTES:

1. THIS METHOD APPLIES TO MINOR WATERBODY CROSSINGS THAT ARE DEFINED AS WATERBODIES THAT ARE LESS THAN OR EQUAL TO 10 FEET AT WATERS EDGE AT THE TIME OF CROSSING.
2. SEDIMENT BARRIERS SHALL BE INSTALLED AS DEPICTED AND ALONG DOWN GRADIENT SIDES OF WORK AREAS AND STAGING AREAS SUCH THAT NO HEAVILY SILT LADEN WATER ENTERS THE WATERBODY OR LEAVES THE CONSTRUCTION RIGHT OF WAY.
3. HARD DITCH PLUGS MUST REMAIN IN PLACE AT CONVENIENT LOCATIONS TO SEPARATE MAINLINE DITCH FROM THE WATERBODY CROSSING UNTIL THE WATERBODY IS INSTALLED AND BACK FILLED.
4. INSTALL TURBIDITY CURTAINS DOWNSTREAM OF CROSSING AT EDGE OF WORK CORRIDOR IF STREAM FLOW IS CONDUCIVE TO SUCH AN INSTALLATION.
5. IF FLOW OF WATERBODY IS SUCH THAT TURBIDITY CURTAIN CAN NOT BE INSTALLED, THEN INSTALL DOWNSTREAM SEDIMENT BARRIER BAFFLE SYSTEM AS DEPICTED.
6. EQUIPMENT OPERATING IN THE WATERBODY SHALL BE LIMITED TO THAT NEEDED TO PERFORM CONSTRUCTION. IF OTHER TYPES OF EQUIPMENT MUST CROSS THE WATERBODY, CONTRACTOR SHALL PROVIDE AND USE TEMPORARY STREAM CROSSING (BEC).
7. STAGING AREA(S) FOR WATERBODY CROSSING(S), WHEN REQUIRED, SHALL BE LOCATED AT LEAST 50 FEET FROM WATER'S EDGE AND SHALL BE OF A MINIMUM SIZE NEEDED FOR CONVENIENT PREPARATION.
8. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED DAILY AND REPAIRED IF NECESSARY.
9. INSTALL DIVERSION TRENCHES AT THE BASE OF ALL SLOPES ADJACENT TO THE WATERBODY.
10. CHEMICALS, FUELS AND LUBRICATING OILS SHALL NOT BE STORED AND EQUIPMENT SHALL NOT BE REFUELED WITHIN 100 FEET OF THE WATERBODY.
11. INSTALL TRENCH PLUGS ON BOTH SIDES OF THE WATERBODY TO PREVENT DIVERSION OF WATER INTO UPLAND PORTIONS OF THE PIPELINE TRENCH AND TO KEEP ANY ACCUMULATED TRENCH WATER OUT OF THE WATERBODY.
12. CONTRACTOR SHALL POSTPONE GRADING OF RIGHT-OF-WAY IMMEDIATELY ADJACENT TO WATERBODY UNTIL STAGING AREA IS PREPARED AND WORK IN THE WATERBODY IS READY TO COMMENCE.
13. EXCEPT FOR BLASTING AND OTHER ROCK BREAKING MEASURES, COMPLETE IN STREAM CONSTRUCTION ACTIVITIES (INCLUDING TRENCHING, PIPE INSTALLATION, BACKFILL, AND RESTORATION OF THE STREAM BED CONTOURS) WITHIN 24 HOURS. STREAM BANKS AND UNCONSOLIDATED STREAM BEDS MAY REQUIRE ADDITIONAL RESTORATION AFTER THIS PERIOD.

(APPLIES TO WATERBODIES 10' WIDE OR LESS AT WATERS EDGE AT TIME OF CROSSING)

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

MWC WET MINOR WATERBODY CROSSING

Williams.

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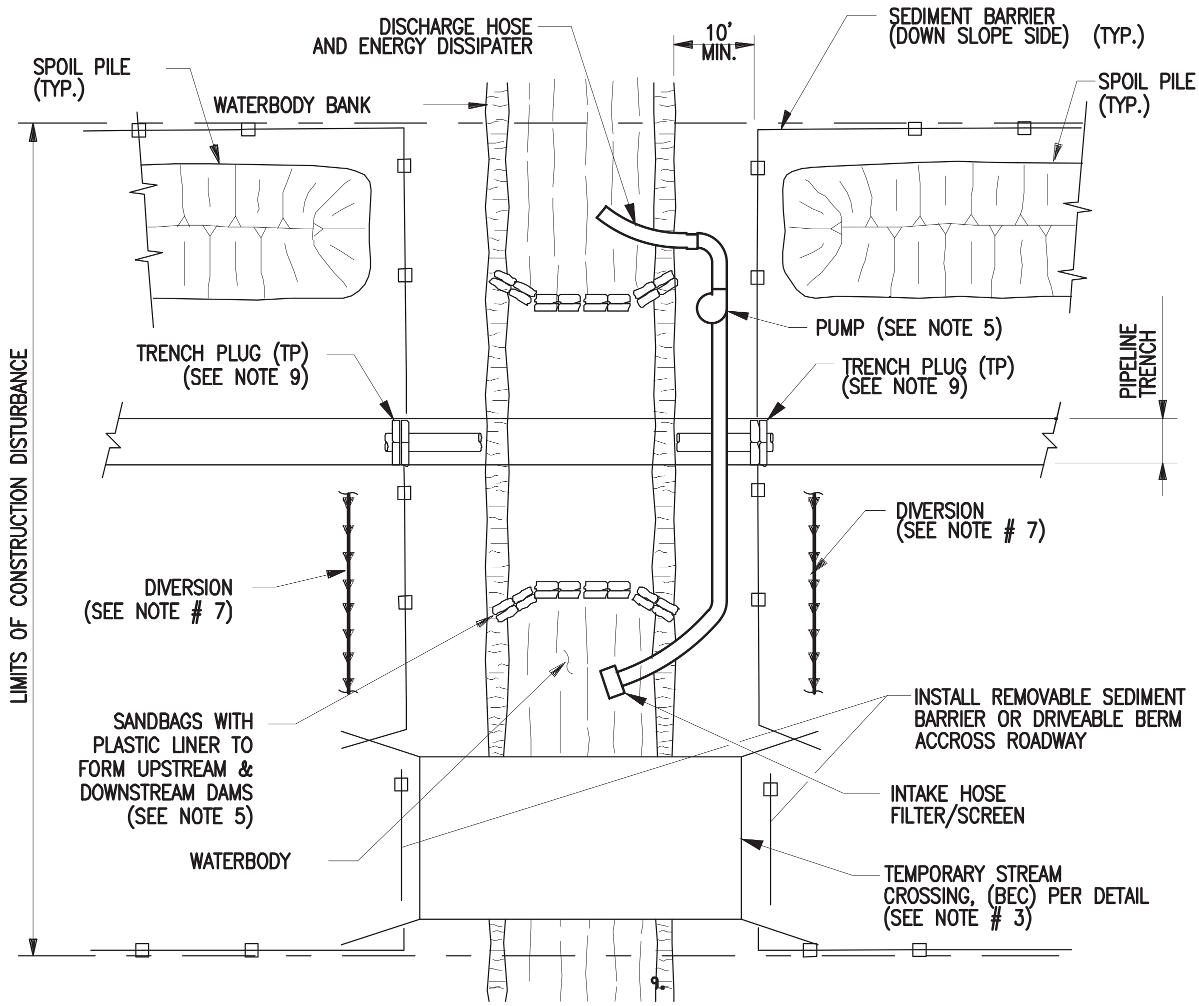

NOTES:

1. SEDIMENT BARRIERS SHALL BE INSTALLED AS DEPICTED AND ALONG DOWN GRADIENT SIDES OF WORK AREAS AND STAGING AREAS SUCH THAT NO HEAVY SILT LADEN WATER ENTERS THE WATERBODY OR LEAVES THE CONSTRUCTION RIGHT-OF-WAY.
2. HARD DITCH PLUGS MUST REMAIN IN PLACE AT CONVENIENT LOCATIONS TO SEPARATE MAINLINE DITCH FROM THE WATERBODY CROSSING UNTIL THE WATERBODY CROSSING IS INSTALLED AND BACKFILLED.
3. EQUIPMENT OPERATING IN THE WATERBODY SHALL BE LIMITED TO THAT NEEDED TO PERFORM CONSTRUCTION. IF OTHER TYPES OF EQUIPMENT MUST CROSS THE WATERBODY, CONTRACTOR SHALL PROVIDE AND USE A TEMPORARY STREAM CROSSING (BEC).
4. STAGING AREA(S) FOR WATERBODY CROSSING(S), WHEN REQUIRED, SHALL BE LOCATED AT LEAST 50 FEET FROM WATER'S EDGE AND SHALL BE OF A MINIMUM SIZE NEEDED FOR CONVENIENT PREPARATION.
5. IMPLEMENTATION OF THE DAM-AND-PUMP CROSSING METHOD MUST MEET THE FOLLOWING PERFORMANCE CRITERIA:
   (A) USE SUFFICENT PUMPS, INCLUDING ON-SITE BACKUP PUMPS, TO MAINTAIN DOWNSTREAM FLOWS.
   (B) CONSTRUCT DAMS WITH MATERIALS THAT PREVENT SEDIMENT AND OTHER POLLUTANTS FROM ENTERING THE WATERBODY (E.G., SANDBAGS OR CLEAN GRAVEL WITH PLASTIC LINER).
   (C) SCREEN PUMP INTAKES;
   (D) PREVENT STREAMBED SCOUR AT PUMP DISCHARGE.
   (E) MONITOR THE DAM AND PUMPS TO ENSURE PROPER OPERATION THROUGHOUT THE WATERBODY CROSSING.
6 EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED DAILY AND REPAIRED IF NECESSARY.
7. INSTALL DIVERSION TRENCHES AT THE BASE OF ALL SLOPES ADJACENT TO THE WATERBODY.
8. CHEMICALS, FUELS AND LUBRICATING OILS SHALL NOT BE STORED AND EQUIPMENT SHALL NOT BE REFUELED WITHIN 100 FEET OF THE WATERBODY.
9. INSTALL TRENCH PLUGS ON BOTH SIDES OF THE WATERBODY TO PREVENT DIVERSION OF WATER INTO UPLAND PORTIONS OF THE PIPELINE TRENCH AND TO KEEP ANY ACCUMULATED TRENCH WATER OUT OF THE WATERBODY.
10. CONTRACTOR SHALL POSTPONE GRADING OF RIGHT-OF-WAY ADJACENT TO WATERBODY UNTIL STAGING AREA IS PREPARED AND WORK IN THE WATERBODY IS READY TO COMMENCE.
11. PUMP INTAKE SHALL BE MAINTAINED TO A SUFFICIENT DISTANCE FROM BOTTOM TO PREVENT SEDIMENT FROM ENTERING THE SYSTEM.
12. DO NOT EXCAVATE A SUMP FOR THE PUMP INTAKE.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
STANDARD ENVIRONMENTAL DETAIL

DPX

DAM AND PUMP CROSSING
TEMPORARY EROSION CONTROL MEASURE

Williams.

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Williams

Transcontinental Gas Pipe Line Company LLC

TYPICAL RIGHT-OF-WAY CROSS-SECTIONS
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
M.P. 0.00 TO M.P. 57.30
PENNSYLVANIA

F-XS-CPLN-A-01

DATE: 03/31/2015 REV. 0

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DOCUMENT NAME	SHEET NUMBER	ROW WIDTH (FT)	DESCRIPTION	REVISION	DATE
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F-XS-CPLN-A-01	02		TABLE OF CONTENTS	0	03/31/2015
F-XS-CPLN-A-01	03	90	NO TOPSOIL STRIPPING - NOT ADJACENT TO EXISTING PIPELINE	0	03/31/2015
F-XS-CPLN-A-01	04	110	FULL WIDTH TOPSOIL STRIPPING - NOT ADJACENT TO EXISTING PIPELINE	0	03/31/2015
F-XS-CPLN-A-01	05	110	MODERATE SIDESLOPE CONSTRUCTION - ADJACENT TO EXISTING FOREIGN PIPELINE (CUT)	0	03/31/2015
F-XS-CPLN-A-01	06	110	FULL WIDTH TOPSOIL STRIPPING - ADJACENT TO EXISTING FOREIGN PIPELINE	0	03/31/2015
F-XS-CPLN-A-01	07	90	NO TOPSOIL STRIPPING - ADJACENT TO EXISTING FOREIGN PIPELINE	0	03/31/2015
F-XS-CPLN-A-01	08	110	MODERATE SIDESLOPE CONSTRUCTION - NOT ADJACENT TO EXISTING PIPELINE (FILL)	0	03/31/2015
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F-XS-CPLN-A-01	10	110	MODERATE SIDESLOPE CONSTRUCTION - ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE (FILL)	0	03/31/2015
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F-XS-CPLN-A-01	14	75	WITHIN SATURATED WETLAND AREAS - ADJACENT TO TRANSCONTINENTAL PIPELINE	0	03/31/2015
F-XS-CPLN-A-01	15	75	WITHIN SATURATED WETLAND AREAS	0	03/31/2015
F-XS-CPLN-A-01	16	75	NO TOPSOIL STRIPPING - WORKING OVER EXISTING TRANSCONTINENTAL PIPELINE	0	03/31/2015
F-XS-CPLN-A-01	17	75	WITHIN SATURATED WETLAND AREAS - ADJACENT TO EXISTING FOREIGN PIPELINE	0	03/31/2015
F-XS-CPLN-A-01	18	100	FULL WIDTH TOPSOIL STRIPPING (SPOIL SIDE) - NOT ADJACENT TO EXISTING PIPELINE	0	03/31/2015
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F-XS-CPLN-A-01	20	75	WITHIN UNSATURATED WETLAND AREAS	0	03/31/2015
F-XS-CPLN-A-01	21	75	WITHIN UNSATURATED WETLAND AREAS ADJACENT TO TRANSCONTINENTAL PIPELINE	0	03/31/2015

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:		SCALE: NTS	
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:		REV: 0	
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01		SHEET 02	
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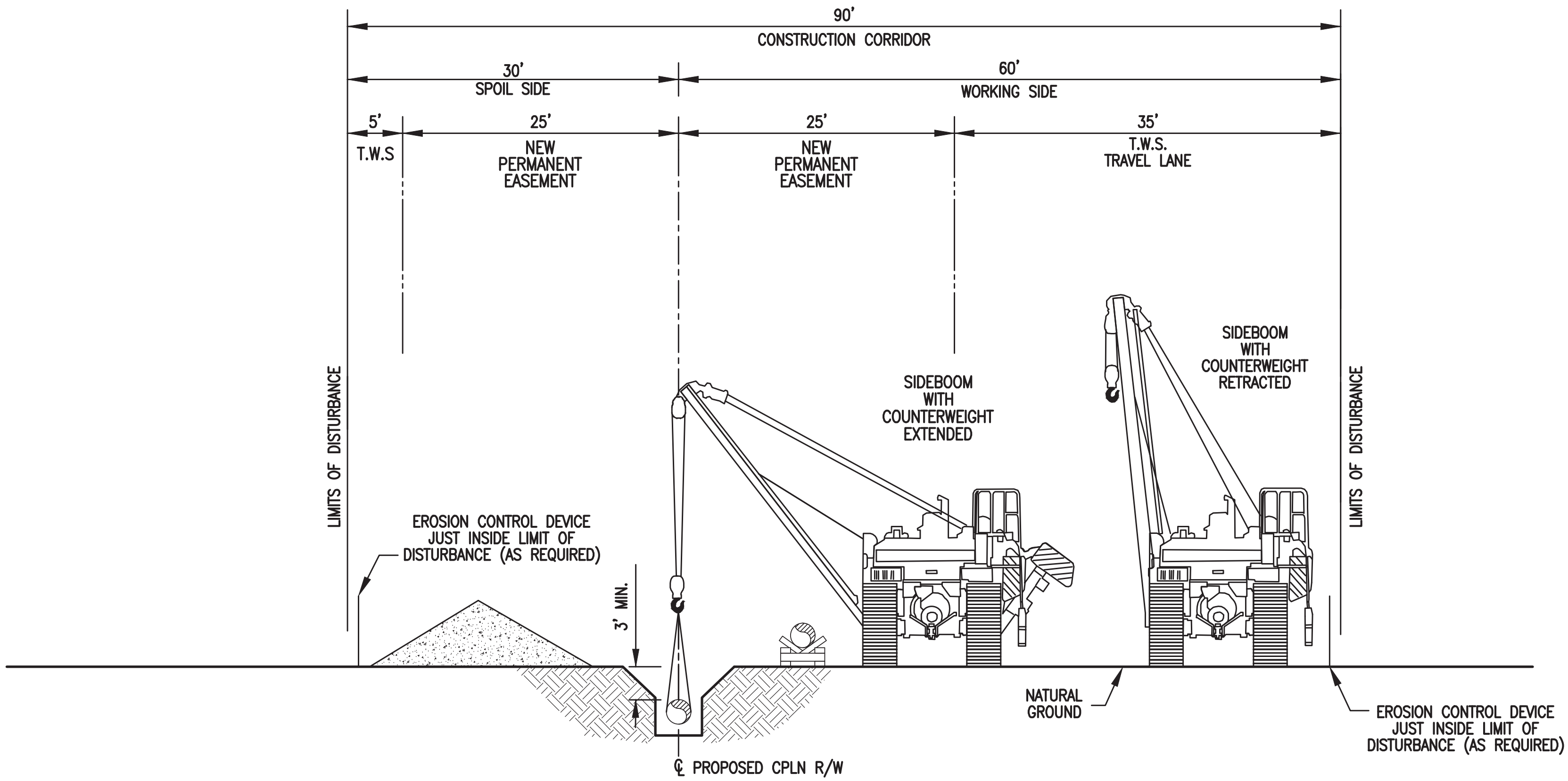


TYPICAL CROSS SECTION FOR 30" PIPELINE
NO TOPSOIL STRIPPING – NOT ADJACENT TO EXISTING PIPELINE

DRAWING NO.	REFERENCE TITLE

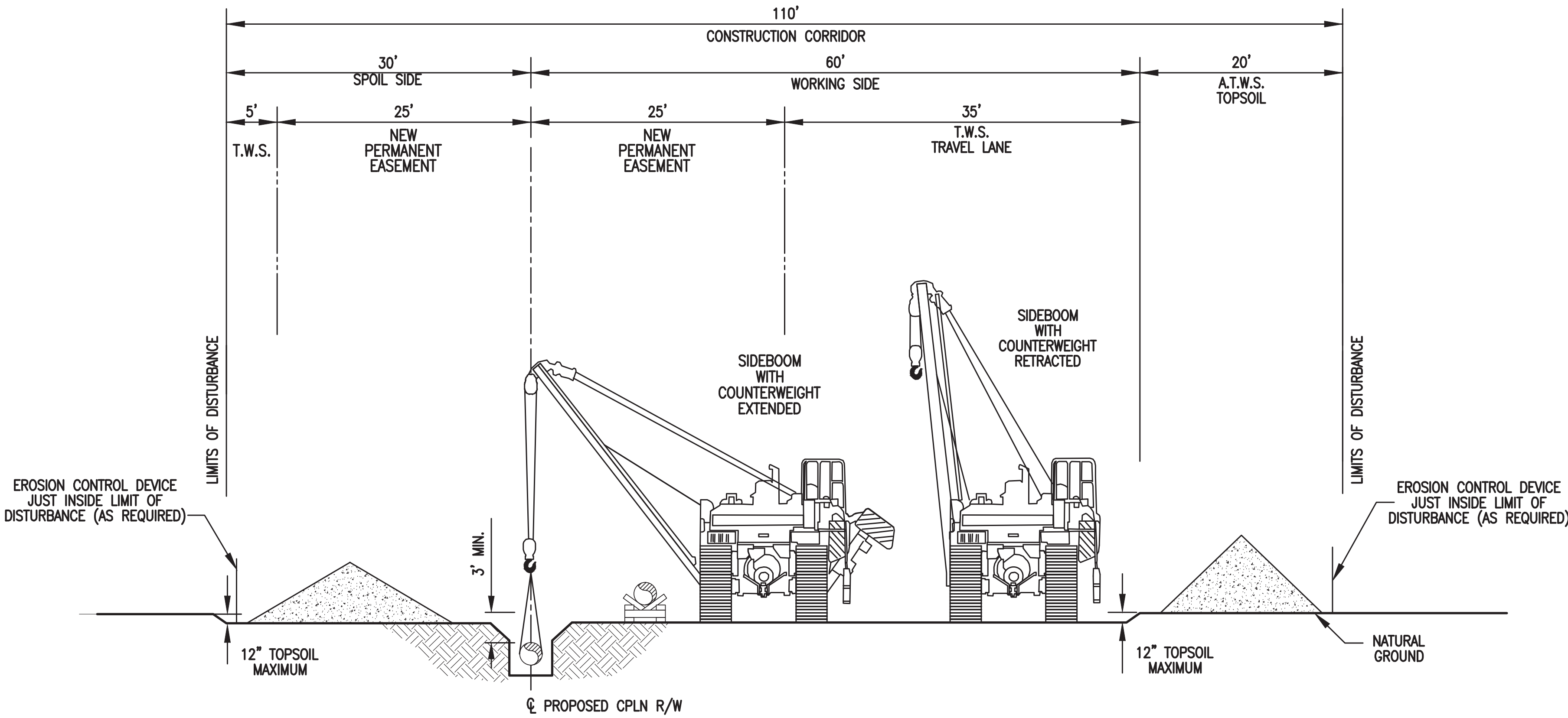
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01	SHEET 03 OF 21
WO: 1161481		3:03pm 3/20/2015 a1traha K:\103646-CPLN\Mapping\Typicals\F-XS-CPLN-A\REV_0\CPLN-03.dwg	

WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 30" PIPELINE
FULL WIDTH TOPSOIL STRIPPING – NOT ADJACENT TO EXISTING PIPELINE

DRAWING NO.	REFERENCE TITLE

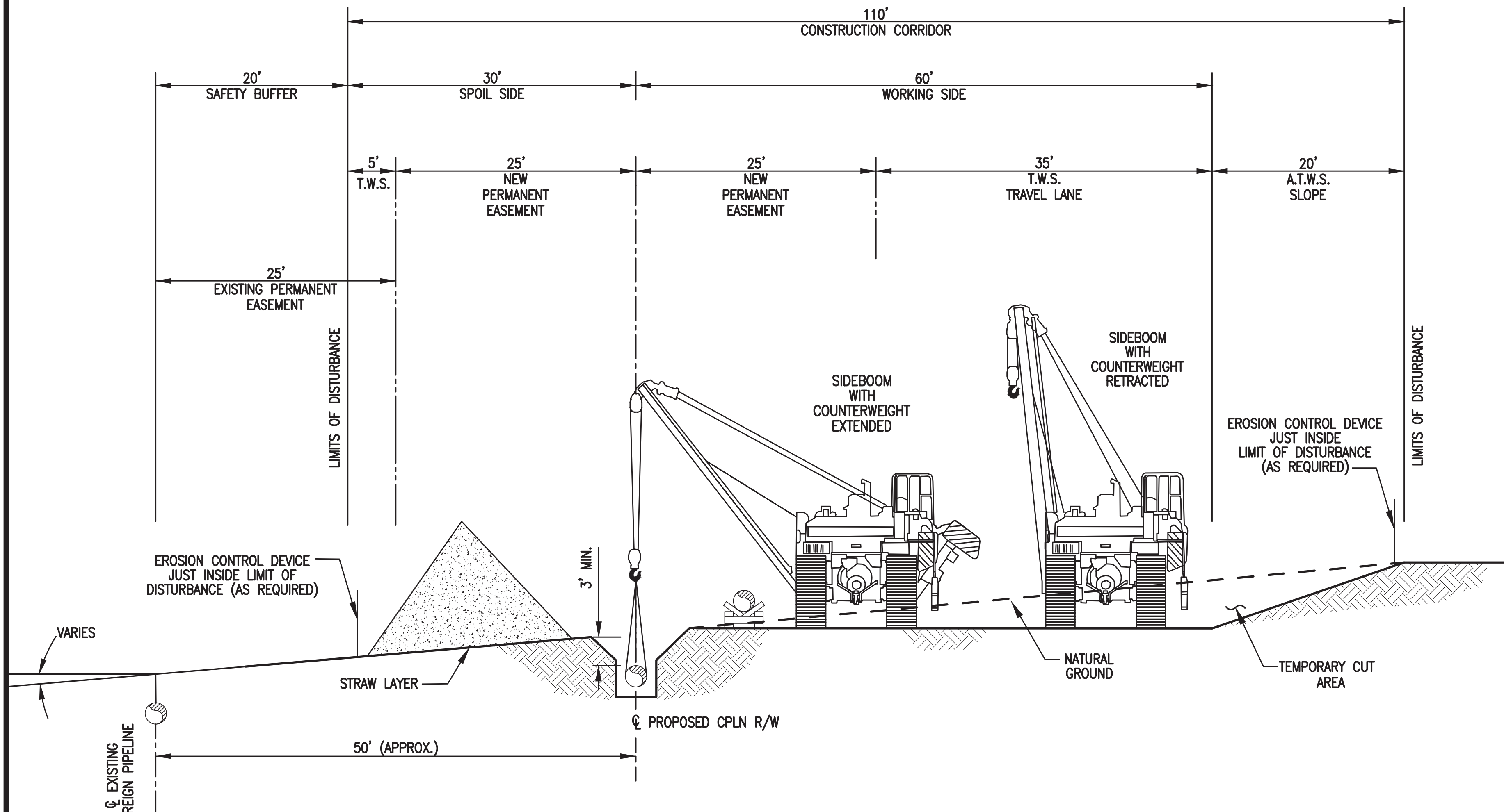
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

DRAWN BY:	AT	DATE:	09/26/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY:	EP	DATE:	10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY:	MJH	DATE:	10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01	SHEET 04 OF 21
WO:	1161481			3:06pm 3/20/2015 a1traha K:\103646-CPLN\Mapping\Typicals\F-XS-CPLN-A\REV_0\CPLN-04.dwg	

WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 30" PIPELINE
MODERATE SIDESLOPE CONSTRUCTION – ADJACENT TO EXISTING FOREIGN PIPELINE (CUT)

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01	SHEET 05
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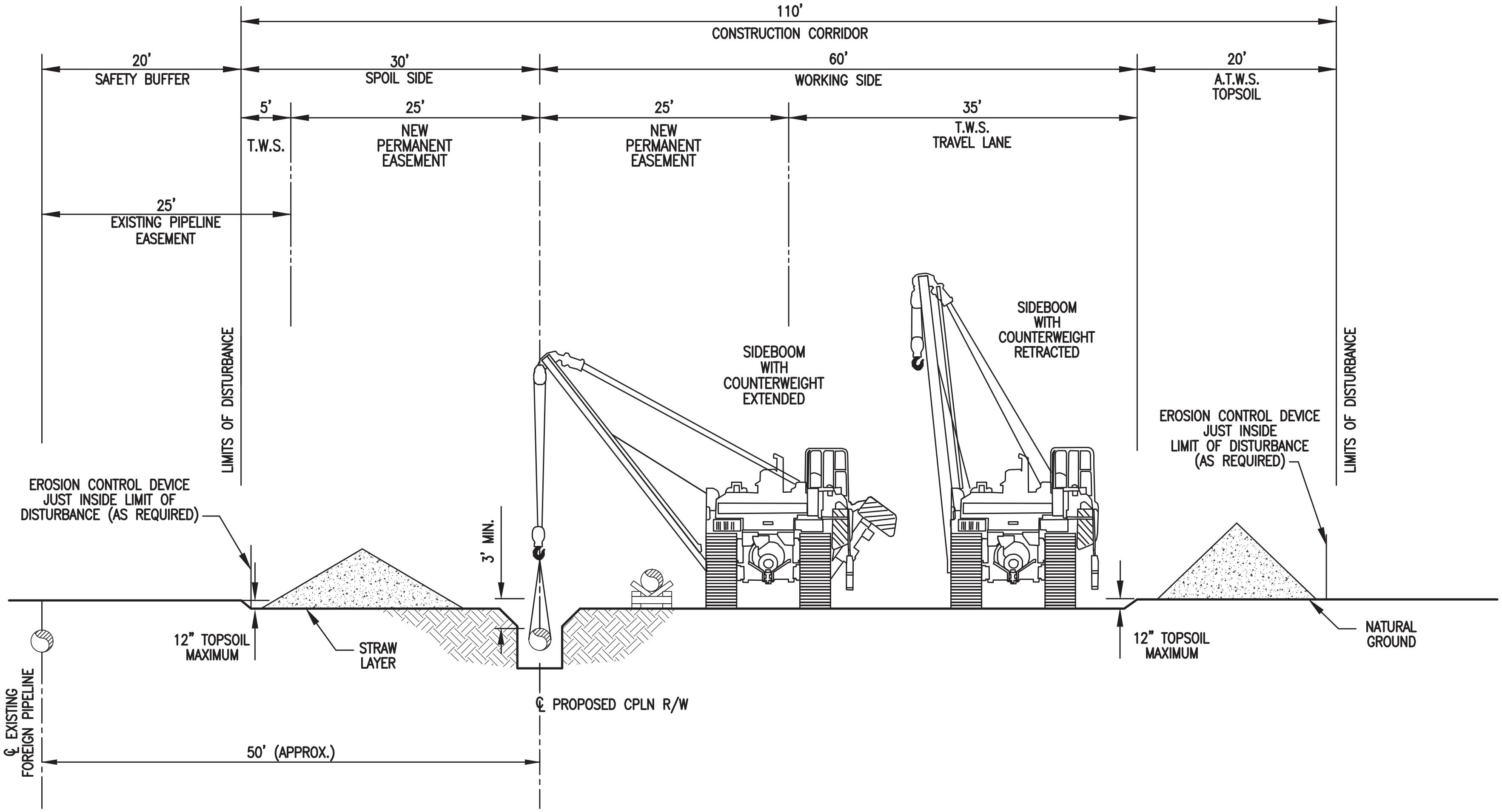


TYPICAL CROSS SECTION FOR 30" PIPELINE
FULL WIDTH TOPSOIL STRIPPING – ADJACENT TO EXISTING FOREIGN PIPELINE

DRAWING NO.	REFERENCE TITLE

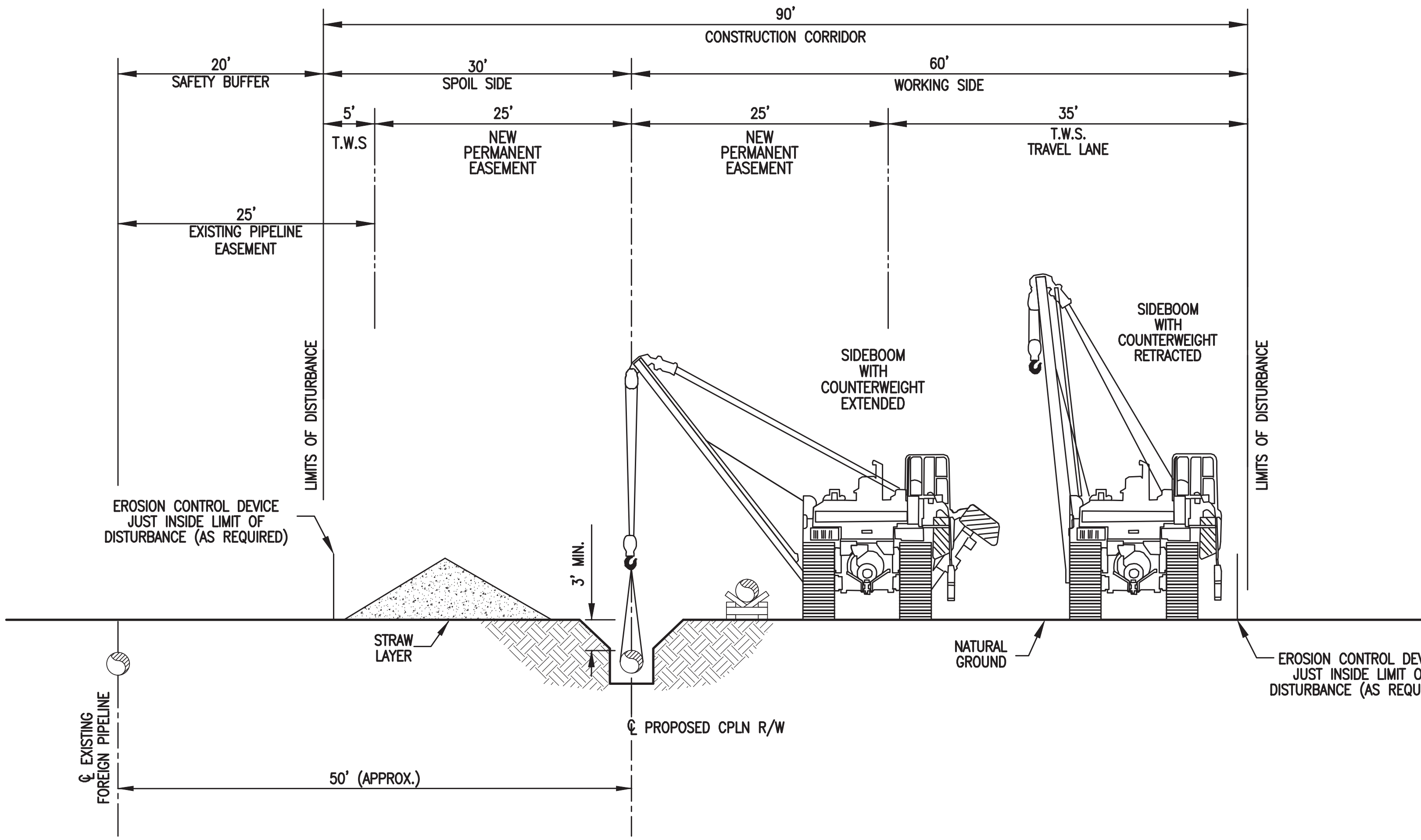
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01	SHEET 06
WO: 1161481		3:09pm 3/20/2015 a1traha K:\103646-CPLN\Mapping\Typicals\F-XS-CPLN-A\REV_0\CPLN-06.dwg	OF 21

WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 30" PIPELINE
NO TOPSOIL STRIPPING – ADJACENT TO EXISTING FOREIGN PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:		SCALE: NTS	
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:		REV: 0	
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01		SHEET 07	
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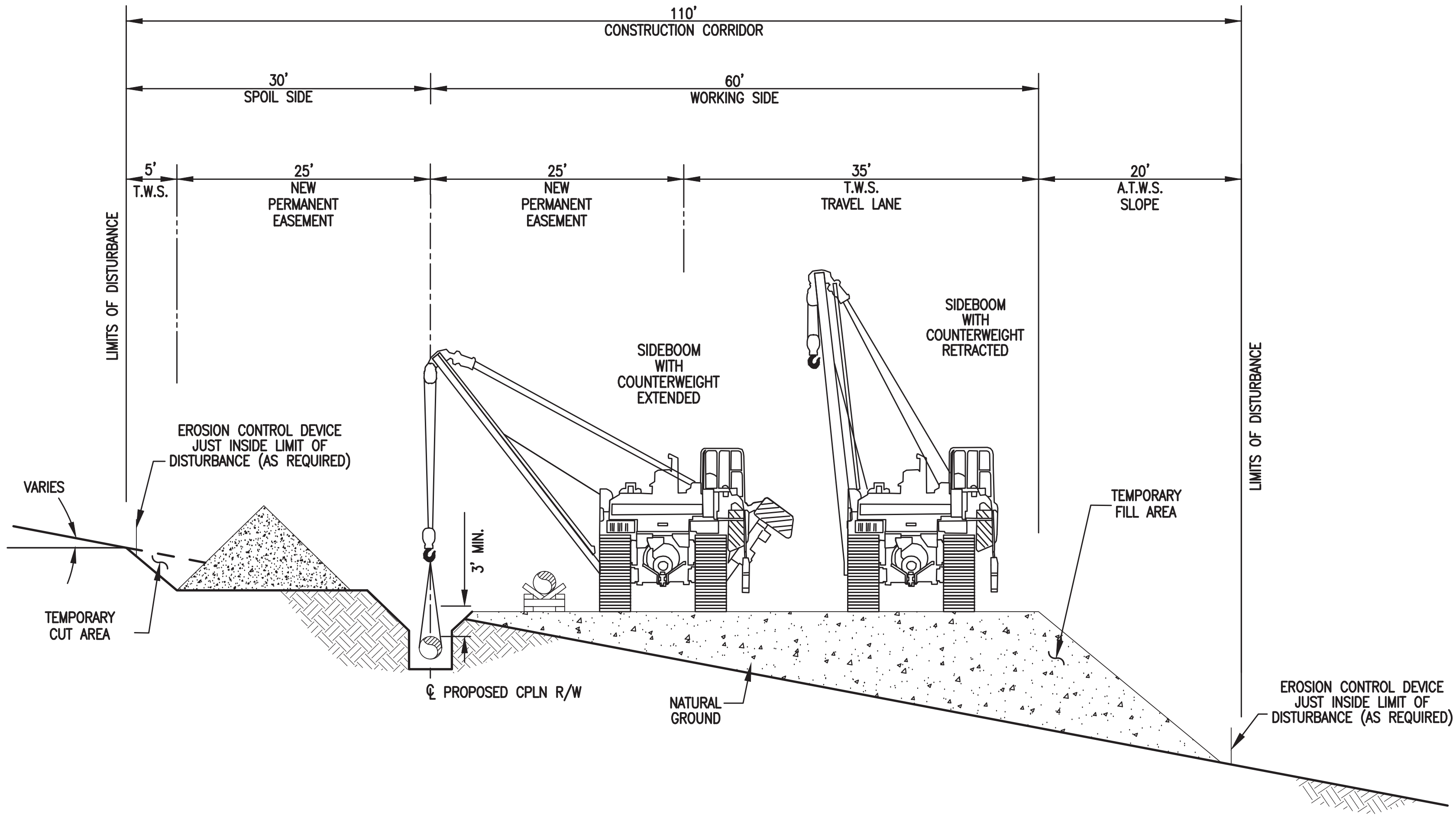


TYPICAL CROSS SECTION FOR 30" PIPELINE
MODERATE SIDESLOPE CONSTRUCTION – NOT ADJACENT TO EXISTING PIPELINE (FILL)

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

DRAWING NO.	REFERENCE TITLE

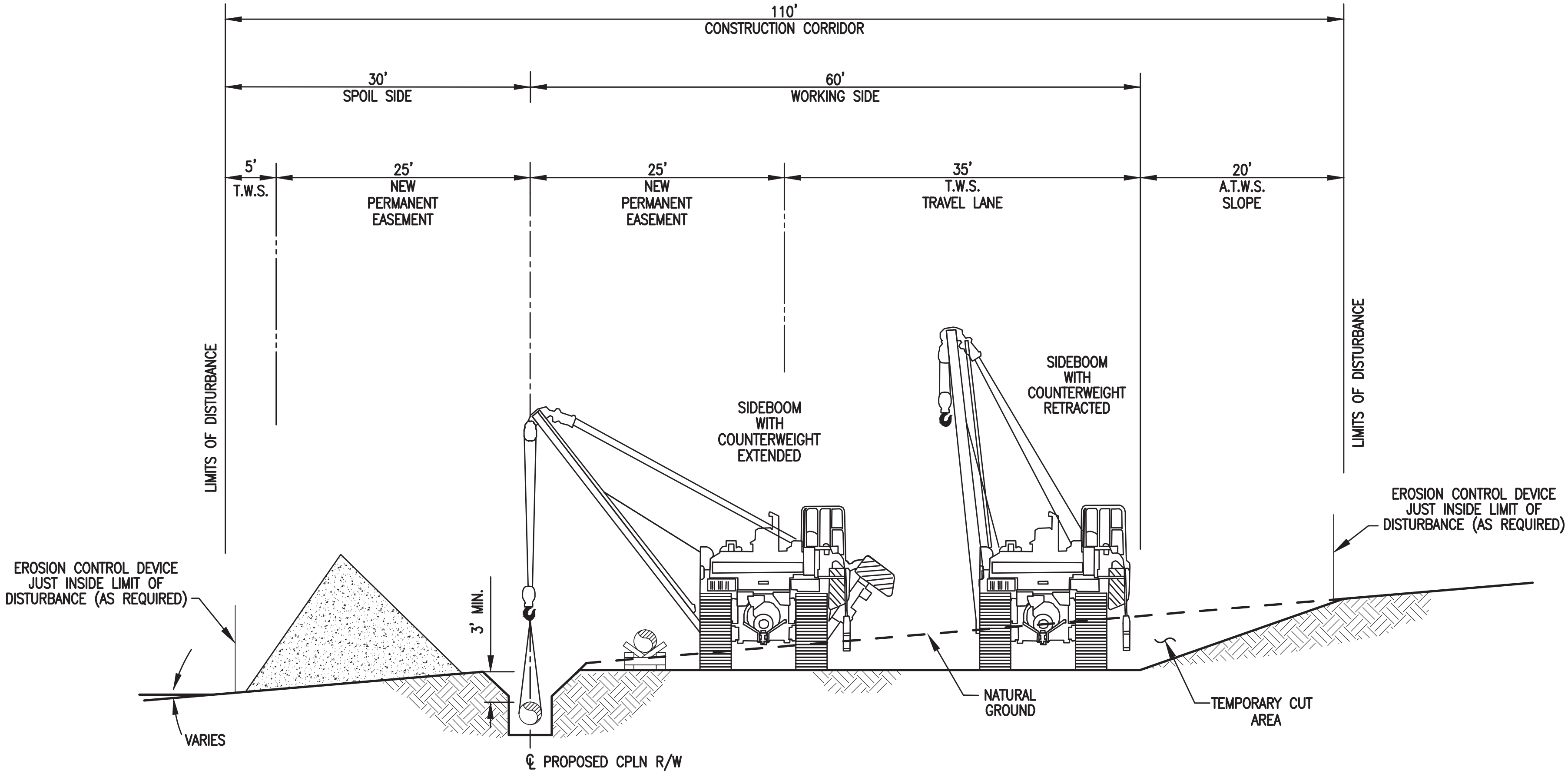
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

DRAWN BY:	AT	DATE:	09/26/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY:	EP	DATE:	10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY:	MJH	DATE:	10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01	SHEET 08 OF 21
WO:	1161481			3:12pm 3/20/2015 a1traha K:\103646-CPLN\Mapping\Typicals\F-XS-CPLN-A\REV_0\CPLN-08.dwg	

WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 30" PIPELINE
MODERATE SIDESLOPE CONSTRUCTION – NOT ADJACENT TO EXISTING PIPELINE (CUT)

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:		SCALE: NTS	
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:		REV: 0	
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01		SHEET 09	
WO: 1161481		3:15pm	3/20/2015 a1traha	OF 21	

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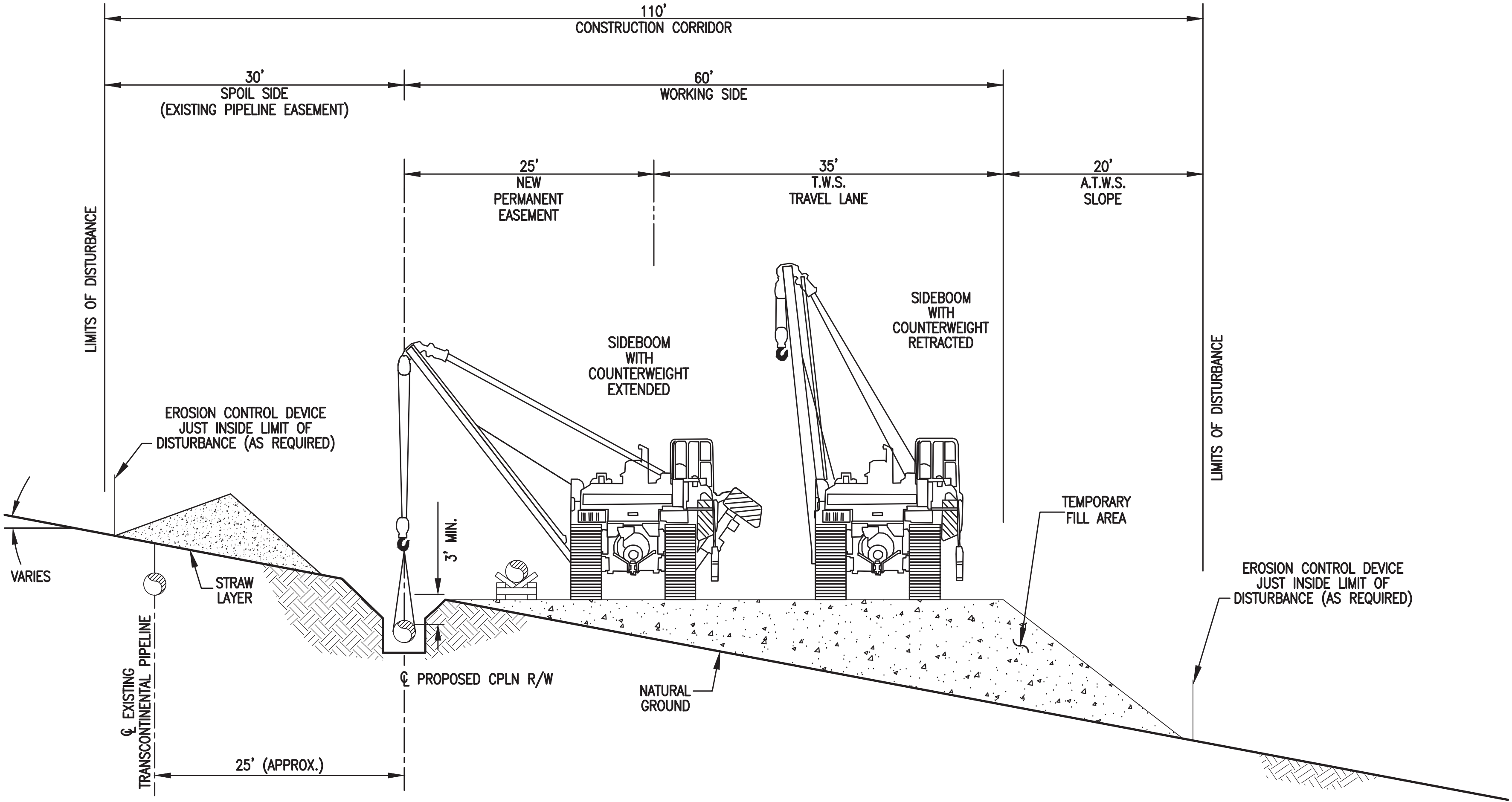
WOOD GROUP MUSTANG, INC.

B-126



TYPICAL CROSS SECTION FOR 30" PIPELINE
MODERATE SIDESLOPE CONSTRUCTION – ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE (FILL)

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:		SCALE: NTS	
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:		REV: 0	
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01		SHEET 10	
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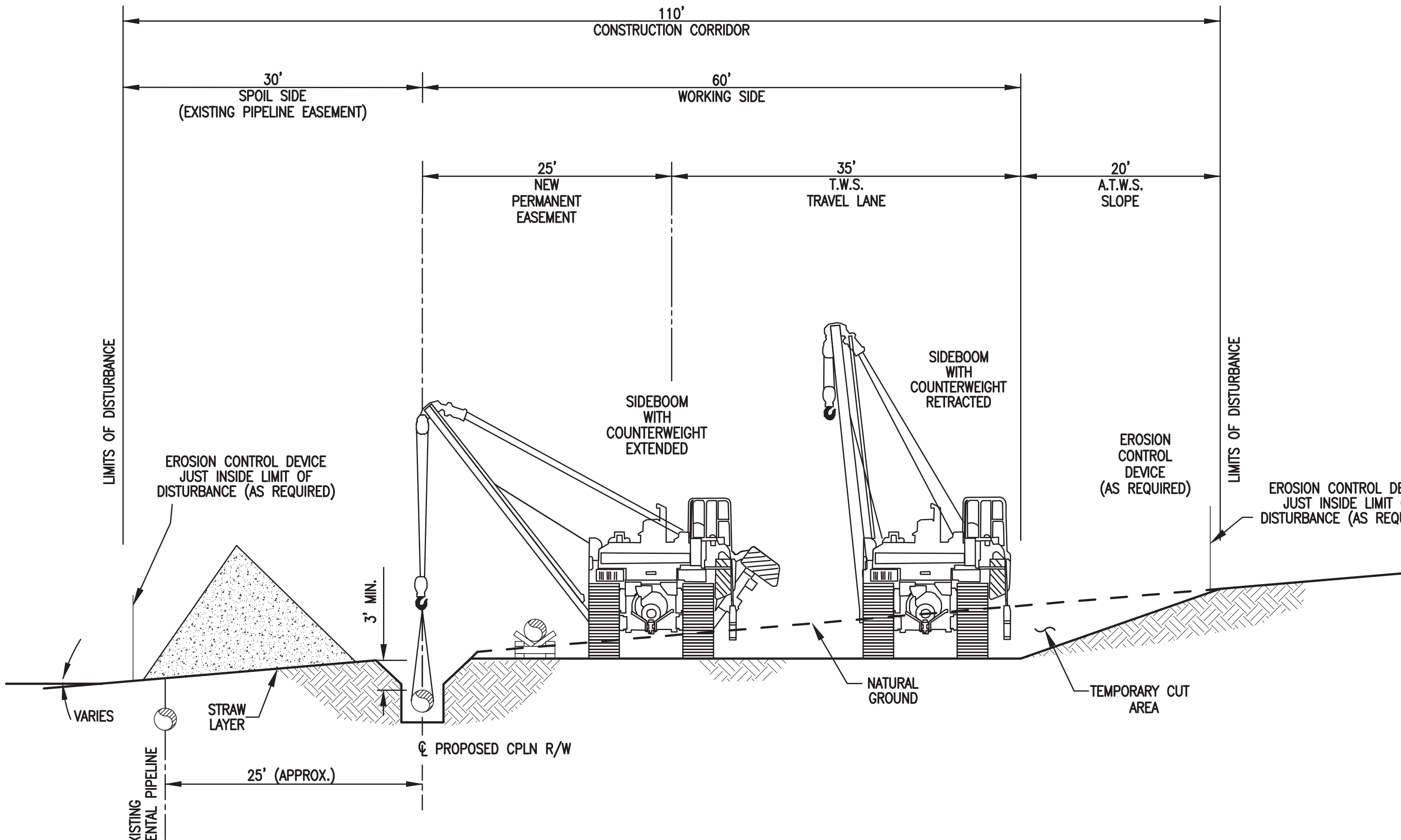

TYPICAL CROSS SECTION FOR 30" PIPELINE
MODERATE SIDESLOPE CONSTRUCTION – ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE (CUT)

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:		SCALE: NTS	
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:		REV: 0	
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01			SHEET 11
WO: 1161481		3:18pm	3/20/2015 a1traha		OF 21

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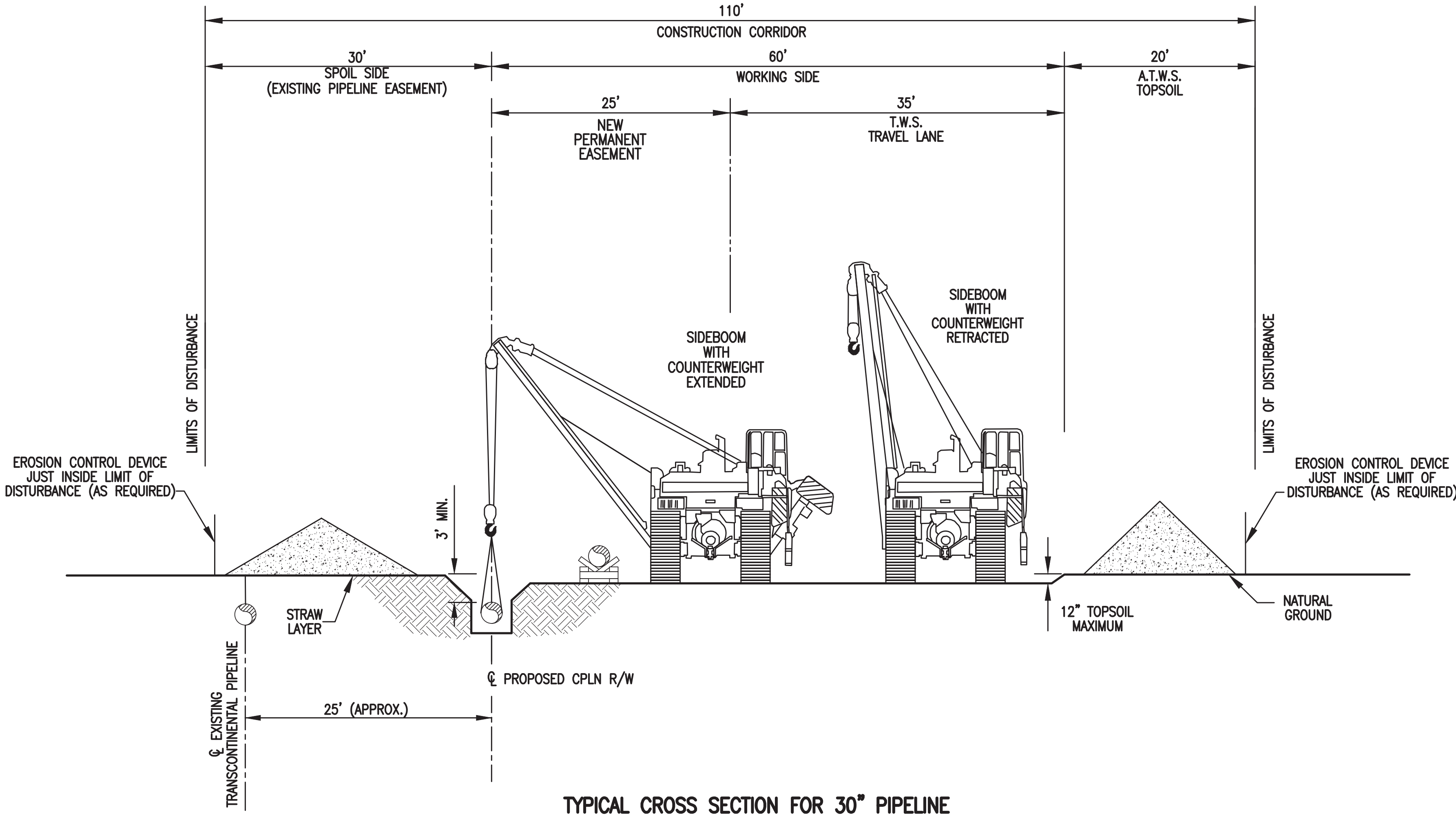
WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 30" PIPELINE
TOPSOIL STRIPPING – ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT–OF–WAY CROSS–SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:		SCALE: NTS	
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:		REV: 0	
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F–XS–CPLN–A–01		SHEET 12	
WO: 1161481		3:20pm	3/20/2015	a1traha	OF 21

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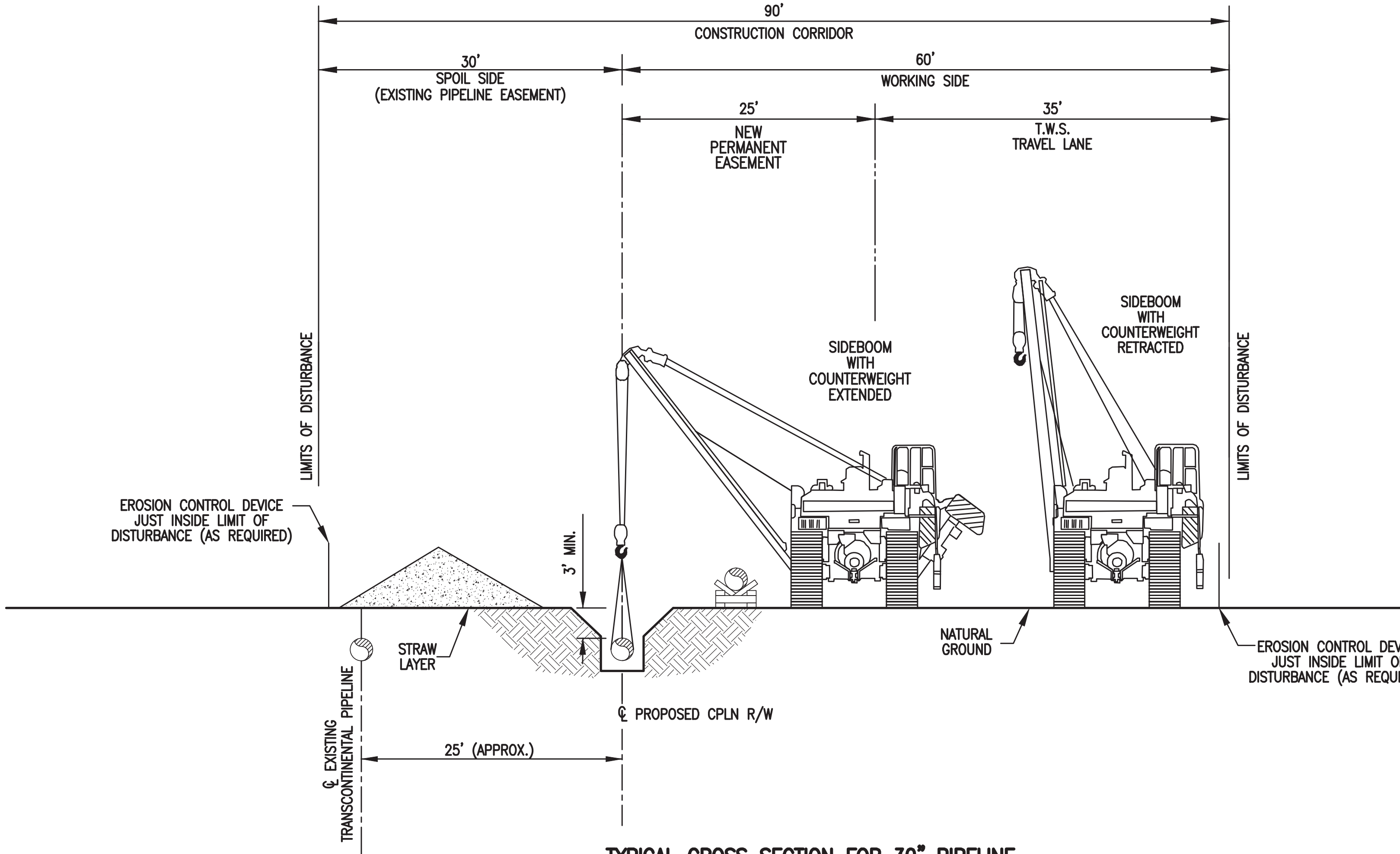

TYPICAL CROSS SECTION FOR 30" PIPELINE
NO TOPSOIL STRIPPING – ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:		SCALE: NTS	
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:		REV: 0	
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01		SHEET 13	
WO: 1161481		3:21pm 3/20/2015 a1traha		OF 21	

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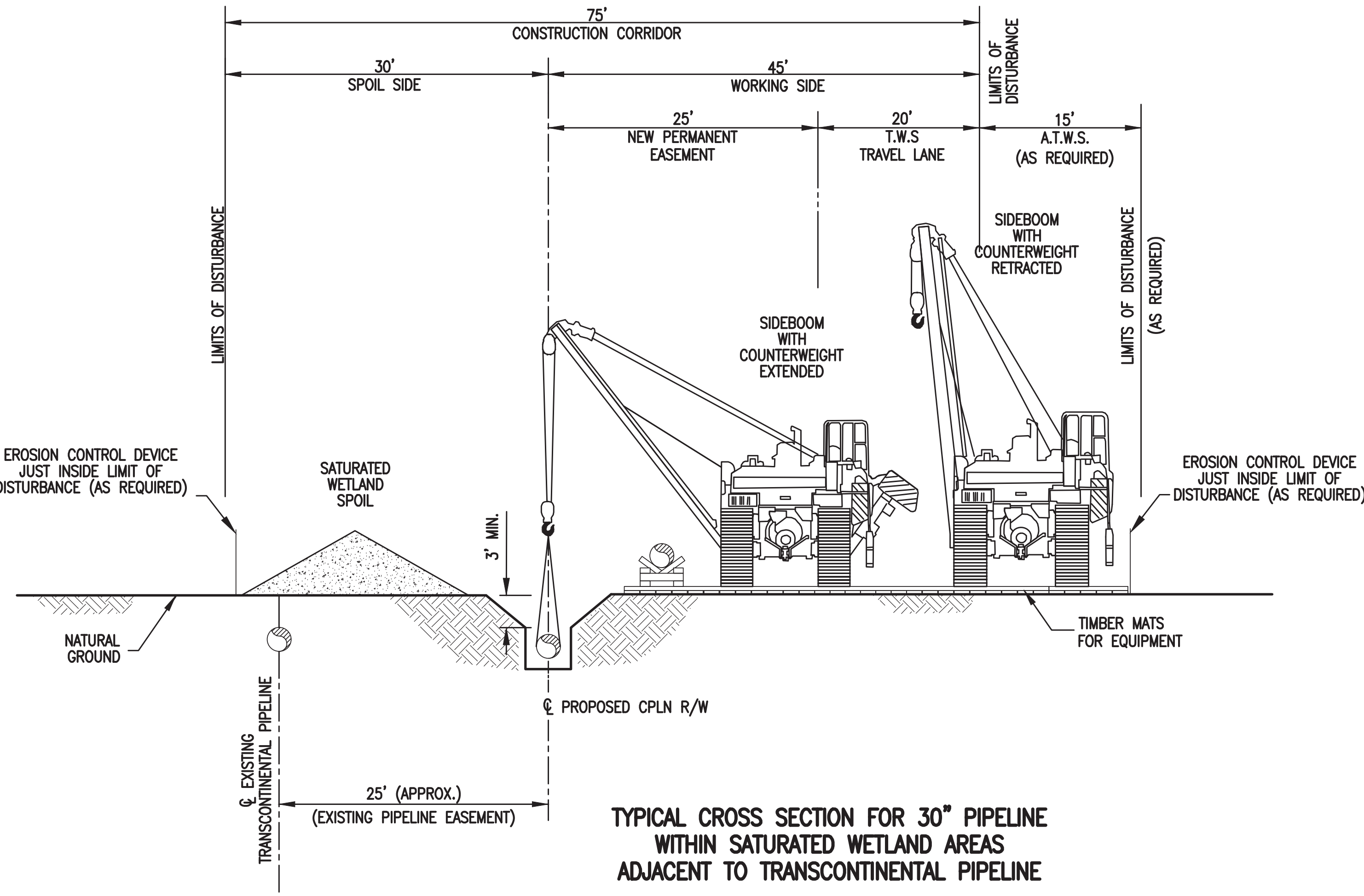
WOOD GROUP
MUSTANG, INC.

B-130



TYPICAL CROSS SECTION FOR 30" PIPELINE WITHIN SATURATED WETLAND AREAS ADJACENT TO TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01	SHEET 14 OF 21
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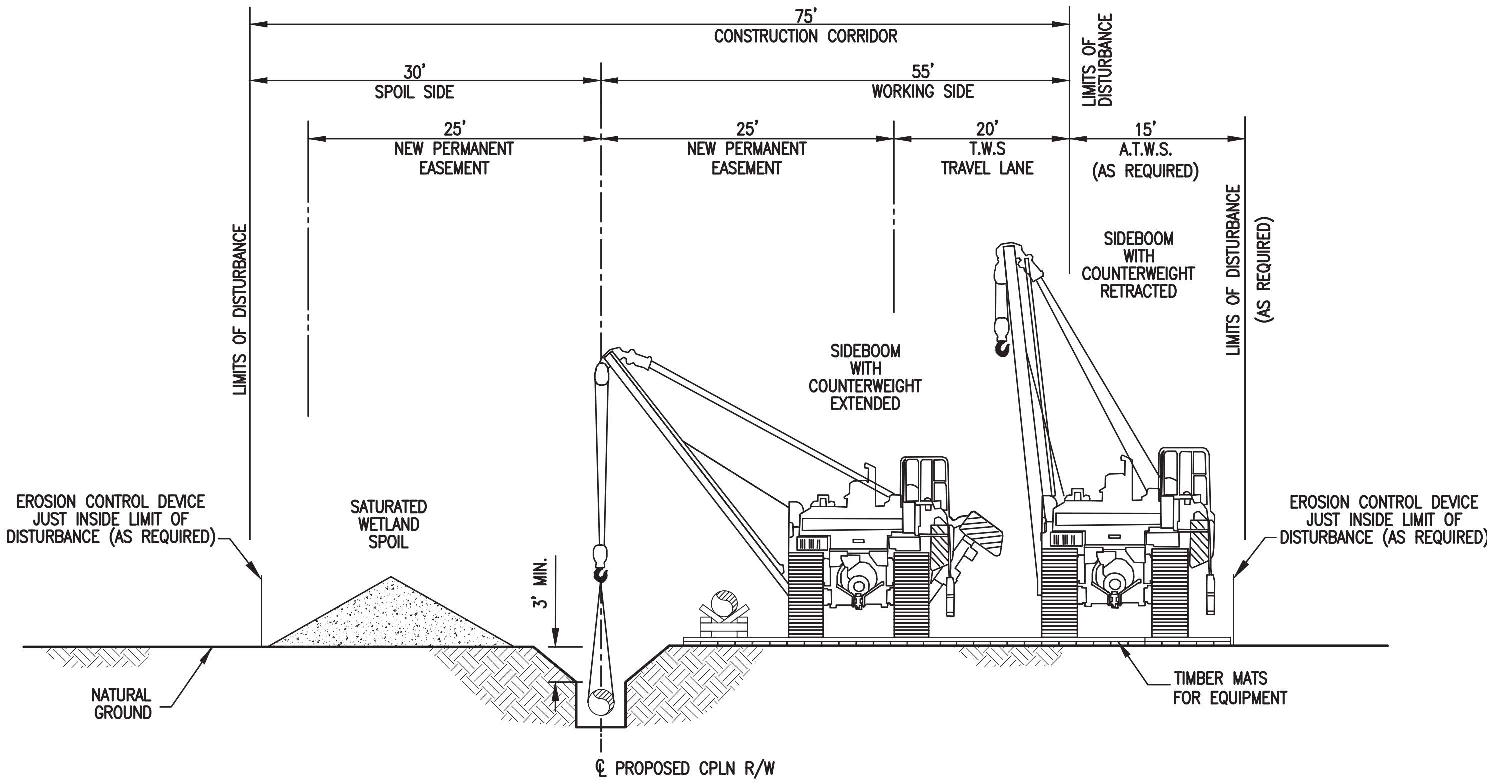
WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 30" PIPELINE WITHIN SATURATED WETLAND AREAS

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:		SCALE: NTS	
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:		REV: 0	
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01		SHEET 15	
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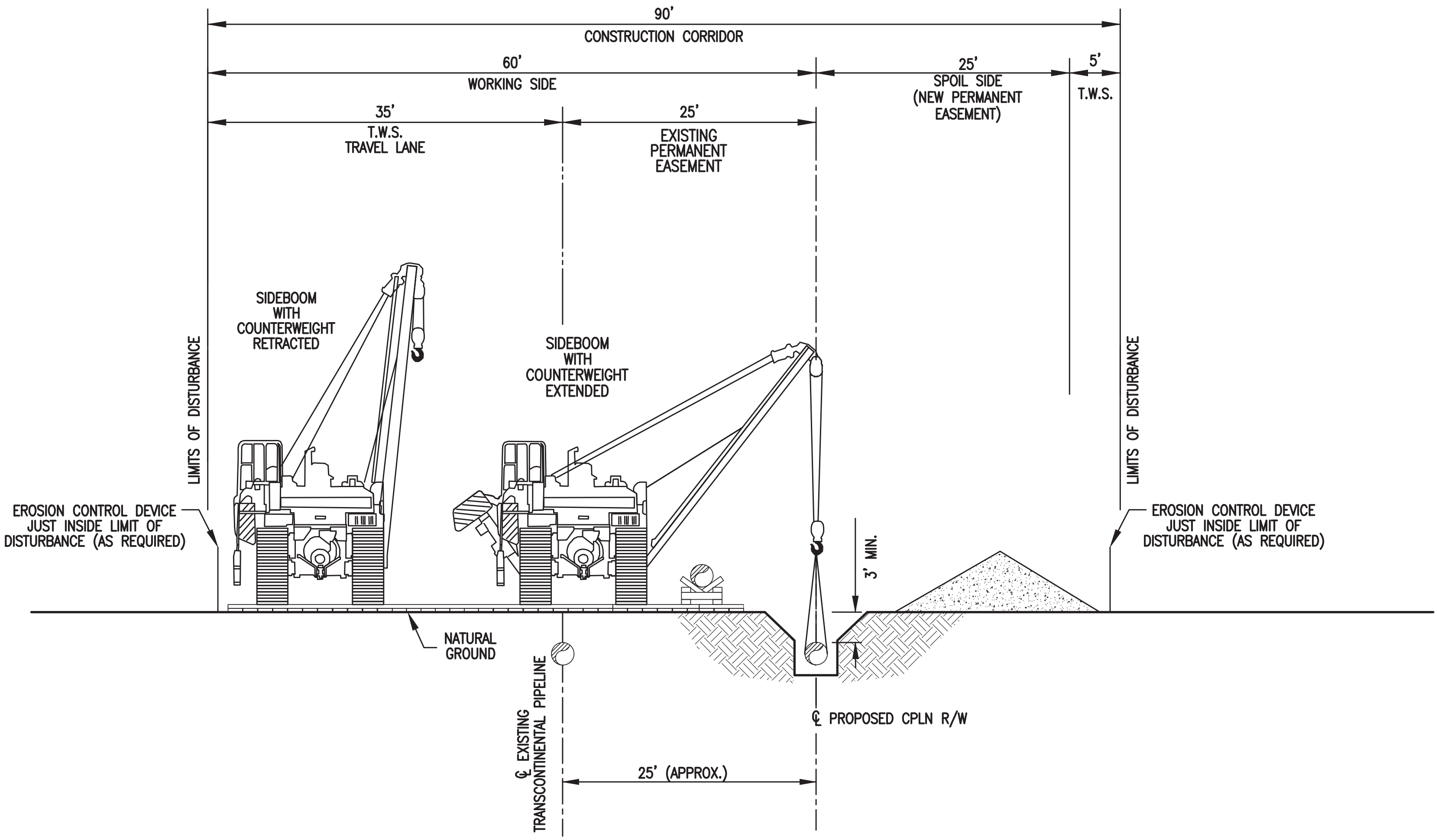
WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 30" PIPELINE
NO TOPSOIL STRIPPING – WORKING OVER EXISTING TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT–OF–WAY CROSS–SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F–XS–CPLN–A–01	SHEET 16
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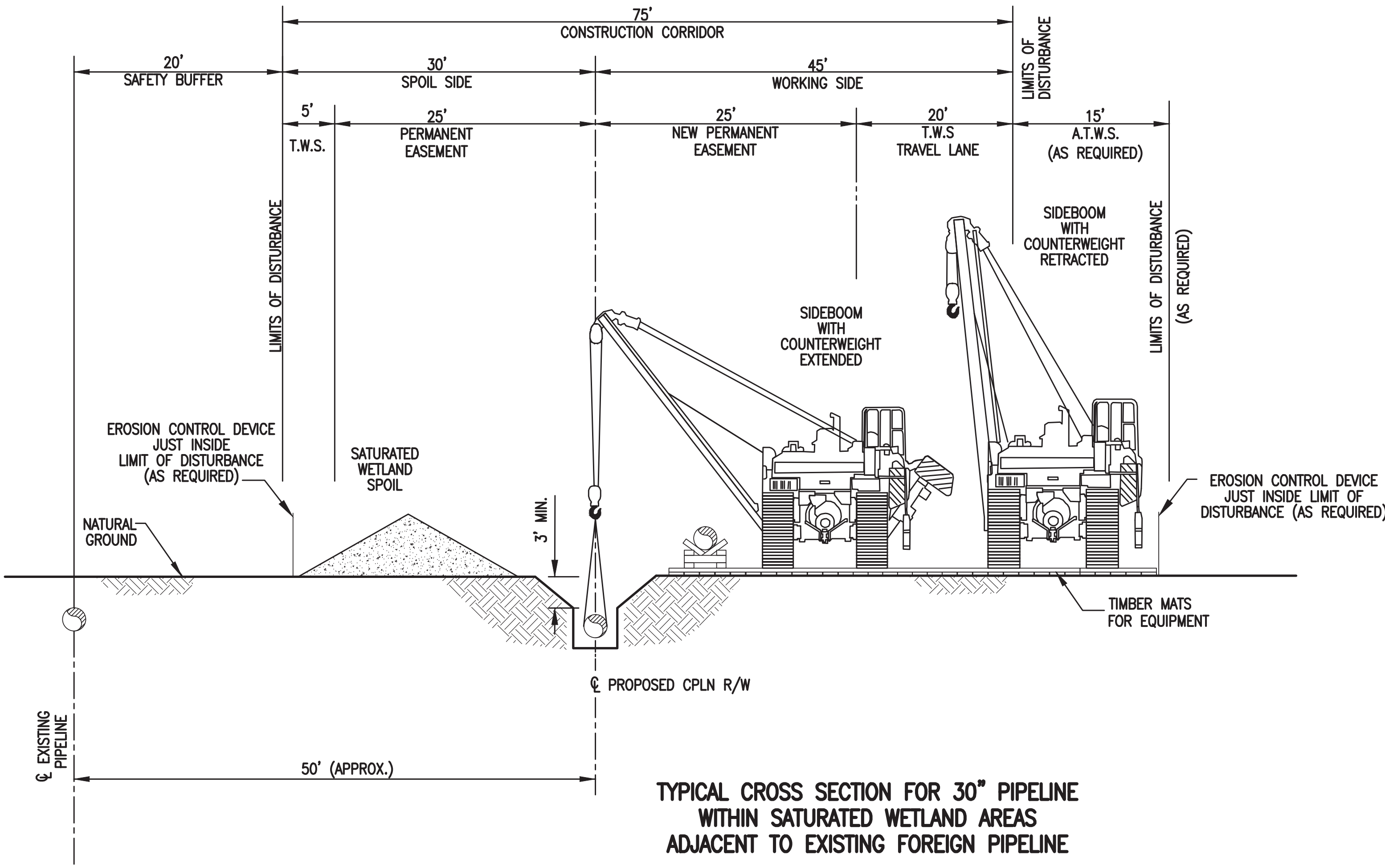
WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 30" PIPELINE WITHIN SATURATED WETLAND AREAS ADJACENT TO EXISTING FOREIGN PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:		SCALE: NTS	
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:		REV: 0	
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01		SHEET 17	
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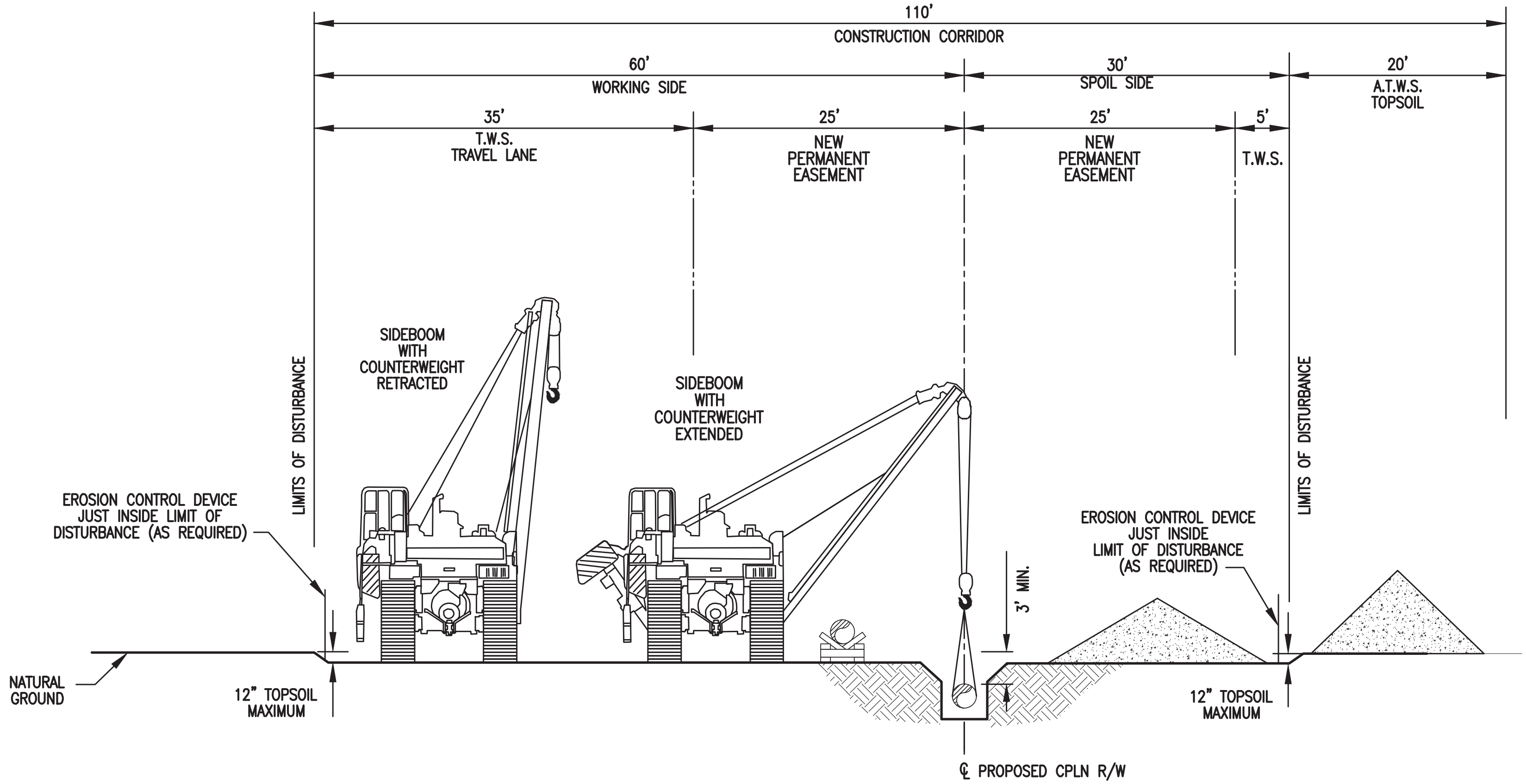

TYPICAL CROSS SECTION FOR 30" PIPELINE
FULL WIDTH TOPSOIL STRIPPING (SPOIL SIDE) – NOT ADJACENT TO EXISTING PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:		SCALE: NTS	
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:		REV: 0	
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01		SHEET 18	
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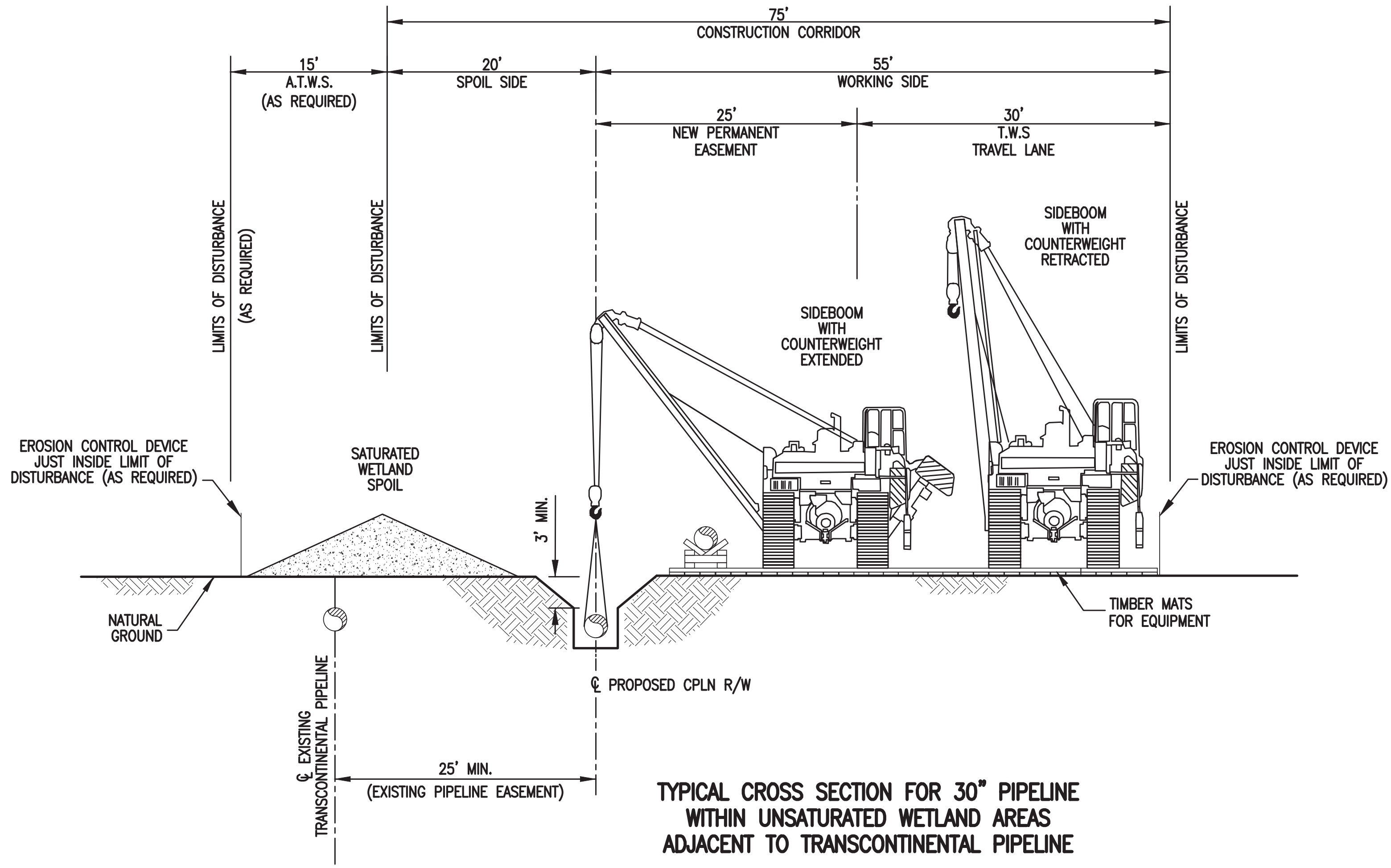
B-135



TYPICAL CROSS SECTION FOR 30" PIPELINE WITHIN UNSATURATED WETLAND AREAS ADJACENT TO TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

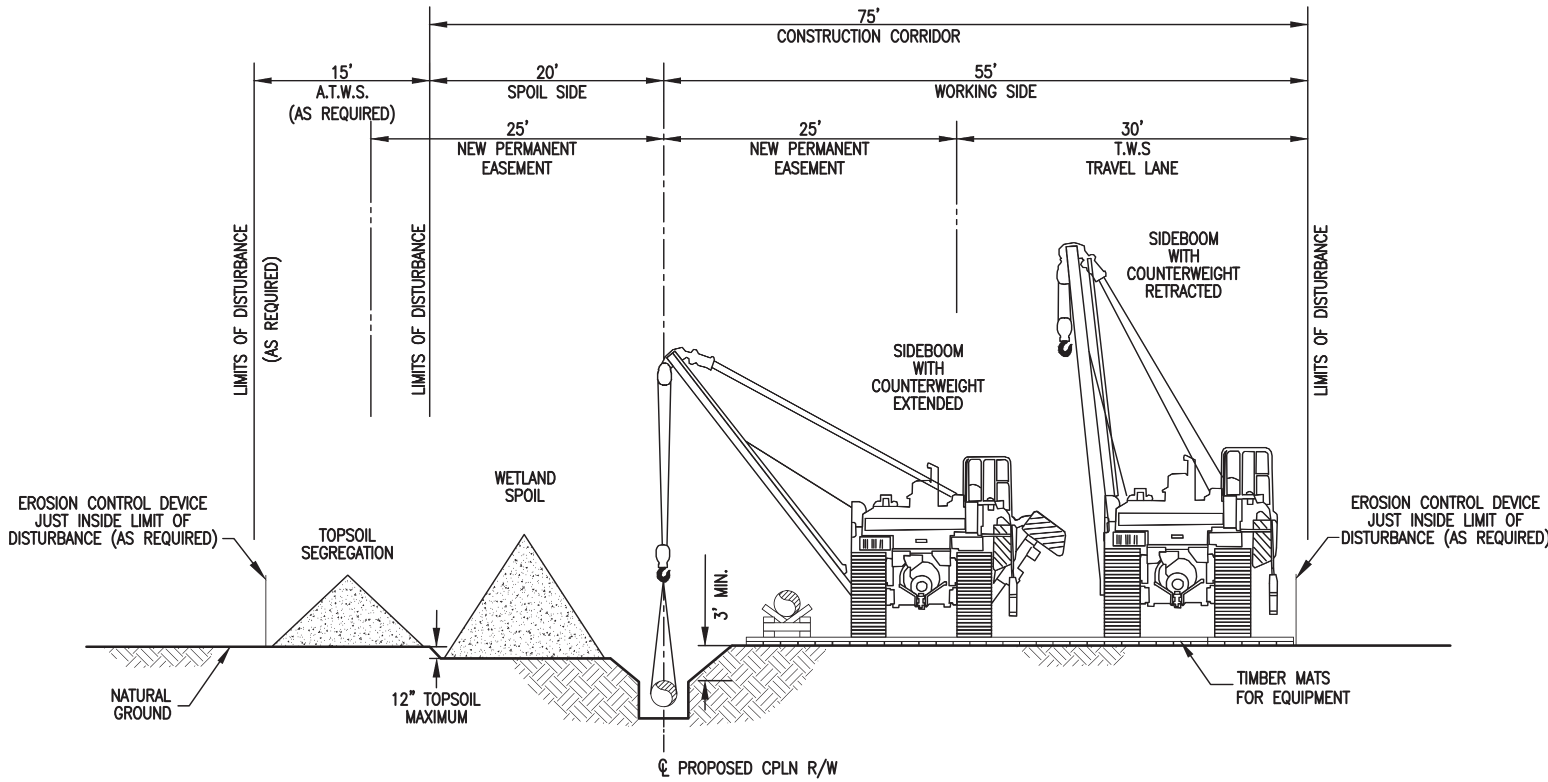
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01	SHEET 19 OF 21
WO: 1161481		3:33pm 3/20/2015 a1traha K:\103646-CPLN\Mapping\Typicals\F-XS-CPLN-A\REV_0\CPLN-19.dwg	

WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 30" PIPELINE WITHIN UNSATURATED WETLAND AREAS

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:		SCALE: NTS	
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:		REV: 0	
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01		SHEET 20	
WO: 1161481		3:36pm	3/20/2015	a1traha	OF 21

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WOOD GROUP MUSTANG, INC.

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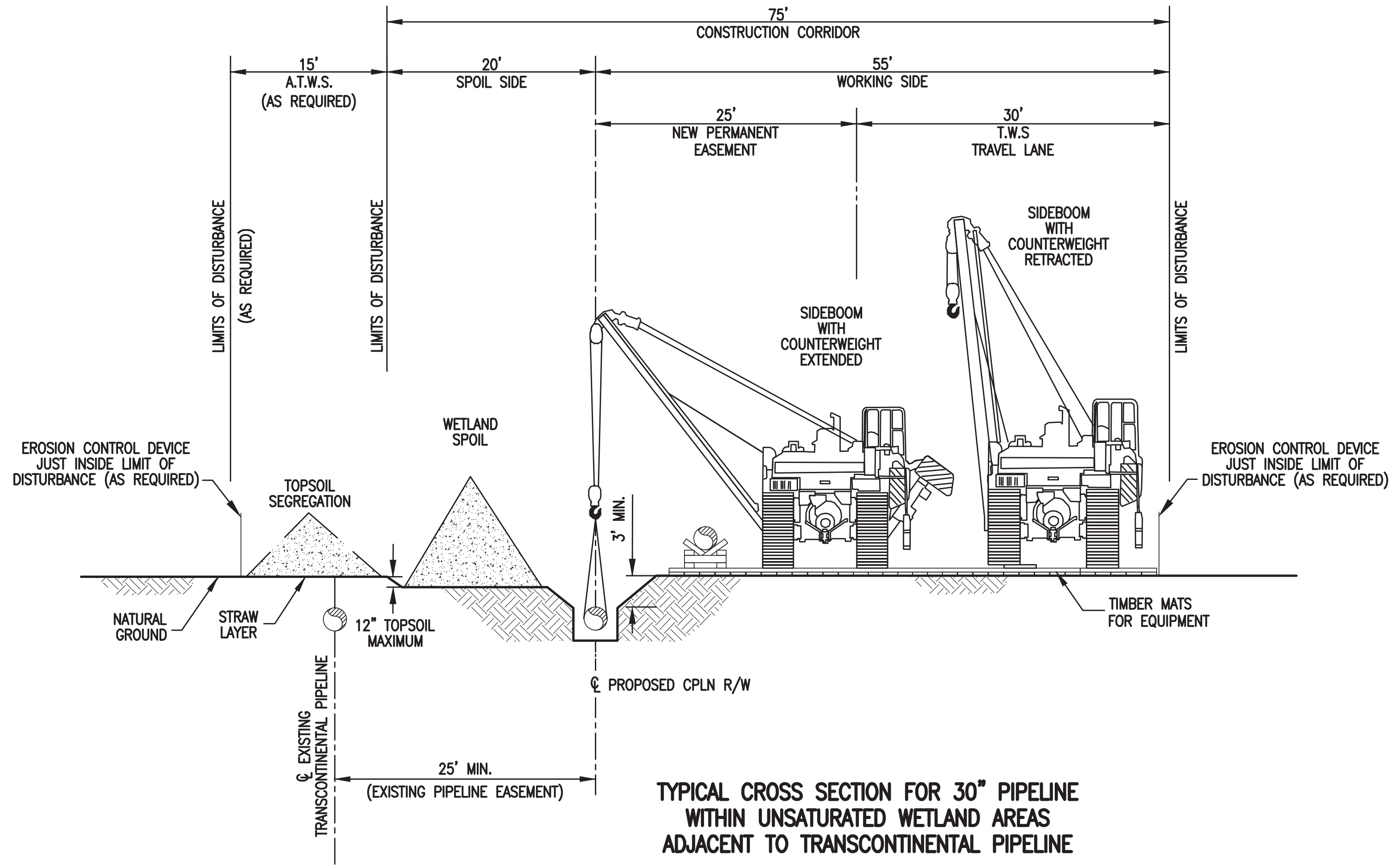

**TYPICAL CROSS SECTION FOR 30" PIPELINE
WITHIN UNSATURATED WETLAND AREAS
ADJACENT TO TRANSCONTINENTAL PIPELINE**

DRAWING NO.	REFERENCE TITLE

**TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" CENTRAL PENN LINE NORTH
PENNSYLVANIA**

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161481	DP	MJH

DRAWN BY: AT	DATE: 09/26/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLN-A-01	SHEET 21 OF 21
WO: 1161481		3:38pm 3/20/2015 a1traha K:\103646-CPLN\Mapping\Typicals\F-XS-CPLN-A\REV_0\CPLN-21.dwg	

WOOD GROUP
MUSTANG, INC.

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B-139

Transcontinental Gas Pipe Line Company LLC

TYPICAL RIGHT-OF-WAY CROSS-SECTIONS
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
M.P. 0.00 TO M.P. 125.15
PENNSYLVANIA

F-XS-CPLS-A-01

DATE: 03/31/2015 REV. 0

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DOCUMENT NAME	SHEET NUMBER	ROW WIDTH (FT)	DESCRIPTION	REVISION	DATE
F-XS-CPLS-A-01	01		COVERSHEET	0	03/31/2015
F-XS-CPLS-A-01	02		TABLE OF CONTENTS	0	03/31/2015
F-XS-CPLS-A-01	03	100	NO TOPSOIL STRIPPING - NOT ADJACENT TO EXISTING PIPELINE	0	03/31/2015
F-XS-CPLS-A-01	04	125	FULL WIDTH TOPSOIL STRIPPING - NOT ADJACENT TO EXISTING PIPELINE	0	03/31/2015
F-XS-CPLS-A-01	05	125	MODERATE SIDESLOPE CONSTRUCTION - ADJACENT TO EXISTING FOREIGN PIPELINE (FILL)	0	03/31/2015
F-XS-CPLS-A-01	06	125	MODERATE SIDESLOPE CONSTRUCTION - ADJACENT TO EXISTING FOREIGN PIPELINE (CUT)	0	03/31/2015
F-XS-CPLS-A-01	07	125	FULL WIDTH TOPSOIL STRIPPING - ADJACENT TO EXISTING FOREIGN PIPELINE	0	03/31/2015
F-XS-CPLS-A-01	08	100	NO TOPSOIL STRIPPING - ADJACENT TO EXISTING FOREIGN PIPELINE	0	03/31/2015
F-XS-CPLS-A-01	09	125	MODERATE SIDESLOPE CONSTRUCTION - NOT ADJACENT TO EXISTING PIPELINE (FILL)	0	03/31/2015
F-XS-CPLS-A-01	10	125	MODERATE SIDESLOPE CONSTRUCTION - NOT ADJACENT TO EXISTING PIPELINE (CUT)	0	03/31/2015
F-XS-CPLS-A-01	11	100	75' FROM CENTERLINE OF TOWERS OR POLES TO TRANSCONTINENTAL PERMANENT EASEMENT	0	03/31/2015
F-XS-CPLS-A-01	12	150	MODERATE SIDESLOPE CONSTRUCTION - WITH TOPSOIL STRIPPING (FILL)	0	03/31/2015
F-XS-CPLS-A-01	13	75	WITHIN SATURATED WETLAND AREAS	0	03/31/2015
F-XS-CPLS-A-01	14	125	FULL WIDTH TOPSOIL STRIPPING (SPOIL SIDE) - NOT ADJACENT TO EXISTING PIPELINE	0	03/31/2015
F-XS-CPLS-A-01	15	150	SEVERE SIDESLOPE CONSTRUCTION (CUT)	0	03/31/2015
F-XS-CPLS-A-01	16	150	SEVERE SIDESLOPE CONSTRUCTION (FILL)	0	03/31/2015
F-XS-CPLS-A-01	17	125	75' FROM CENTERLINE OF TOWERS OR POLES TO TRANSCONTINENTAL PERMANENT EASEMENT - WITH TOPSOIL STRIPPING	0	03/31/2015
F-XS-CPLS-A-01	18	75	WITHIN UNSATURATED WETLAND AREAS	0	03/31/2015
F-XS-CPLS-A-01	19	75	WITHIN UNSATURATED WETLAND AREAS ADJACENT TO EXISTING FOREIGN PIPELINE	0	03/31/2015
F-XS-CPLS-A-01	20	75	WITHIN SATURATED WETLAND AREAS ADJACENT TO EXISTING FOREIGN PIPELINE	0	03/31/2015

WOOD GROUP MUSTANG, INC.

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:	SCALE: NTS		
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0		
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLS-A-01	SHEET 02 OF 20		
WO: 1161503		2:22pm 3/20/2015 a1traha			

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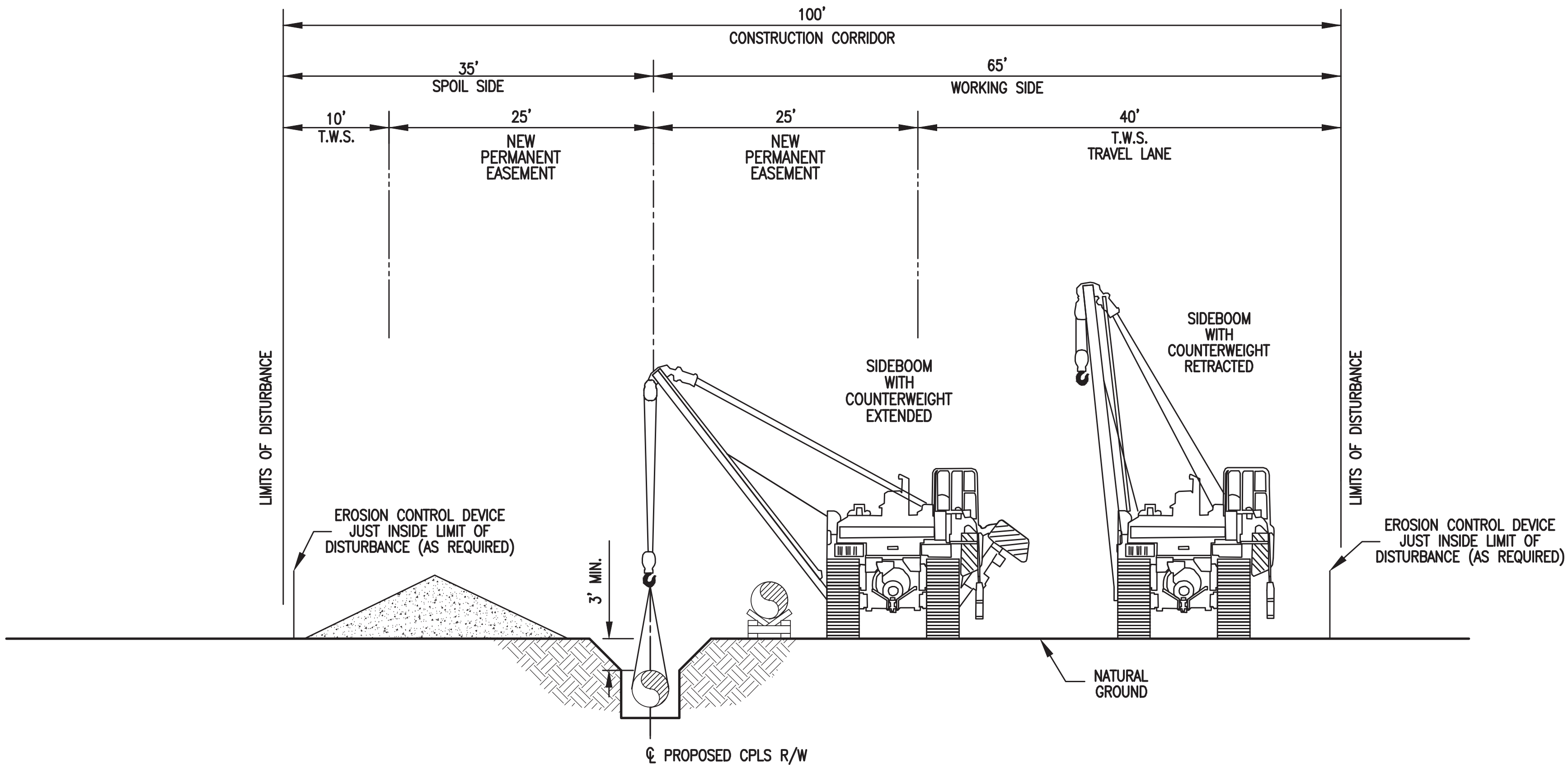


TYPICAL CROSS SECTION FOR 42" PIPELINE
NO TOPSOIL STRIPPING – NOT ADJACENT TO EXISTING PIPELINE

DRAWING NO.	REFERENCE TITLE

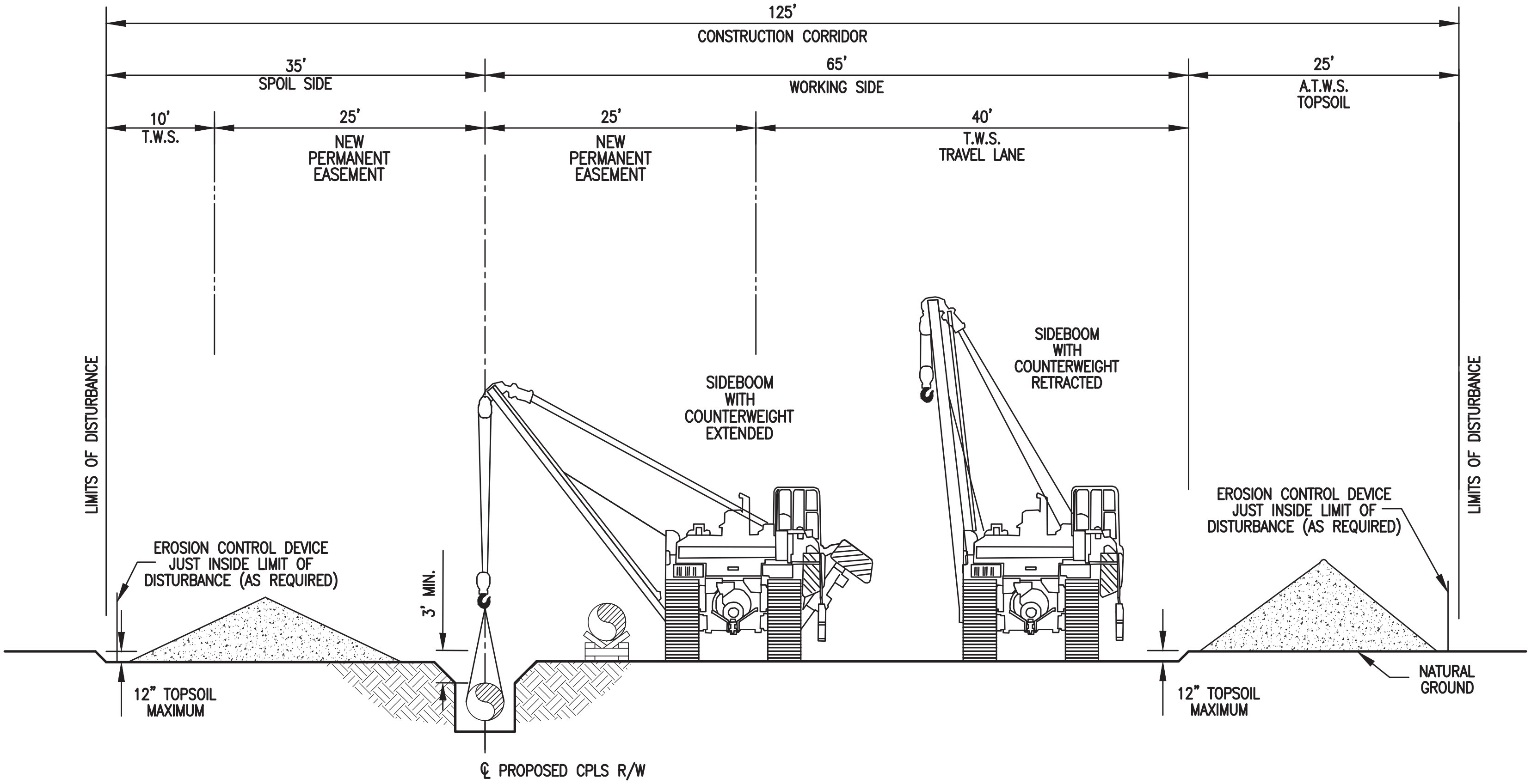
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLS-A-01	SHEET 03 OF 20
WO: 1161503		2:27pm 3/20/2015 a1traha K:\103643-CPLS\Mapping\Typicals\F-XS-CPLS-A\REV_0\CPLS-03_0.dwg	

WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 42" PIPELINE
FULL WIDTH TOPSOIL STRIPPING – NOT ADJACENT TO EXISTING PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLS-A-01	SHEET 04 OF 20
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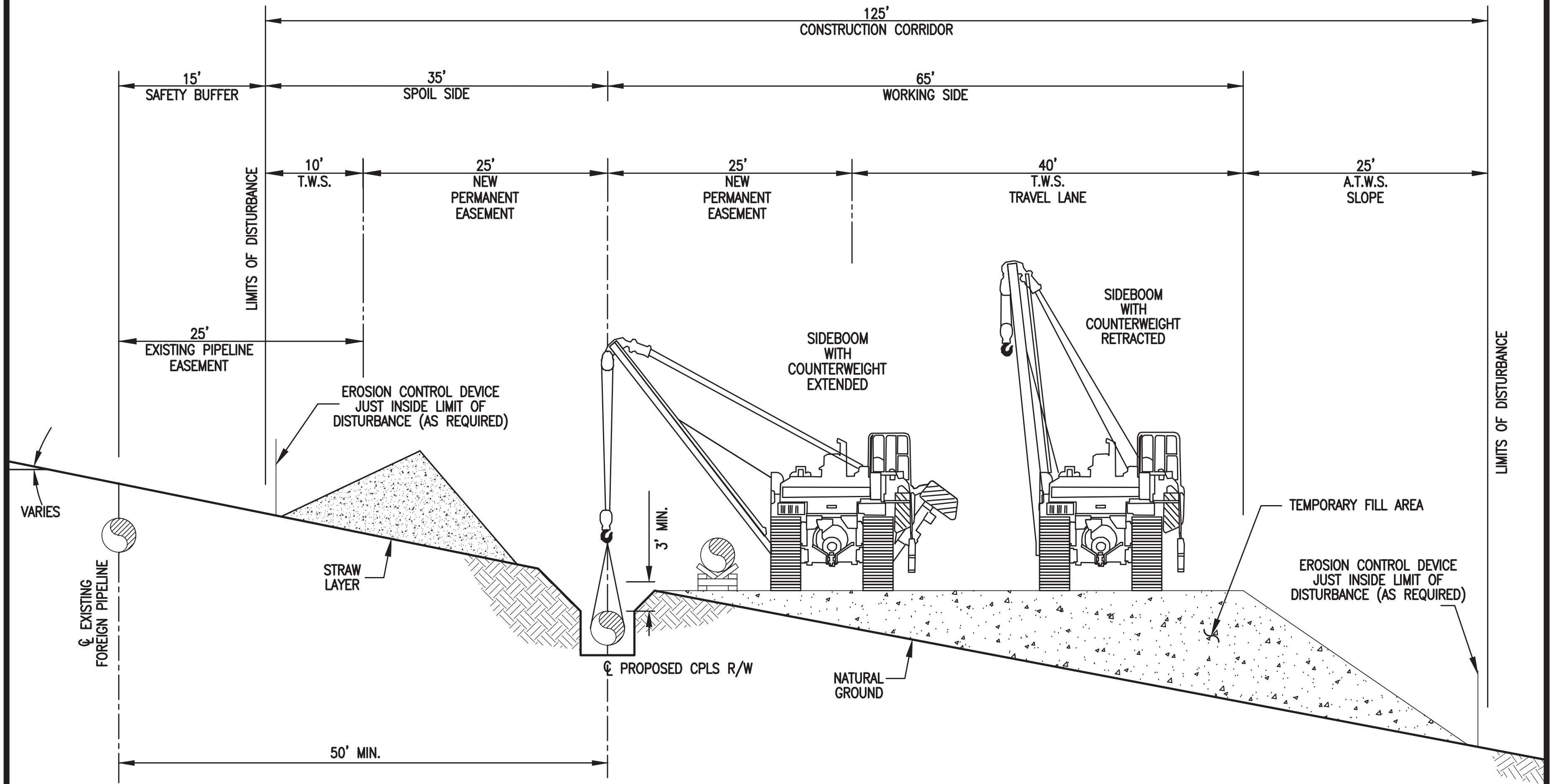


TYPICAL CROSS SECTION FOR 42" PIPELINE
MODERATE SIDESLOPE CONSTRUCTION – ADJACENT TO EXISTING FOREIGN PIPELINE (FILL)

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

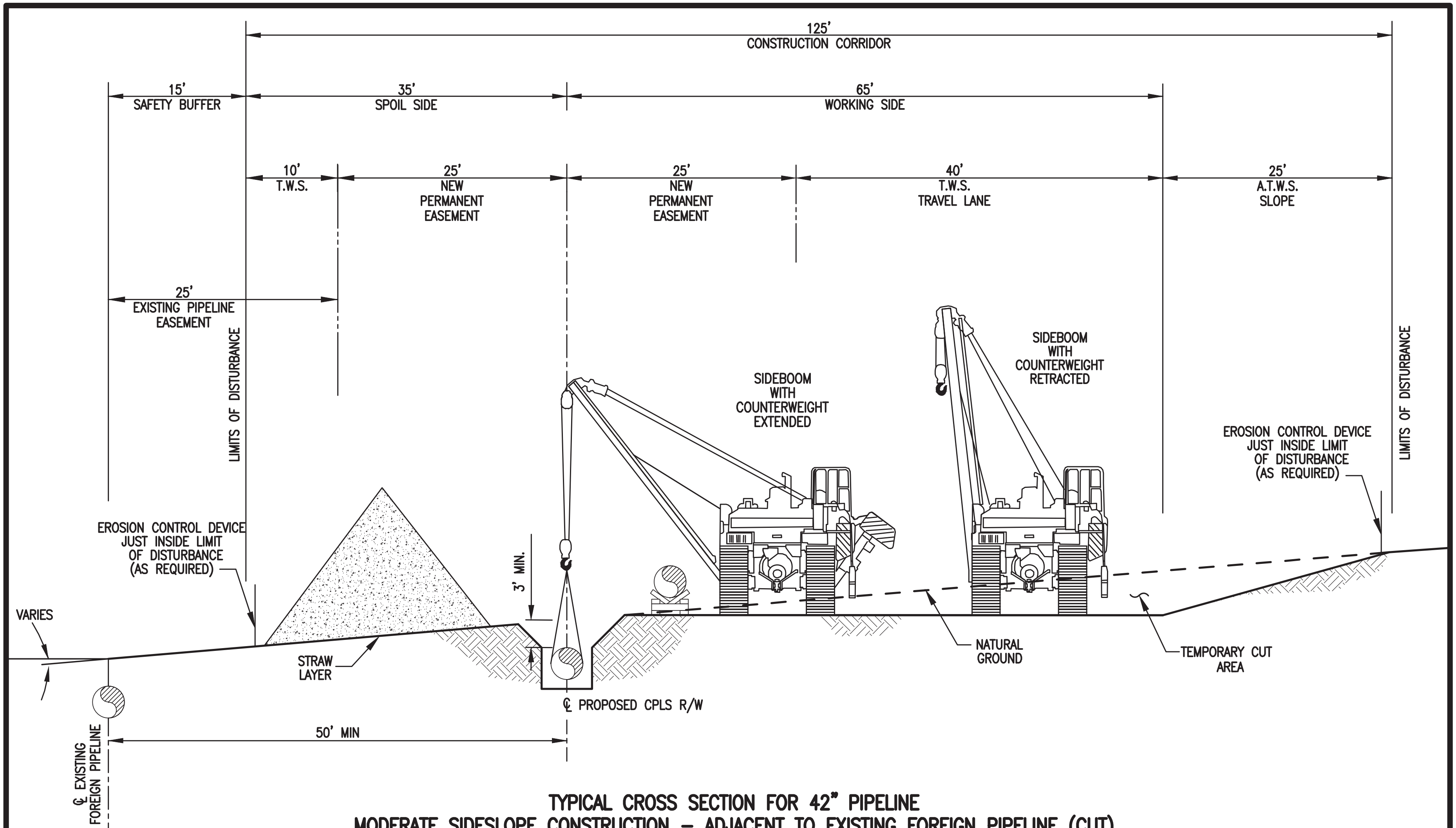
Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLS-A-01	SHEET 05
WO: 1161503		2:31pm 3/20/2015 a1traha K:\103643-CPLS\Mapping\Typicals\F-XS-CPLS-A\REV_0\CPLS-05_0.dwg	OF 20

WOOD GROUP
MUSTANG, INC.

B-146



TYPICAL CROSS SECTION FOR 42" PIPELINE
MODERATE SIDESLOPE CONSTRUCTION – ADJACENT TO EXISTING FOREIGN PIPELINE (CUT)

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

WOOD GROUP MUSTANG, INC.

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLS-A-01	SHEET 06 OF 20
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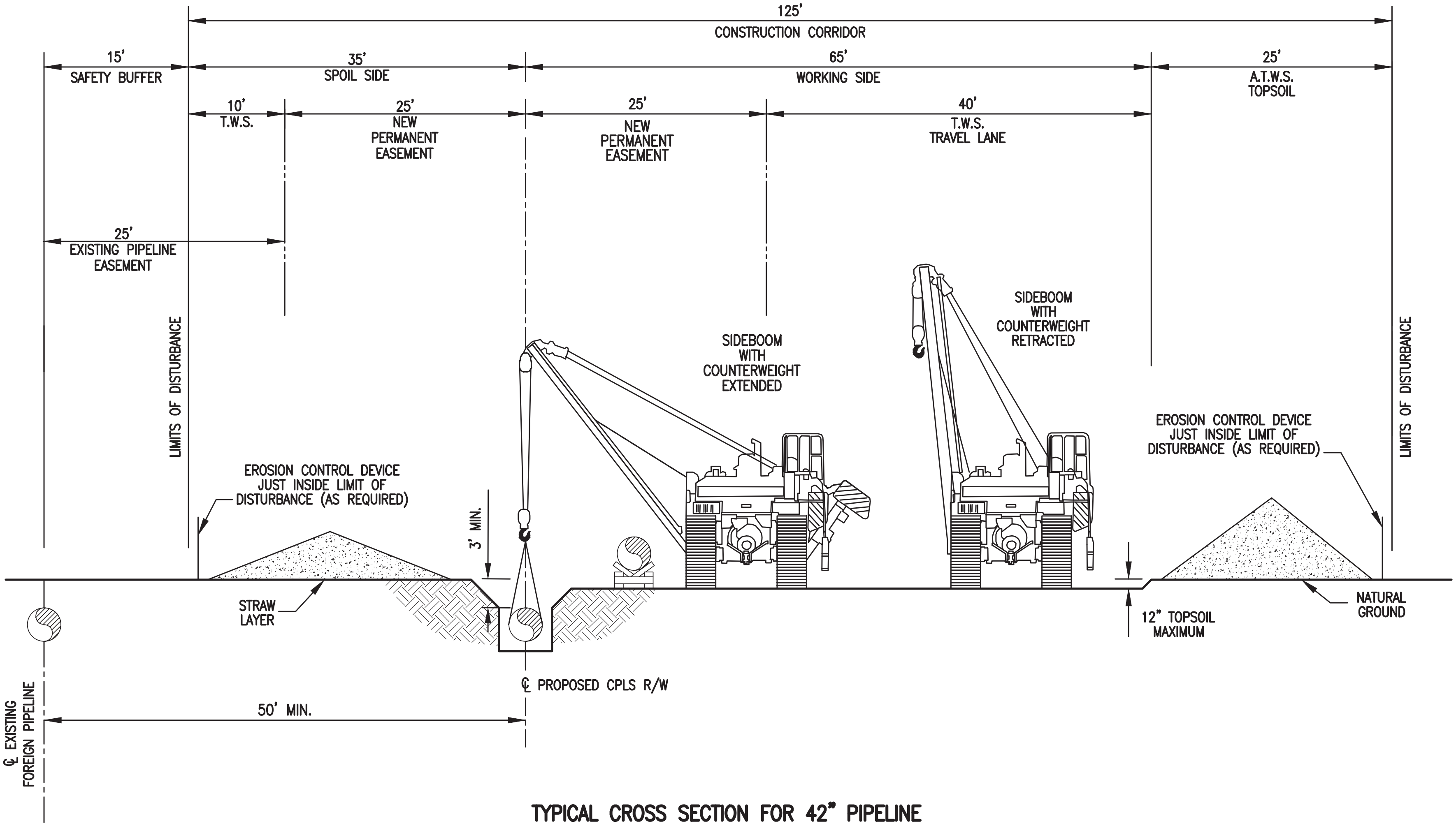

TYPICAL CROSS SECTION FOR 42" PIPELINE
FULL WIDTH TOPSOIL STRIPPING – ADJACENT TO EXISTING FOREIGN PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:		SCALE: NTS	
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:		REV: 0	
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLS-A-01			SHEET 07
WO: 1161503		2:34pm	3/20/2015	a1traha	OF 20

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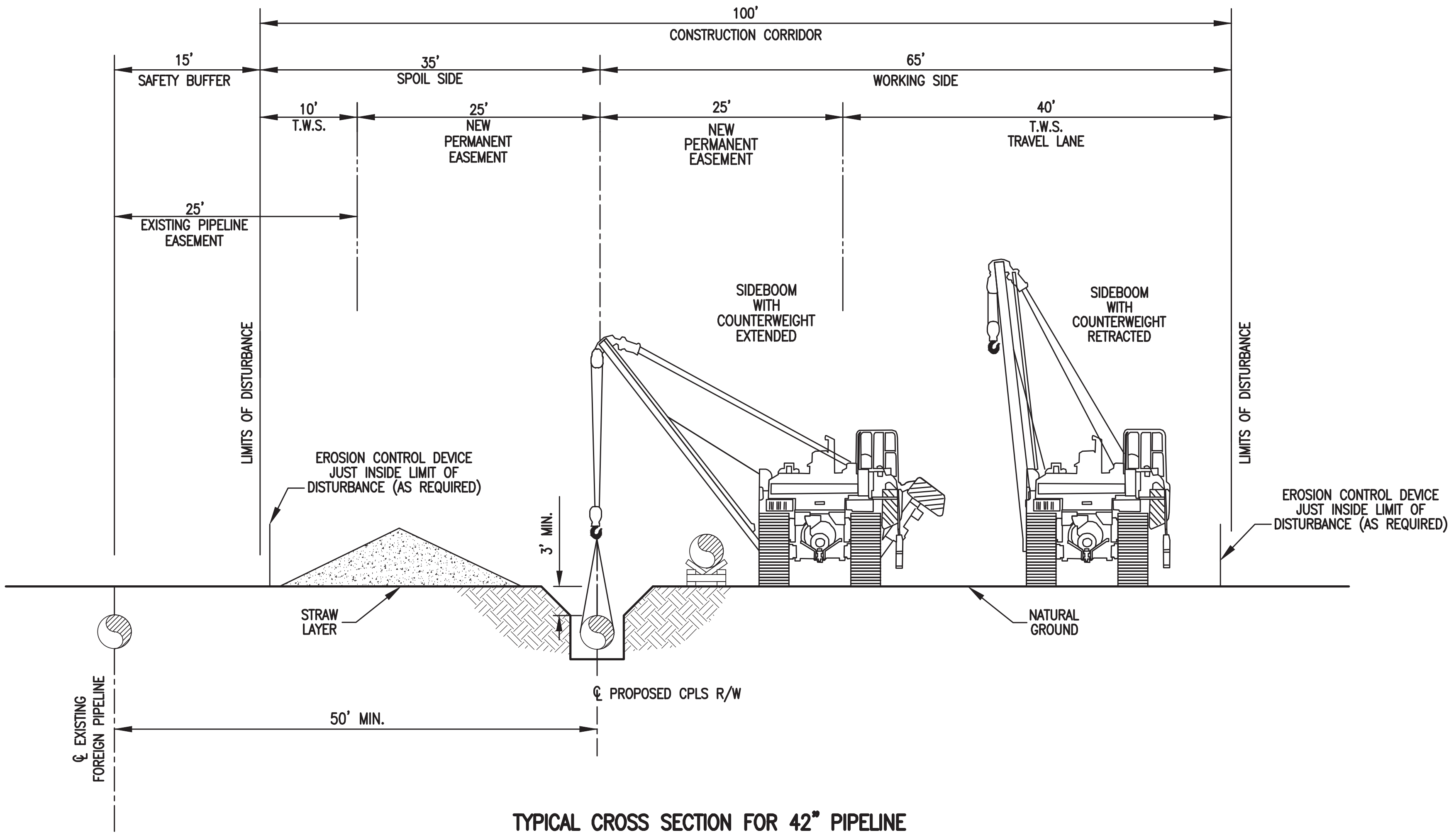

TYPICAL CROSS SECTION FOR 42" PIPELINE
NO TOPSOIL STRIPPING – ADJACENT TO EXISTING FOREIGN PIPELINE

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLS-A-01	SHEET 08 OF 20
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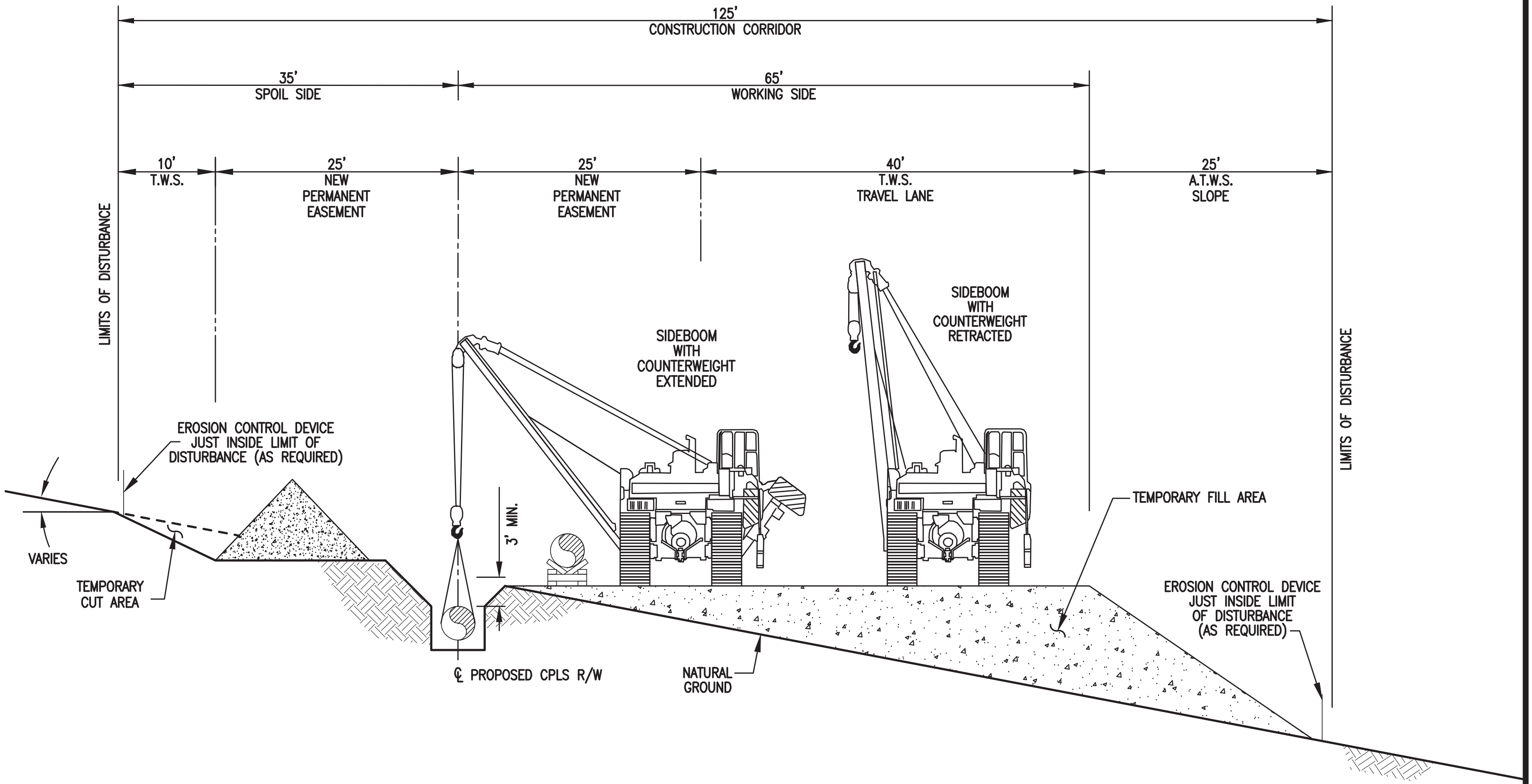
WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 42" PIPELINE
MODERATE SIDESLOPE CONSTRUCTION–NOT ADJACENT TO EXISTING PIPELINE (FILL)

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

Williams.

DRAWN BY:	AT	DATE:	09/19/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY:	EP	DATE:	10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
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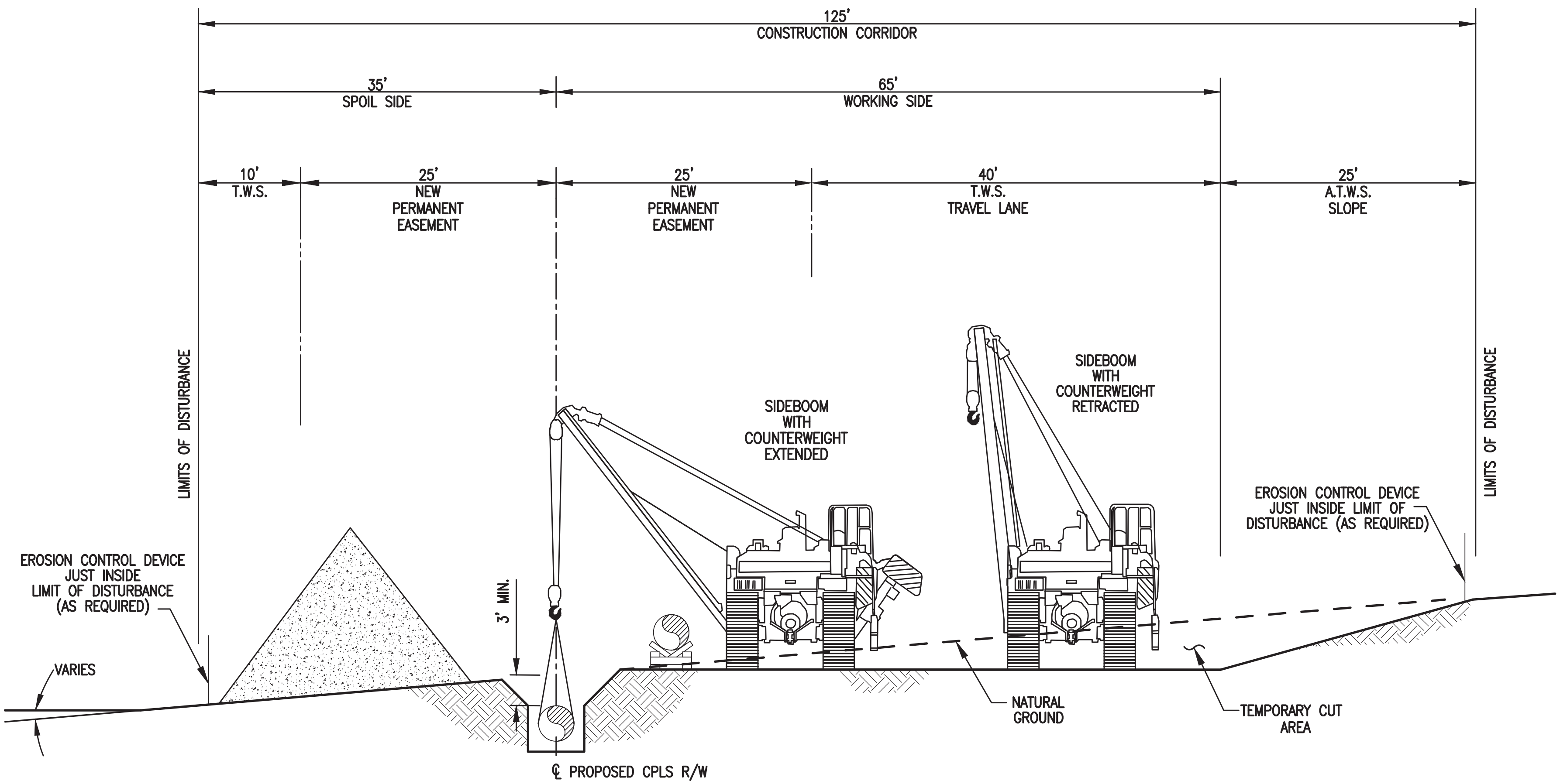

TYPICAL CROSS SECTION FOR 42" PIPELINE
MODERATE SIDESLOPE CONSTRUCTION- NOT ADJACENT TO EXISTING PIPELINE (CUT)

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:		SCALE: NTS	
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:		REV: 0	
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLS-A-01		SHEET 10	
WO: 1161503		2:38pm	3/20/2015	a1traha	OF 20

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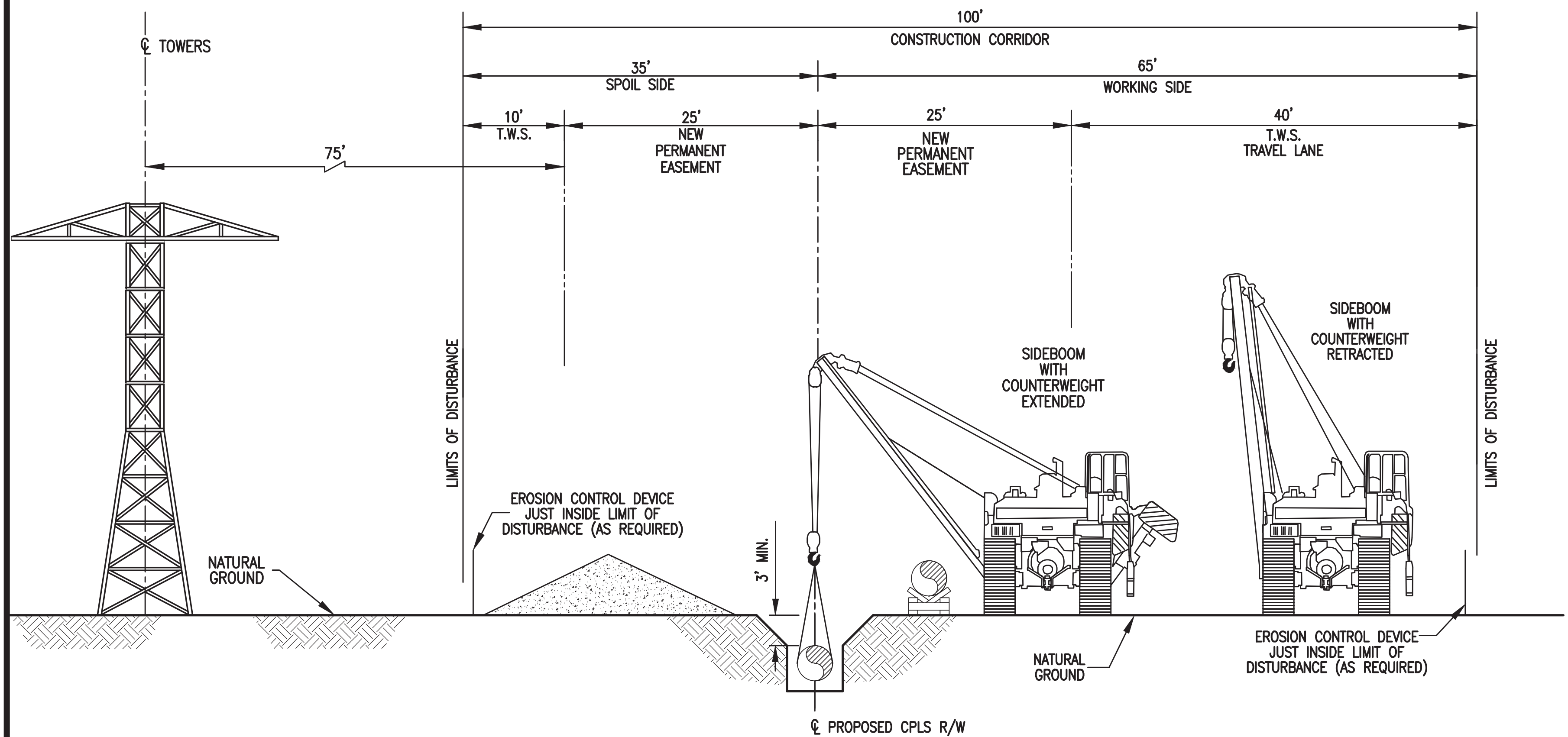


TYPICAL CROSS SECTION FOR 42" PIPELINE
75' FROM CENTERLINE OF TOWERS OR POLES TO TRANSCONTINENTAL PERMANENT EASEMENT

DRAWING NO.	REFERENCE TITLE

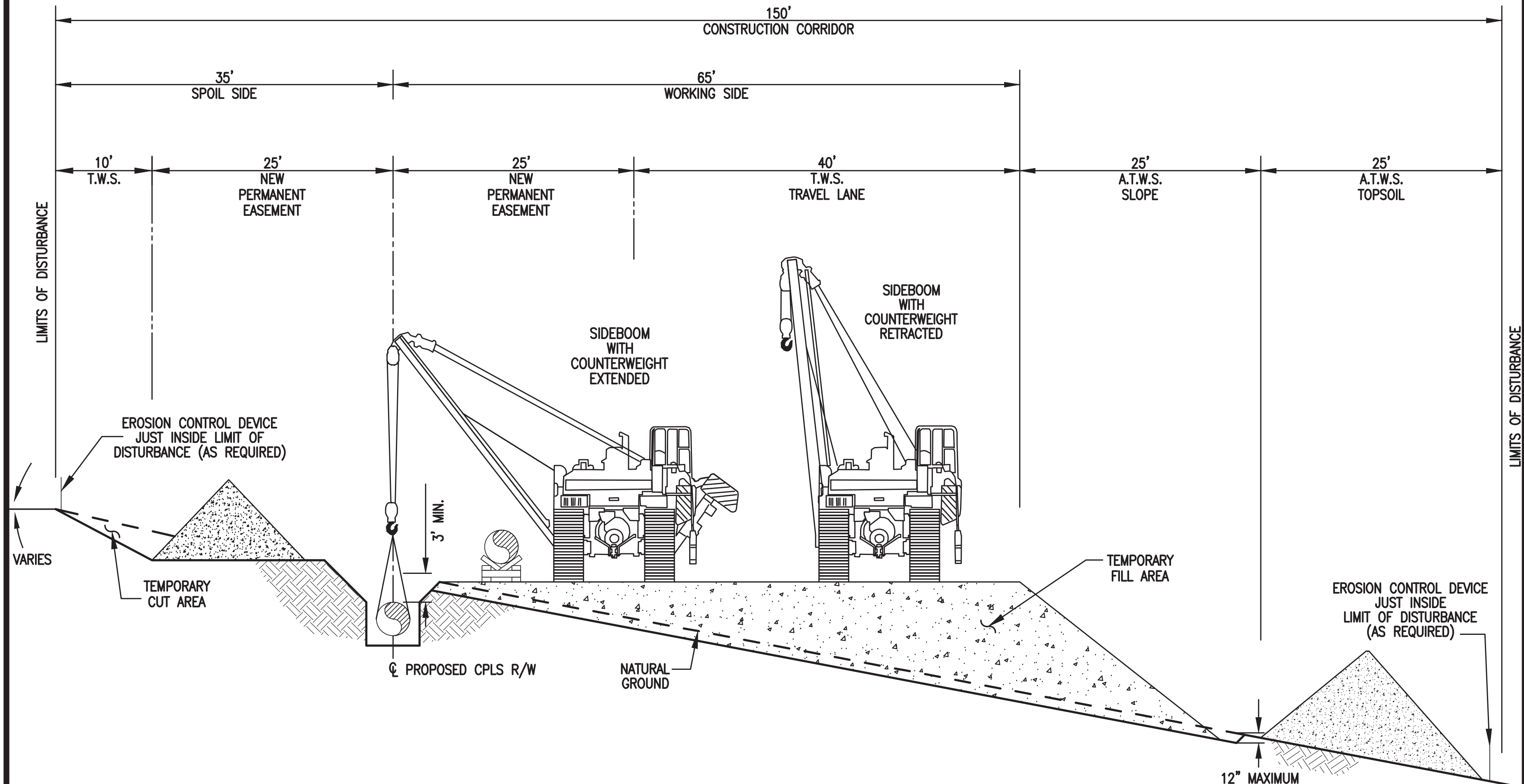
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLS-A-01	SHEET 11 OF 20
WO: 1161503		2:42pm 3/20/2015 a1traha K:\103643-CPLS\Mapping\Typicals\F-XS-CPLS-A\REV_0\CPLS-11_0.dwg	

WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 42" PIPELINE
MODERATE SIDESLOPE CONSTRUCTION – WITH TOPSOIL STRIPPING (FILL)

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT–OF–WAY CROSS–SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F–XS–CPLS–A–01	SHEET 12 OF 20
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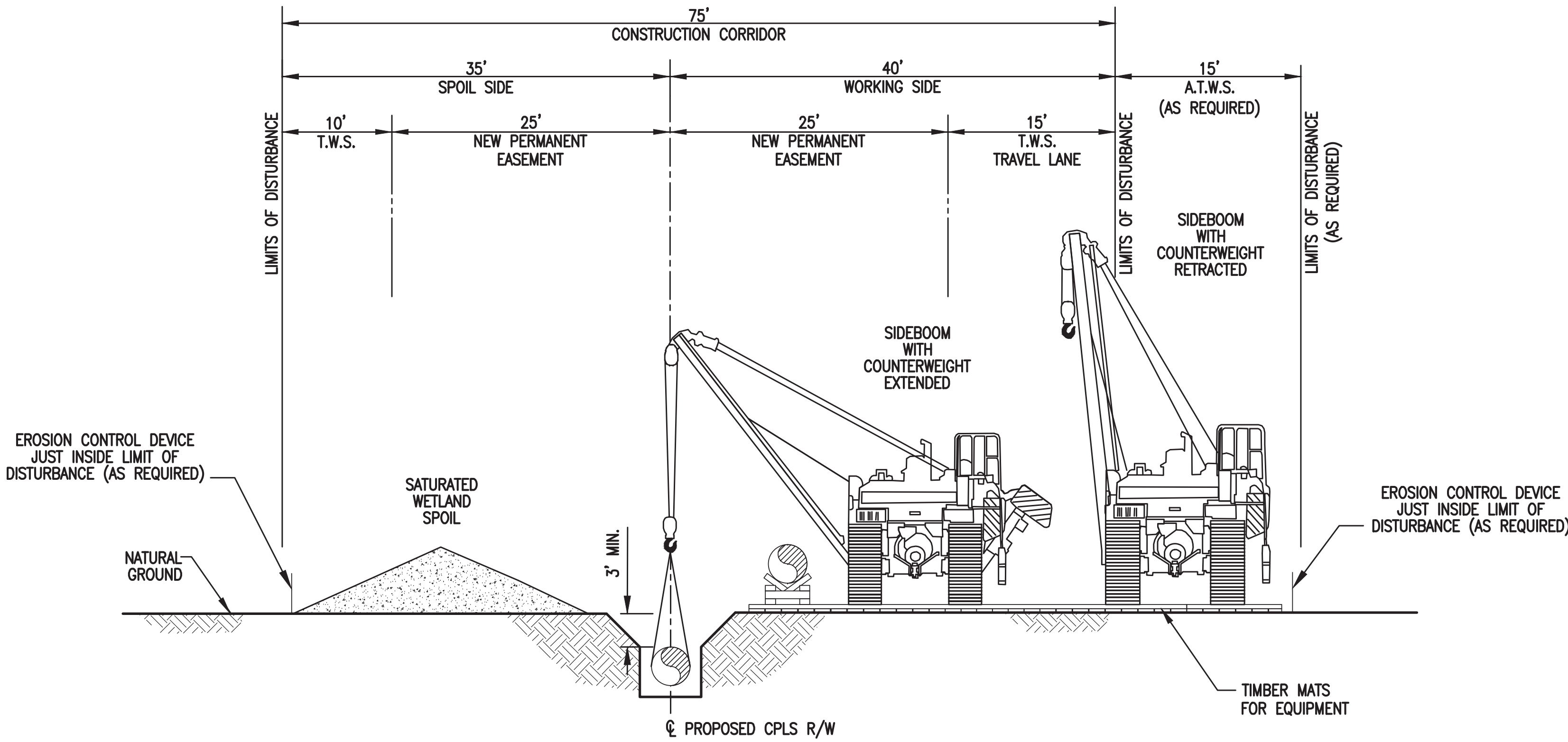
WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 42" PIPELINE WITHIN SATURATED WETLAND AREAS

DRAWING NO.	REFERENCE TITLE

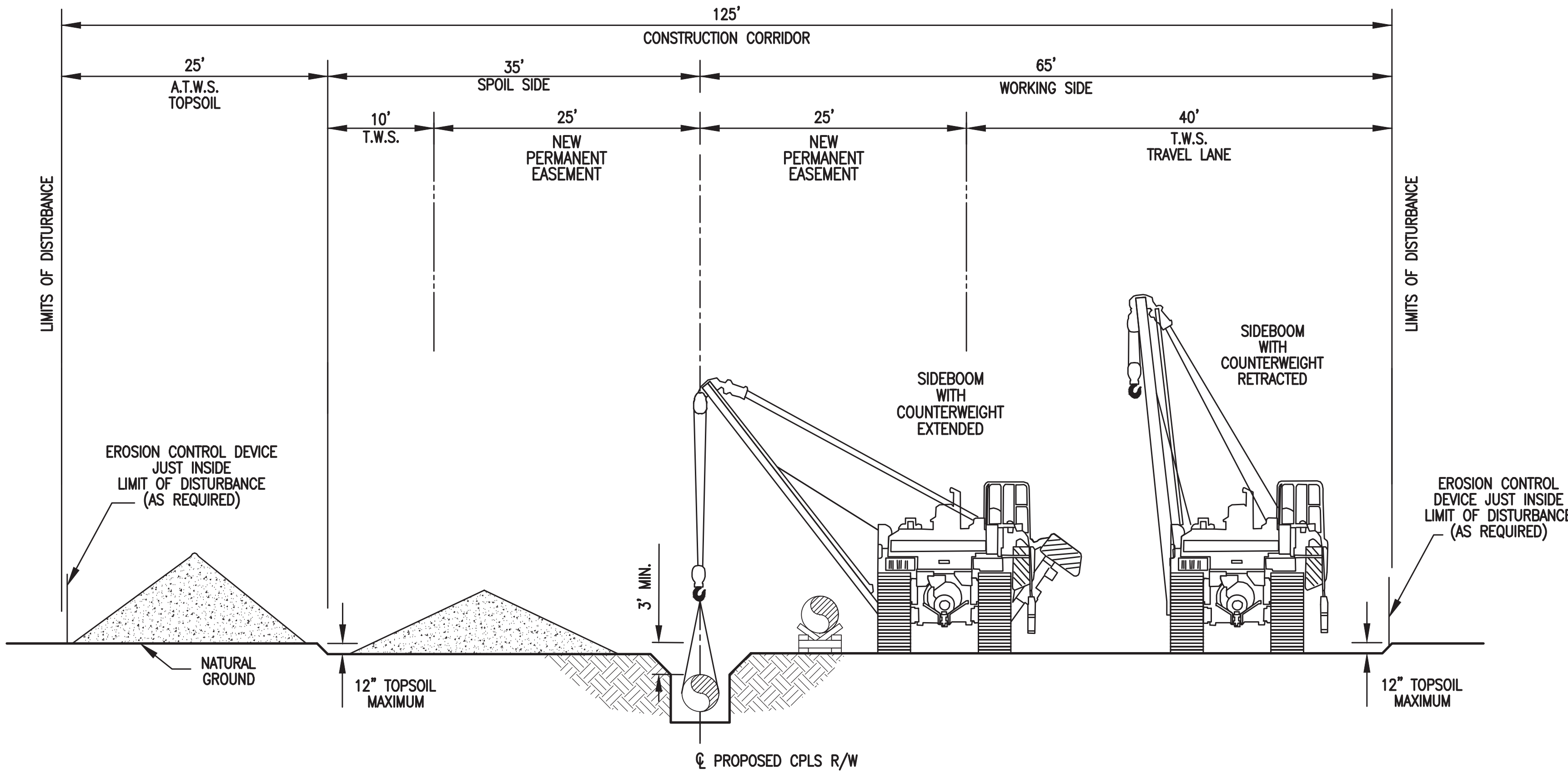
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLS-A-01	SHEET 13 OF 20
WO: 1161503		2:45pm 3/20/2015 a1traha K:\103643-CPLS\Mapping\Typicals\F-XS-CPLS-A\REV_0\CPLS-13_0.dwg	

WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 42" PIPELINE
FULL WIDTH TOPSOIL STRIPPING (SPOIL SIDE) – NOT ADJACENT TO EXISTING PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

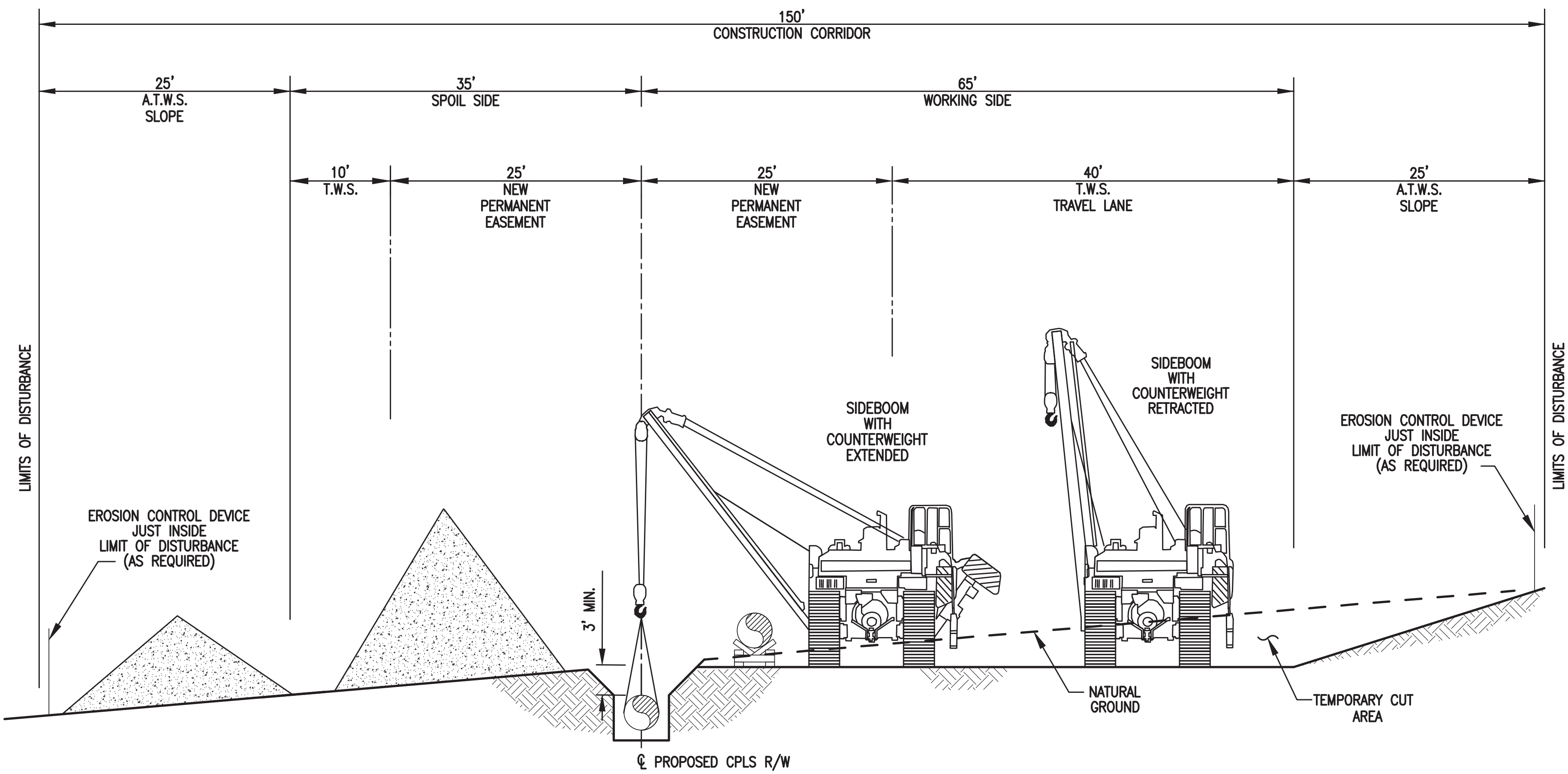
WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLS-A-01	SHEET 14 OF 20
WO: 1161503		2:48pm 3/20/2015 a1traha K:\103643-CPLS\Mapping\Typicals\F-XS-CPLS-A\REV_0\CPLS-14_0.dwg	

B-155



TYPICAL CROSS SECTION FOR 42" PIPELINE SEVERE SIDESLOPE CONSTRUCTION (CUT)

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

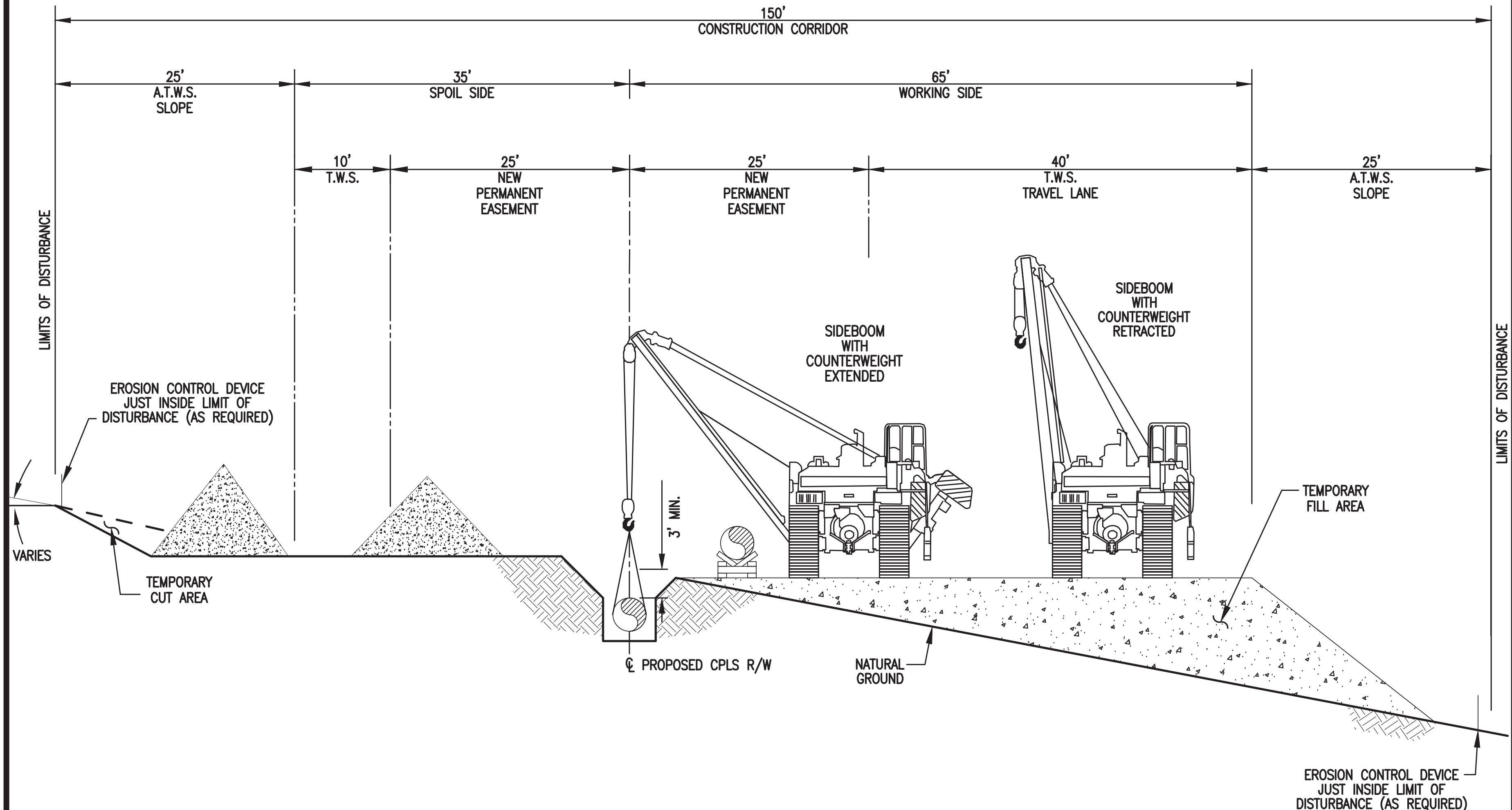
Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLS-A-01	SHEET 15
WO: 1161503		2:49pm 3/20/2015 a1traha K:\103643-CPLS\Mapping\Typicals\F-XS-CPLS-A\REV_0\CPLS-15_0.dwg	OF 20

WOOD GROUP MUSTANG, INC.

B-156



TYPICAL CROSS SECTION FOR 42" PIPELINE
SEVERE SIDESLOPE CONSTRUCTION (FILL)

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:		SCALE: NTS	
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:		REV: 0	
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLS-A-01		SHEET 16	
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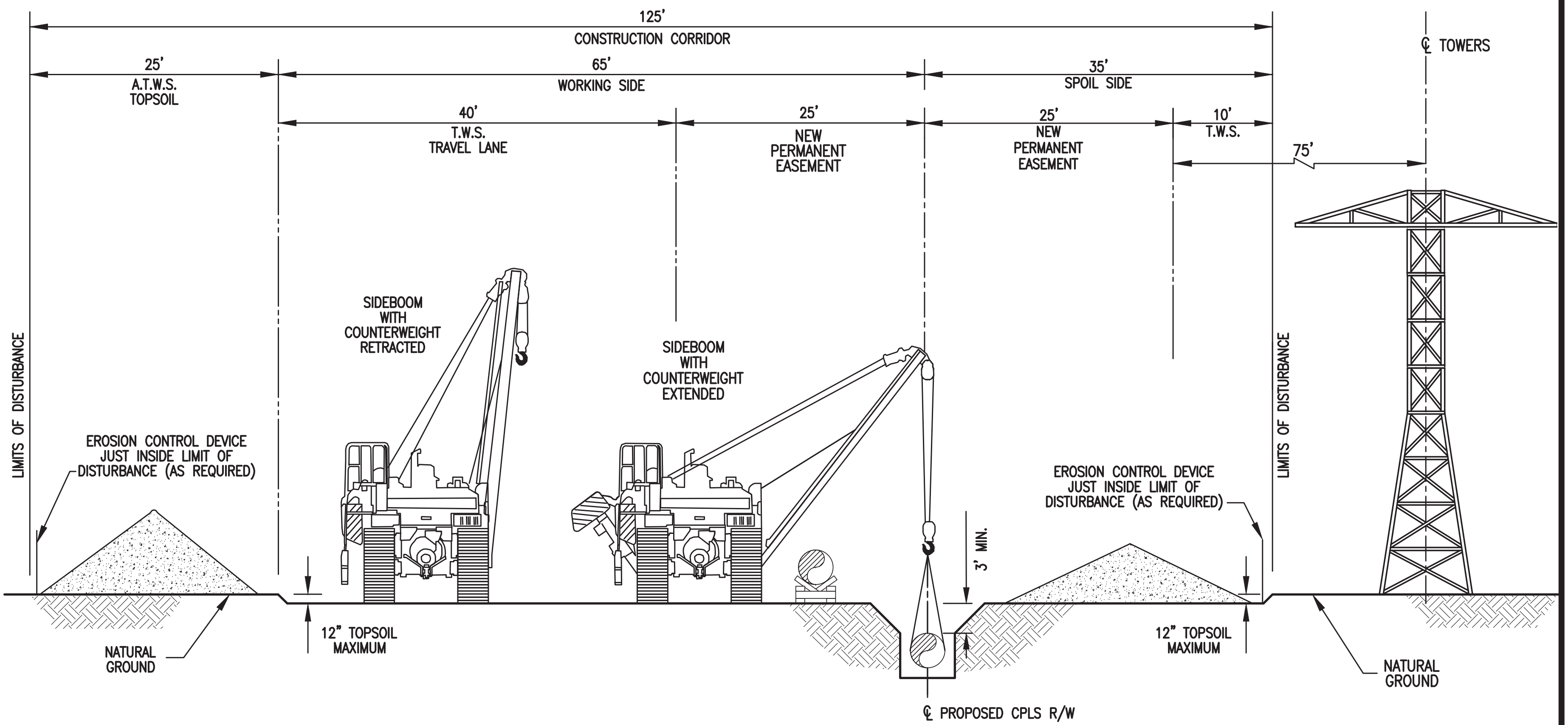

TYPICAL CROSS SECTION FOR 42" PIPELINE
75' FROM CENTERLINE OF TOWERS OR POLES TO TRANSCONTINENTAL PERMANENT EASEMENT – WITH TOPSOIL STRIPPING

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLS-A-01	SHEET 17 OF 20
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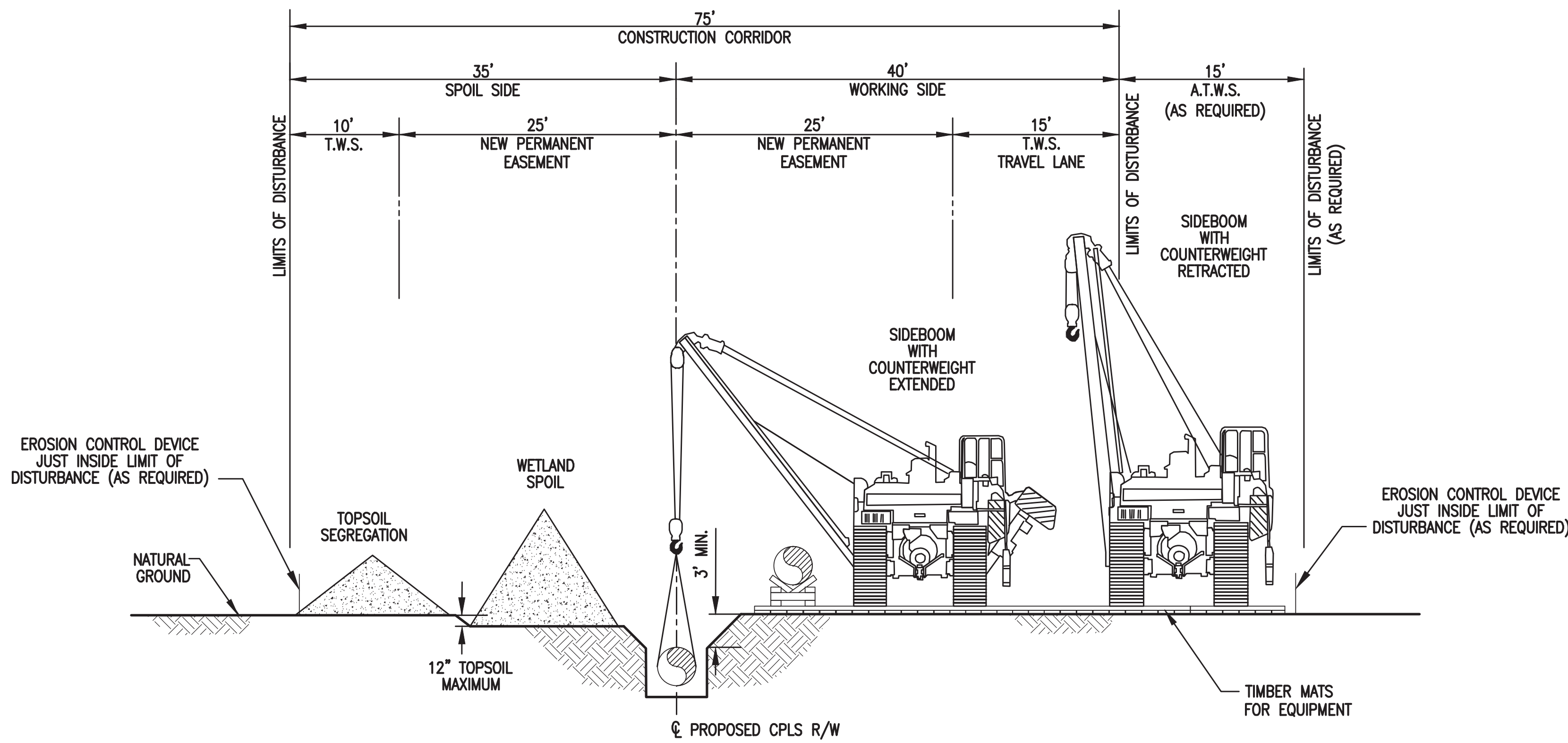
WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 42" PIPELINE WITHIN UNSATURATED WETLAND AREAS

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:		SCALE: NTS	
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:		REV: 0	
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLS-A-01		SHEET 18	
WO: 1161503		2:54pm	3/20/2015	a1traha	OF 20

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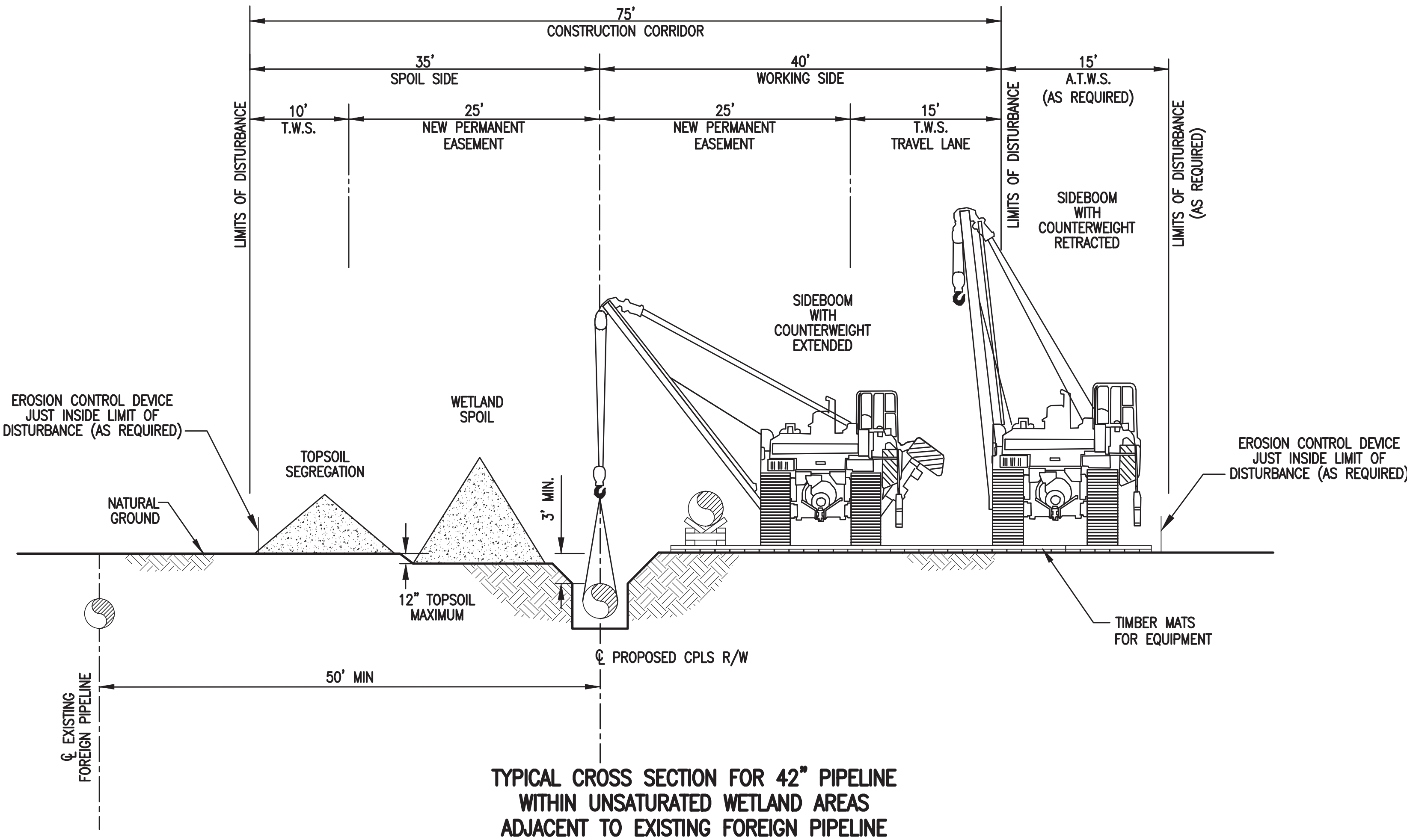
WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 42" PIPELINE
WITHIN UNSATURATED WETLAND AREAS
ADJACENT TO EXISTING FOREIGN PIPELINE

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLS-A-01	SHEET 19
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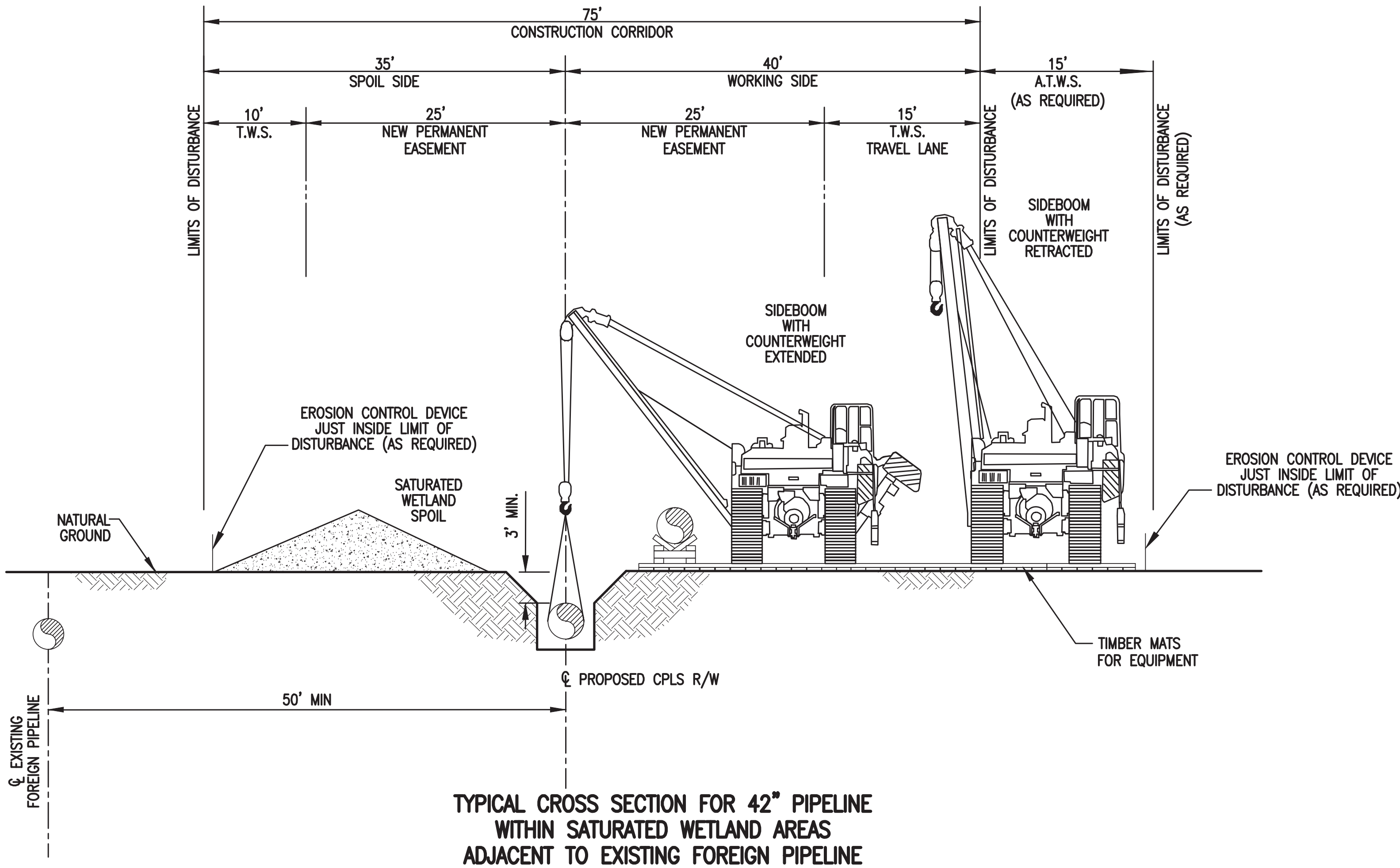
WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 42" PIPELINE WITHIN SATURATED WETLAND AREAS ADJACENT TO EXISTING FOREIGN PIPELINE

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" CENTRAL PENN LINE SOUTH
PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161503	LR	MJH

DRAWN BY: AT	DATE: 09/19/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/20/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/20/14	DRAWING NUMBER: F-XS-CPLS-A-01	SHEET 20
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WOOD GROUP MUSTANG, INC.

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Transcontinental Gas Pipe Line Company LLC

TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 36" CHAPMAN LOOP
LL M.P. 185.95 TO LL MP 188.87
CLINTON COUNTY, PENNSYLVANIA

F-XS-LL185.9-D-01

DATE: 03/31/2015   REV. 0

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DOCUMENT NAME	SHEET NUMBER	ROW WIDTH (FT)	DESCRIPTION	REVISION	DATE
F-XS-LL185.9-D-01	01		COVERSHEET	0	03/31/2015
F-XS-LL185.9-D-01	02		TABLE OF CONTENTS	0	03/31/2015
F-XS-LL185.9-D-01	03	90	NO TOPSOIL STRIPPING- ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE	0	03/31/2015
F-XS-LL185.9-D-01	04	110	TOPSOIL STRIPPING- ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE	0	03/31/2015
F-XS-LL185.9-D-01	05	110	MODERATE SIDESLOPE CONSTRUCTION ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE	0	03/31/2015
F-XS-LL185.9-D-01	06	90	TYPICAL CONSTRUCTION WITHIN SATURATED WETLAND AREAS	0	03/31/2015
F-XS-LL185.9-D-01	07	90	TYPICAL CONSTRUCTION WITHIN UNSATURATED WETLAND AREAS	0	03/31/2015

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/2015	AT	ISSUED FOR FERC FILING	1161125	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 36" CHAPMAN LOOP
LL M.P. 185.95 TO LL M.P. 188.87
CLINTON COUNTY, PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/12/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 09/12/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 09/12/14	DRAWING NUMBER: F-XS-LL185.9-D-01	SHEET 2 OF 7
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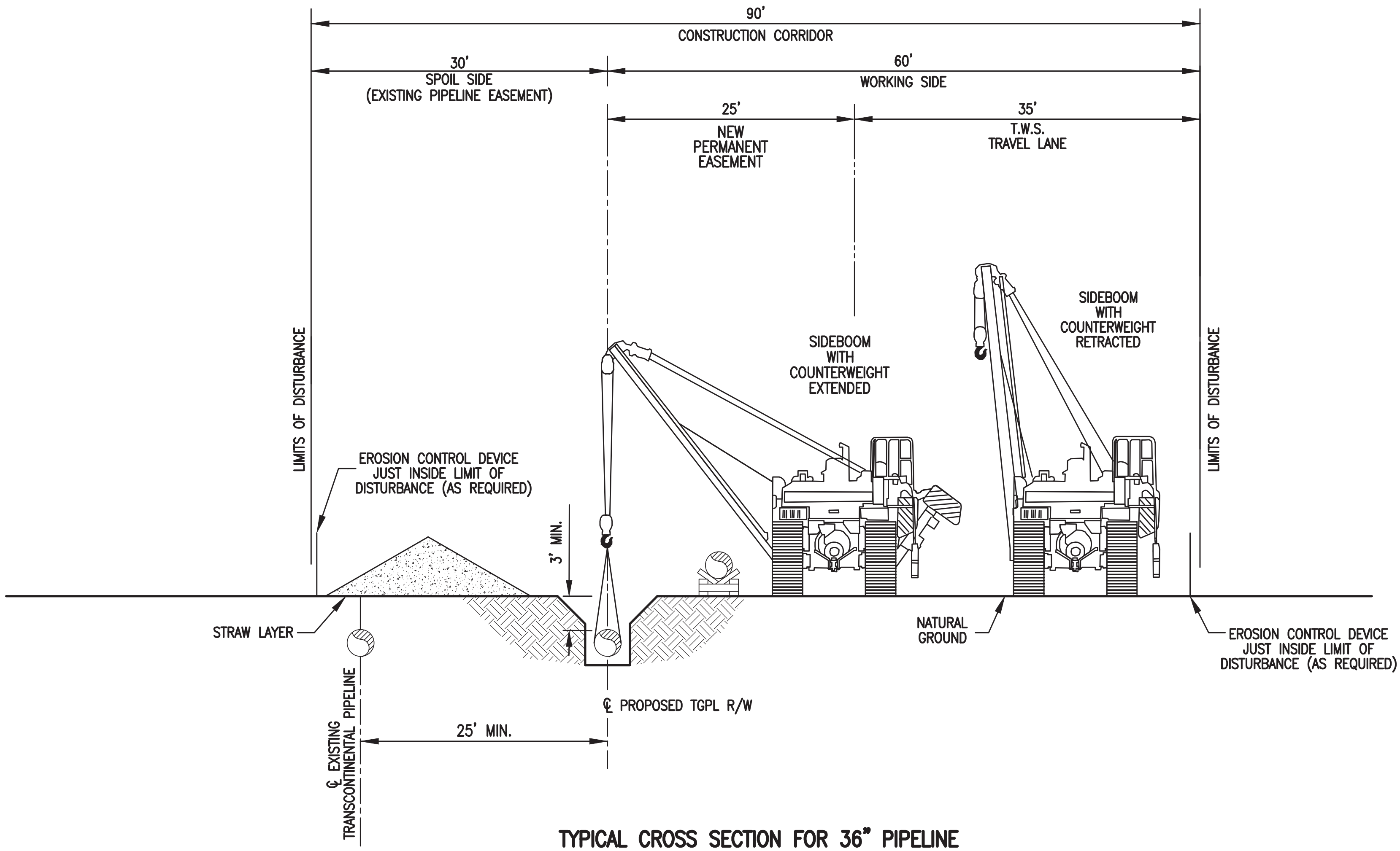

TYPICAL CROSS SECTION FOR 36" PIPELINE
NO TOPSOIL STRIPPING – ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/2015	AT	ISSUED FOR FERC FILING	1161125	DP	MJH

WOOD GROUP
MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 36" CHAPMAN LOOP
LL M.P. 185.95 TO LL M.P. 188.87
CLINTON COUNTY, PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/12/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 09/12/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 09/12/14	DRAWING NUMBER: F-XS-LL185.9-D-01	SHEET 3
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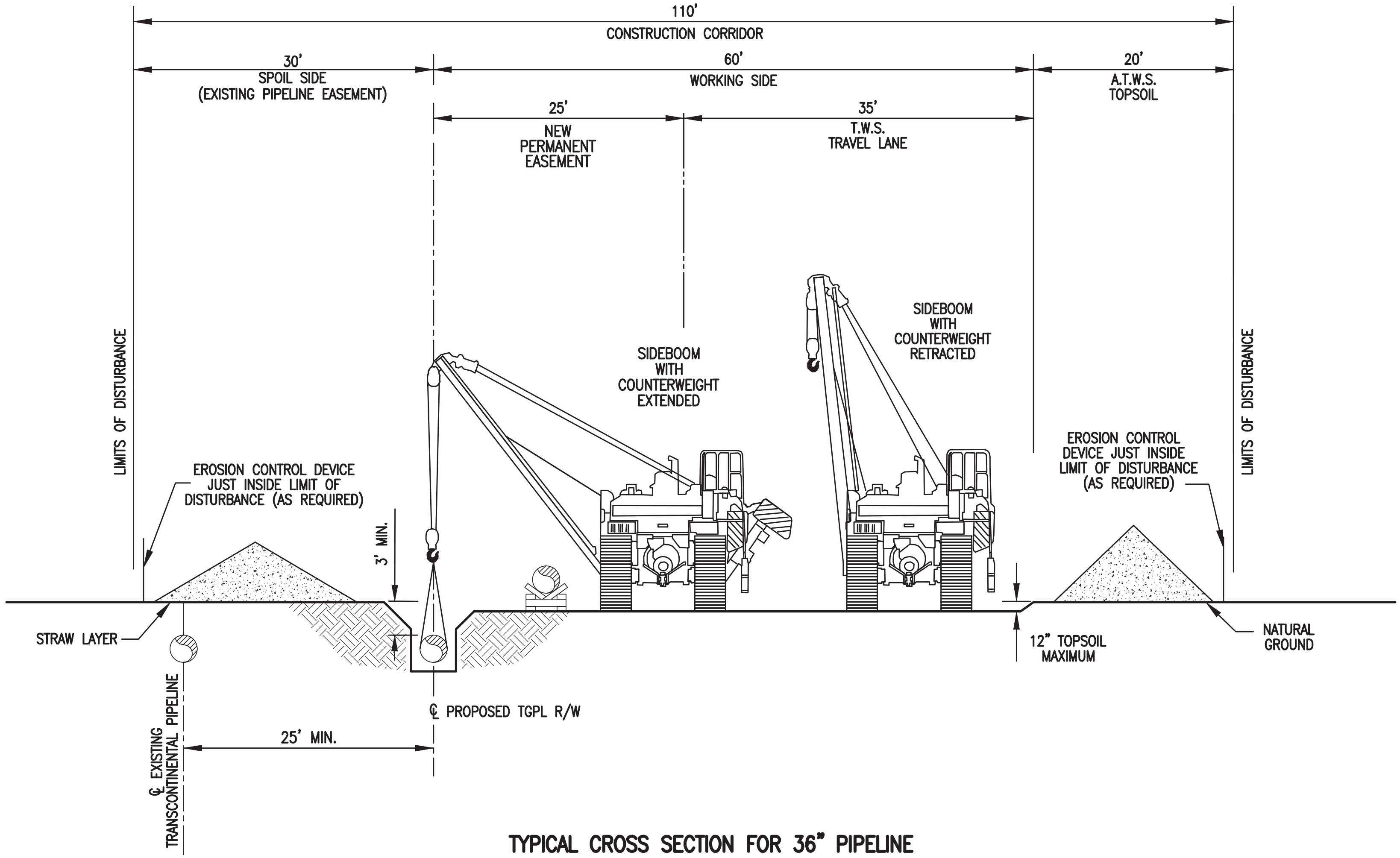


TYPICAL CROSS SECTION FOR 36" PIPELINE
TOPSOIL STRIPPING – ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 36" CHAPMAN LOOP
LL M.P. 185.95 TO LL M.P. 188.87
CLINTON COUNTY, PENNSYLVANIA

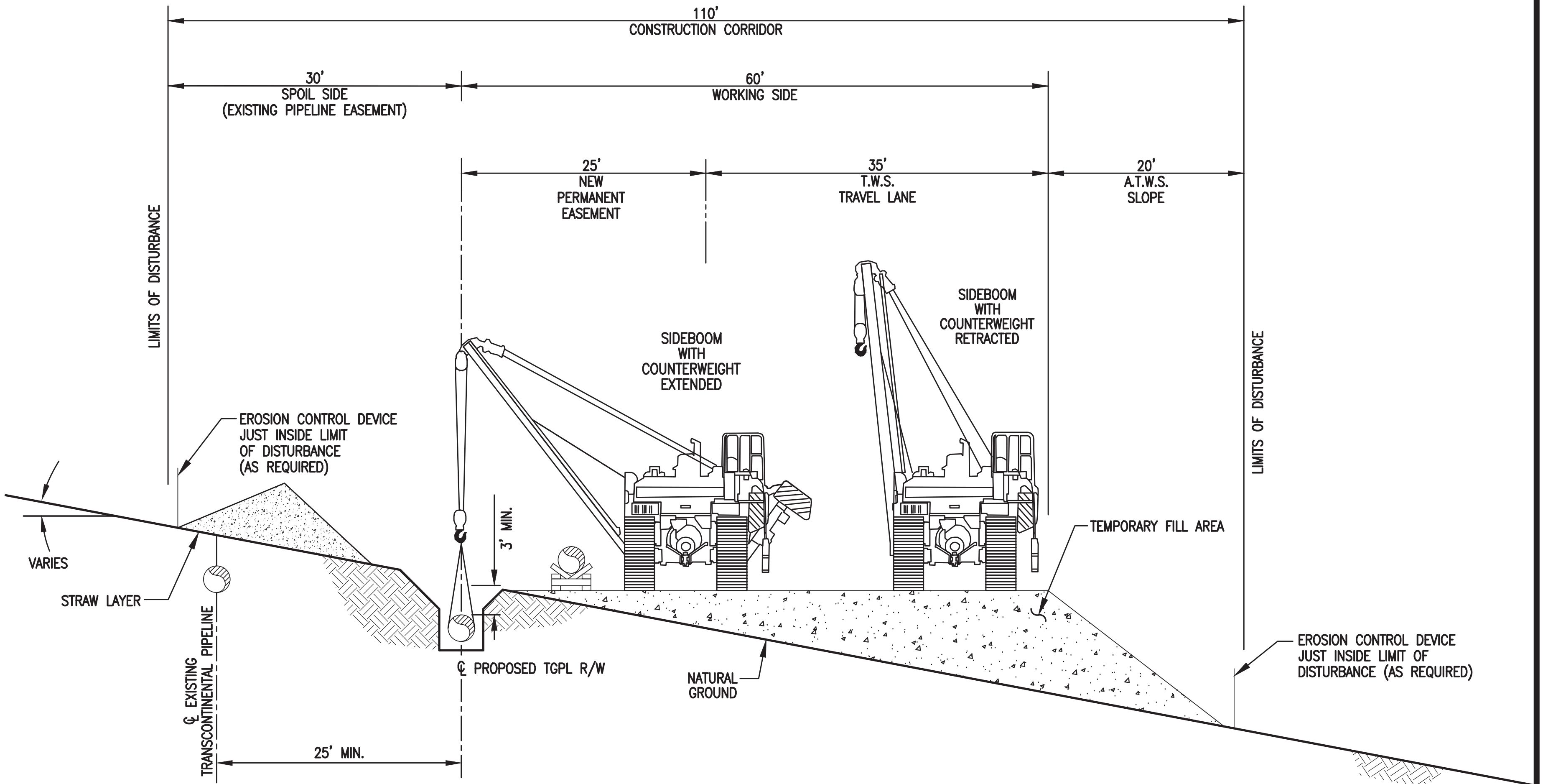
Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/2015	AT	ISSUED FOR FERC FILING	1161125	DP	MJH

DRAWN BY: AT	DATE: 09/12/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 09/12/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 09/12/14	DRAWING NUMBER: F-XS-LL185.9-D-01	SHEET 4 OF 7
WO: 1161125		2:46pm 3/20/2015 j1beasl K:\103653-Chapman\Mapping\Typicals\Chapman xsec\CHAPMAN\REV_0\04.dwg	

WOOD GROUP
MUSTANG, INC.

B-166



TYPICAL CROSS SECTION FOR 36" PIPELINE
MODERATE SIDESLOPE CONSTRUCTION
ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 36" CHAPMAN LOOP
LL M.P. 185.95 TO LL M.P. 188.87
CLINTON COUNTY, PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/2015	AT	ISSUED FOR FERC FILING	1161125	DP	MJH

DRAWN BY: AT	DATE: 09/12/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 09/12/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 09/12/14	DRAWING NUMBER: F-XS-LL185.9-D-01	SHEET 5 OF 7
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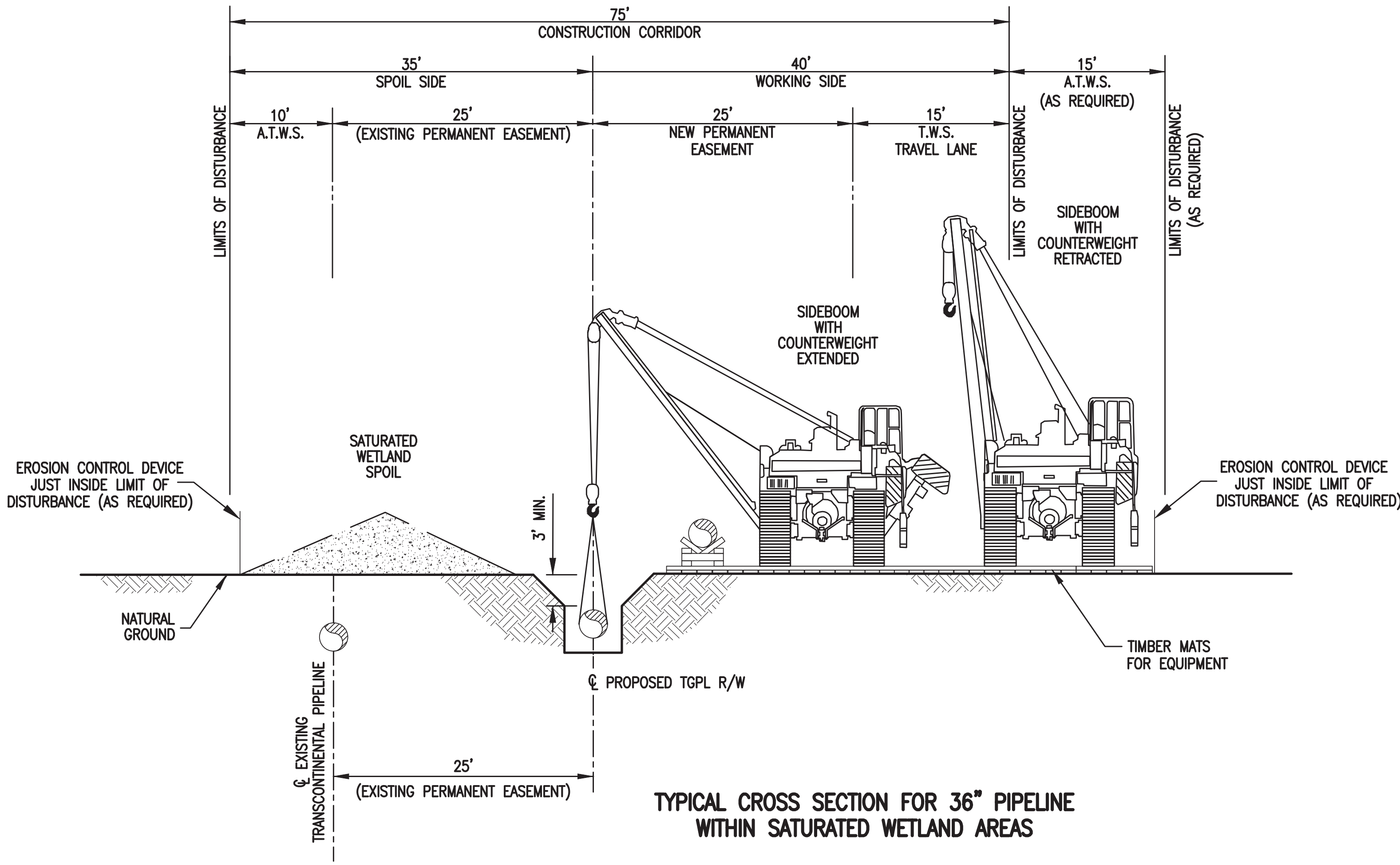
WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 36" PIPELINE WITHIN SATURATED WETLAND AREAS

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/2015	AT	ISSUED FOR FERC FILING	1161125	DP	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 36" CHAPMAN LOOP
LL M.P. 185.95 TO LL M.P. 188.87
CLINTON COUNTY, PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/12/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 09/12/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 09/12/14	DRAWING NUMBER: F-XS-LL185.9-D-01	SHEET 6
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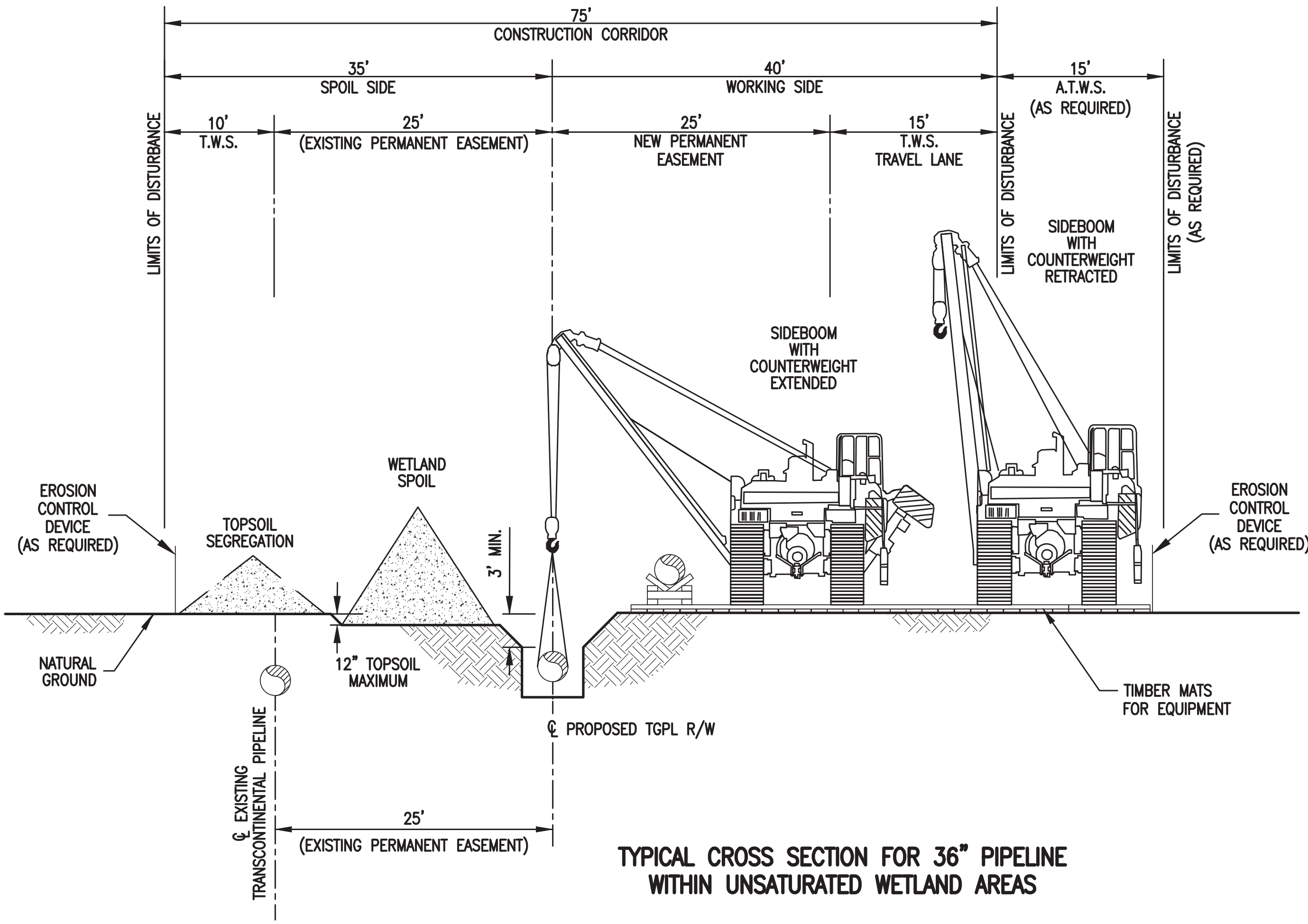
WOOD GROUP MUSTANG, INC.

B-168



TYPICAL CROSS SECTION FOR 36" PIPELINE WITHIN UNSATURATED WETLAND AREAS

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/2015	AT	ISSUED FOR FERC FILING	1161125	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 36" CHAPMAN LOOP
LL M.P. 185.95 TO LL M.P. 188.87
CLINTON COUNTY, PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/12/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 09/12/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 09/12/14	DRAWING NUMBER: F-XS-LL185.9-D-01	SHEET 7 OF 7
WO: 1161125		8:11am 3/20/2015 a1traha K:\103653-Chapman\Mapping\Typicals\Chapman xsec\CHAPMAN\REV_0\07.dwg	

Transcontinental Gas Pipe Line Company LLC

TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" UNITY LOOP
LL M.P. 120.31 TO LL M.P. 128.87
LYCOMING COUNTY, PENNSYLVANIA

F-XS-LL119.8-D-01

DATE: 03/31/2015 REV. 0

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DOCUMENT NAME	SHEET NUMBER	ROW WIDTH (FT)	DESCRIPTION	REVISION	DATE
F-XS-LL119.8-D-01	01		COVERSHEET	0	03/31/2015
F-XS-LL119.8-D-01	02		TABLE OF CONTENTS	0	03/31/2015
F-XS-LL119.8-D-01	03	100	NO TOPSOIL STRIPPING- ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE	0	03/31/2015
F-XS-LL119.8-D-01	04	125	TOPSOIL STRIPPING- ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE	0	03/31/2015
F-XS-LL119.8-D-01	05	125	MODERATE SIDESLOPE CONSTRUCTION ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE (CUT)	0	03/31/2015
F-XS-LL119.8-D-01	06	125	MODERATE SIDESLOPE CONSTRUCTION ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE (FILL)	0	03/31/2015
F-XS-LL119.8-D-01	07	90	TYPICAL CONSTRUCTION WITHIN SATURATED WETLAND AREAS ADJACENT TO EXISTING TRANSCO PL	0	03/31/2015
F-XS-LL119.8-D-01	08	100	TYPICAL CONSTRUCTION OVER EXISTING TRANSCONTINENTAL PIPELINES	0	03/31/2015
F-XS-LL119.8-D-01	09	90	TYPICAL CONSTRUCTION WITHIN SATURATED WETLAND AREAS OVER EXISTING LINES	0	03/31/2015
F-XS-LL119.8-D-01	10	125	FULL WIDTH TOPSOIL STRIPPING-NOT ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE	0	03/31/2015
F-XS-LL119.8-D-01	11	100	TYPICAL CONSTRUCTION WITHIN UNSATURATED WETLAND	0	03/31/2015
F-XS-LL119.8-D-01	12	100	TYPICAL CONSTRUCTION WITHIN UNSATURATED WETLAND AREAS OVER EXISTING LINES	0	03/31/2015

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161145	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" UNITY LOOP
LYCOMING COUNTY, PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/12/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 09/12/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 09/12/14	DRAWING NUMBER: F-XS-LL119.8-D-01	SHEET 02
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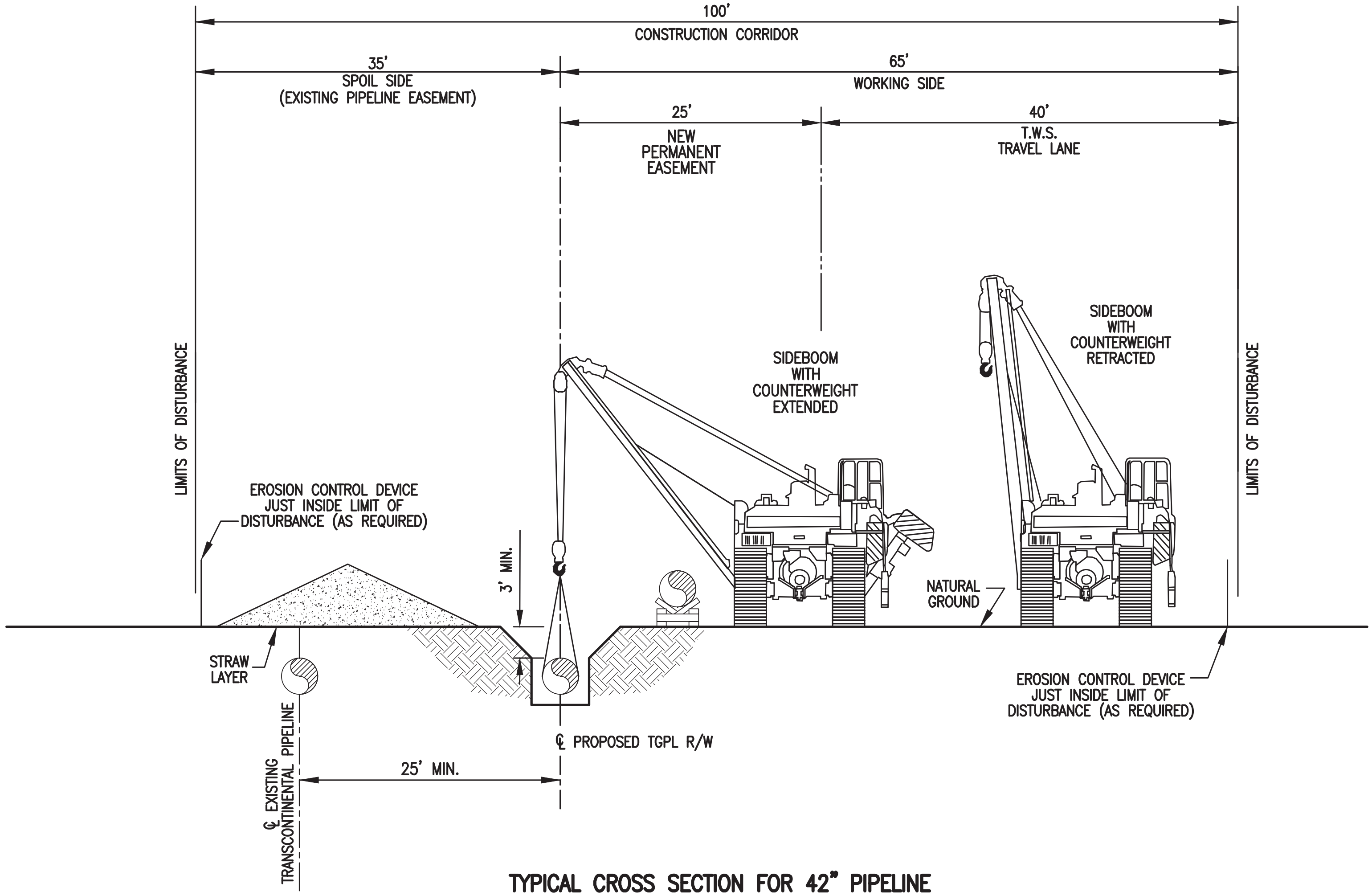


TYPICAL CROSS SECTION FOR 42" PIPELINE
NO TOPSOIL STRIPPING – ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

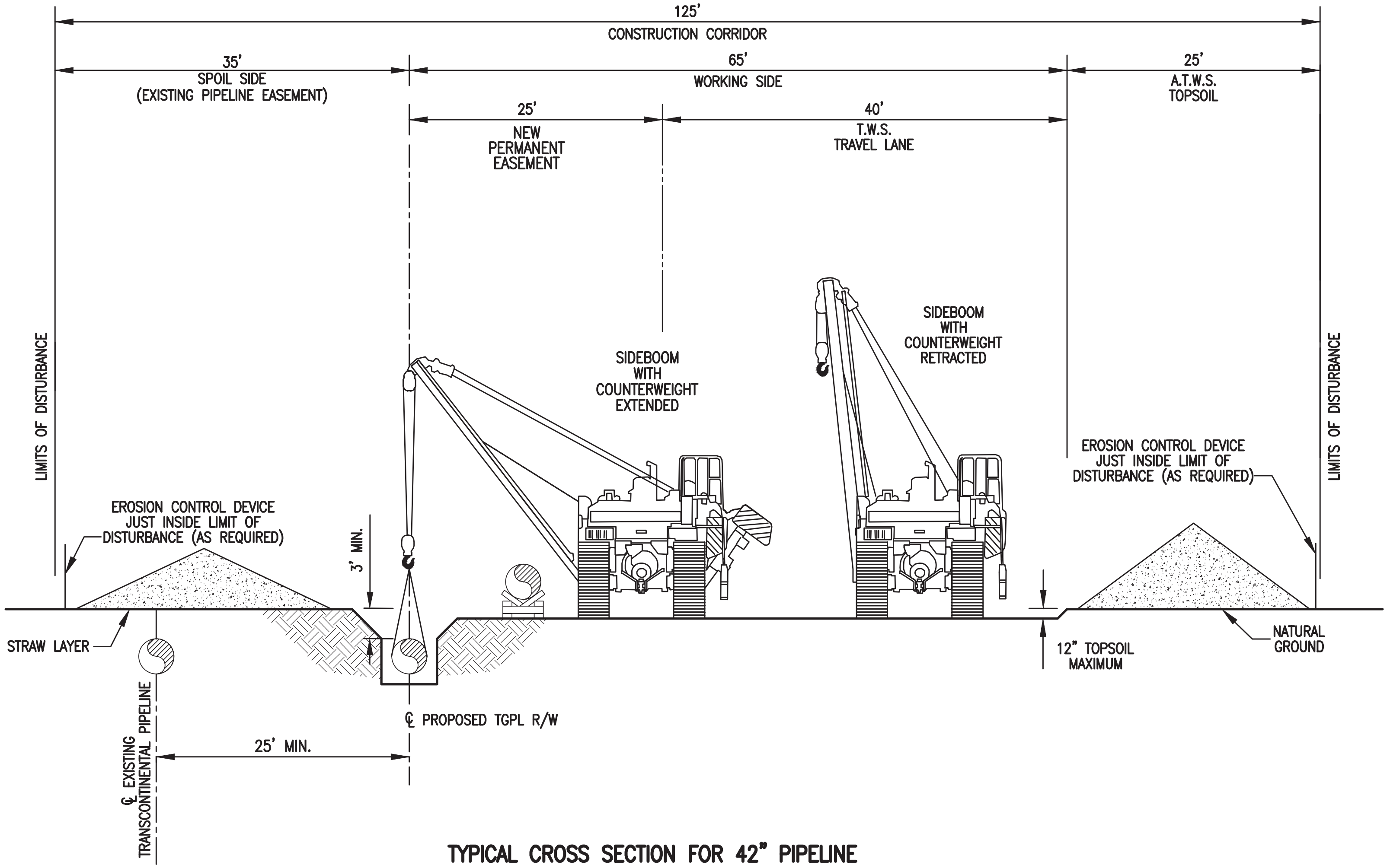
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161145	DP	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" UNITY LOOP
LYCOMING COUNTY, PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/12/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 09/12/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 09/12/14	DRAWING NUMBER: F-XS-LL119.8-D-01	SHEET 03
WO: 1161145		2:43pm 3/20/2015 c1ramir K:\103652-Unity\Mapping\Typicals\Unity xsec\REV_0\UNITY-03.dwg	OF 12

WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 42" PIPELINE
TOPSOIL STRIPPING – ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

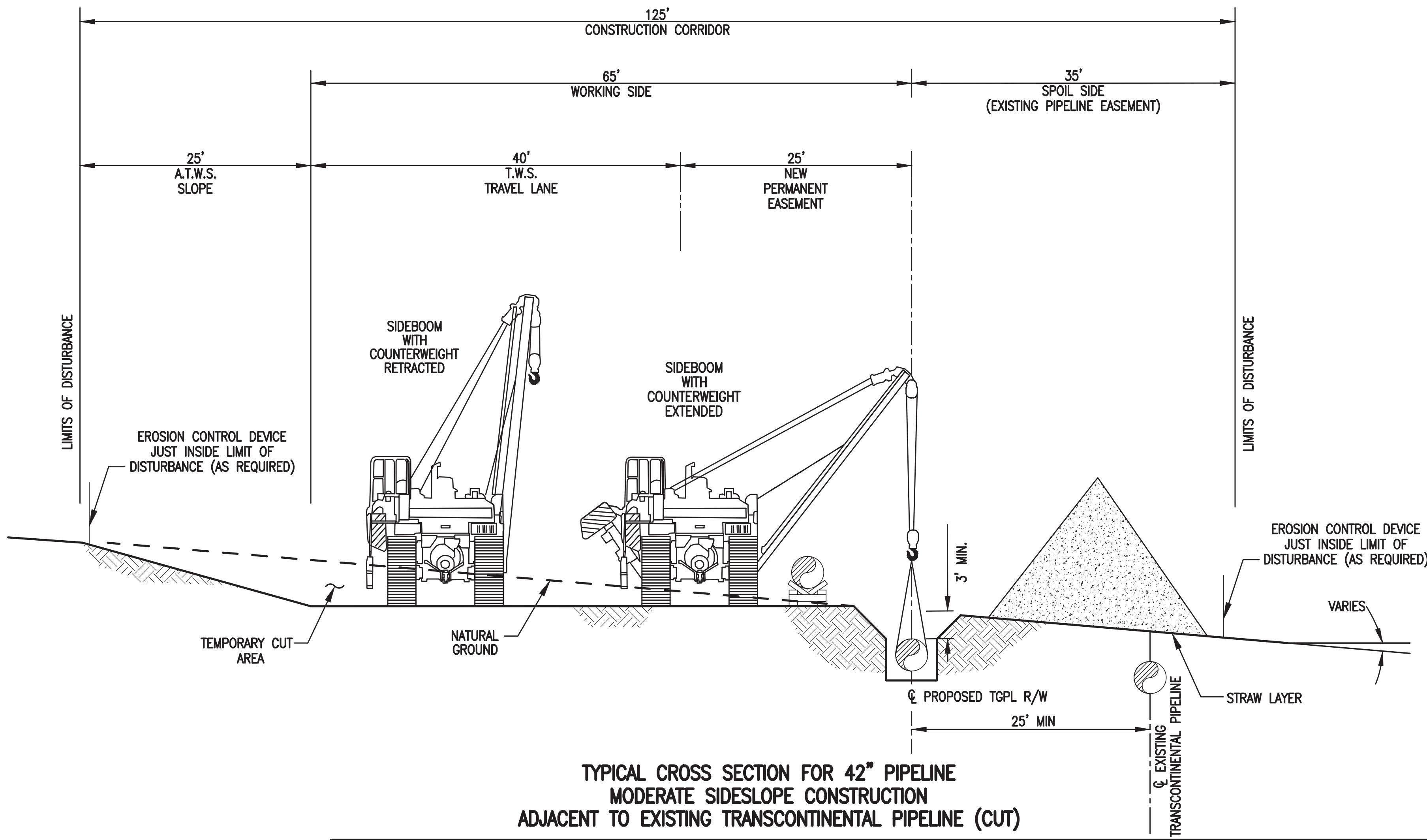
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" UNITY LOOP
LYCOMING COUNTY, PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161145	DP	MJH

DRAWN BY: AT	DATE: 09/12/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 09/12/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 09/12/14	DRAWING NUMBER: F-XS-LL119.8-D-01	SHEET 04
WO: 1161145		2:43pm 3/20/2015 c1ramir K:\103652-Unity\Mapping\Typicals\Unity xsec\REV_0\UNITY-04.dwg	OF 12

WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 42" PIPELINE
MODERATE SIDESLOPE CONSTRUCTION
ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE (CUT)

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161145	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" UNITY LOOP
LYCOMING COUNTY, PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/12/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 09/12/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 09/12/14	DRAWING NUMBER: F-XS-LL119.8-D-01	SHEET 05
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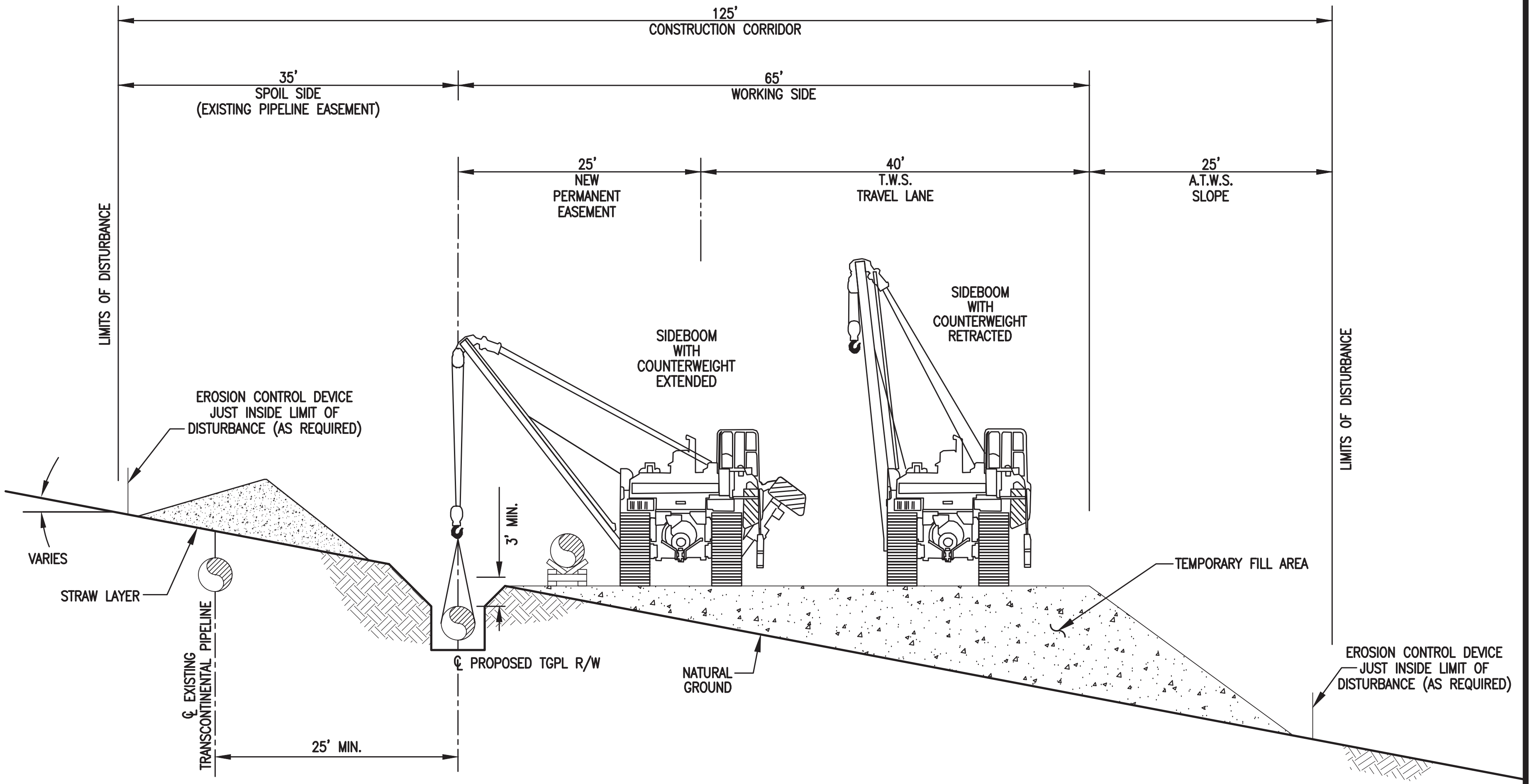

TYPICAL CROSS SECTION FOR 42" PIPELINE
MODERATE SIDESLOPE CONSTRUCTION
ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE (FILL)

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161145	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" UNITY LOOP
LYCOMING COUNTY, PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/12/14	ISSUED FOR BID:		SCALE: NTS	
CHECKED BY: EP	DATE: 09/12/14	ISSUED FOR CONSTRUCTION:		REV: 0	
APPROVED BY: MJH	DATE: 09/12/14	DRAWING NUMBER: F-XS-LL119.8-D-01			SHEET 06
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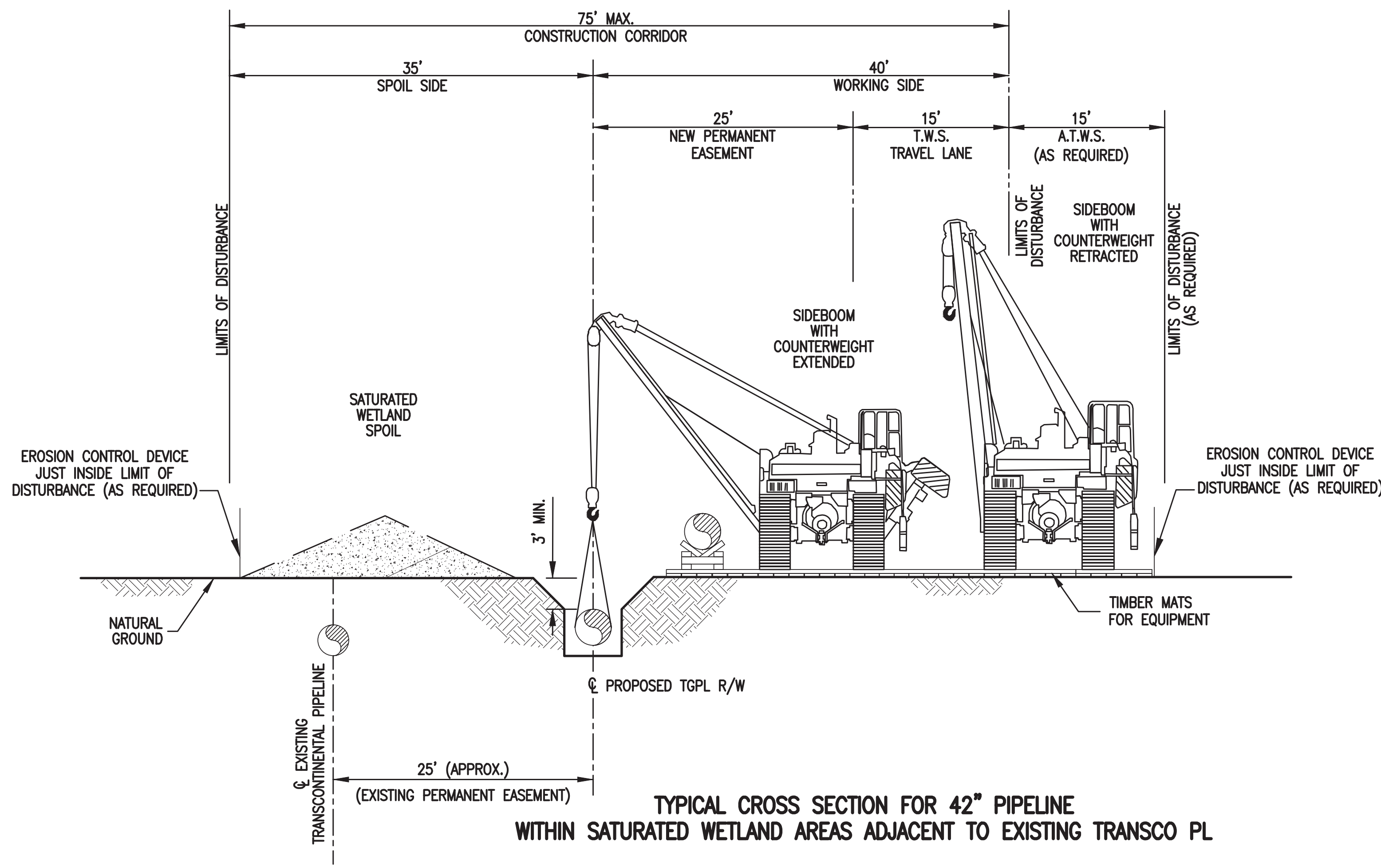

TYPICAL CROSS SECTION FOR 42" PIPELINE
WITHIN SATURATED WETLAND AREAS ADJACENT TO EXISTING TRANSCO PL

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" UNITY LOOP
LYCOMING COUNTY, PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161145	DP	MJH

DRAWN BY: AT	DATE: 09/12/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 09/12/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 09/12/14	DRAWING NUMBER: F-XS-LL119.8-D-01	SHEET 07
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WOOD GROUP MUSTANG, INC.

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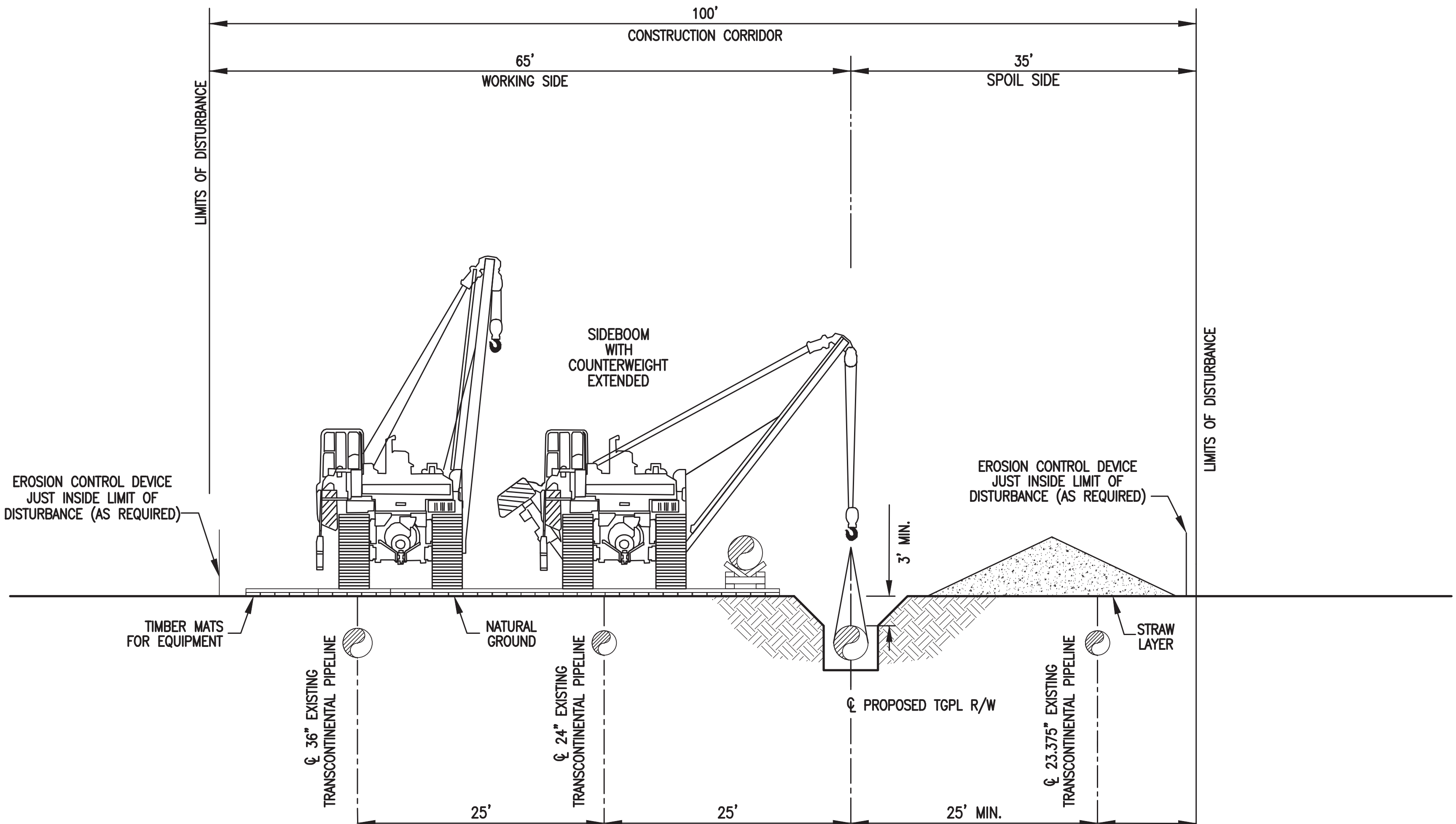


TYPICAL CROSS SECTION FOR 42" PIPELINE OVER EXISTING TRANSCONTINENTAL PIPELINES

DRAWING NO.	REFERENCE TITLE

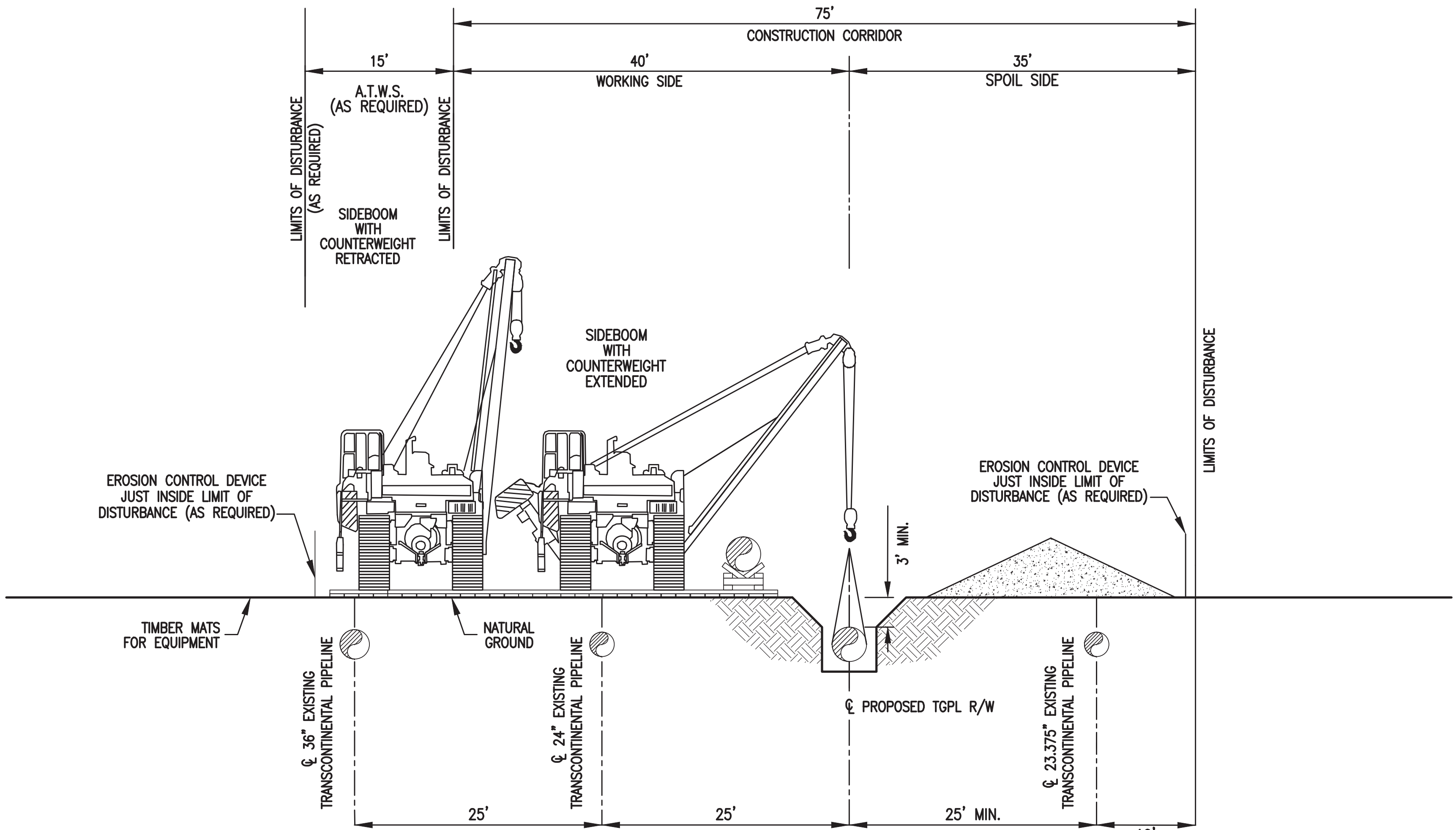
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" UNITY LOOP
LYCOMING COUNTY, PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161145	DP	MJH

DRAWN BY: AT	DATE: 09/12/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 09/12/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 09/12/14	DRAWING NUMBER: F-XS-LL119.8-D-01	SHEET 08 OF 12
WO: 1161145		2:53pm 3/20/2015 c1ramir K:\103652-Unity\Mapping\Typicals\Unity xsec\REV_0\UNITY-08.dwg	

WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 42" PIPELINE WITHIN SATURATED WETLAND AREAS OVER EXISTING LINES

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" UNITY LOOP
LYCOMING COUNTY, PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161145	DP	MJH

DRAWN BY: AT	DATE: 09/12/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 09/12/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 09/12/14	DRAWING NUMBER: F-XS-LL119.8-D-01	SHEET 09 OF 12
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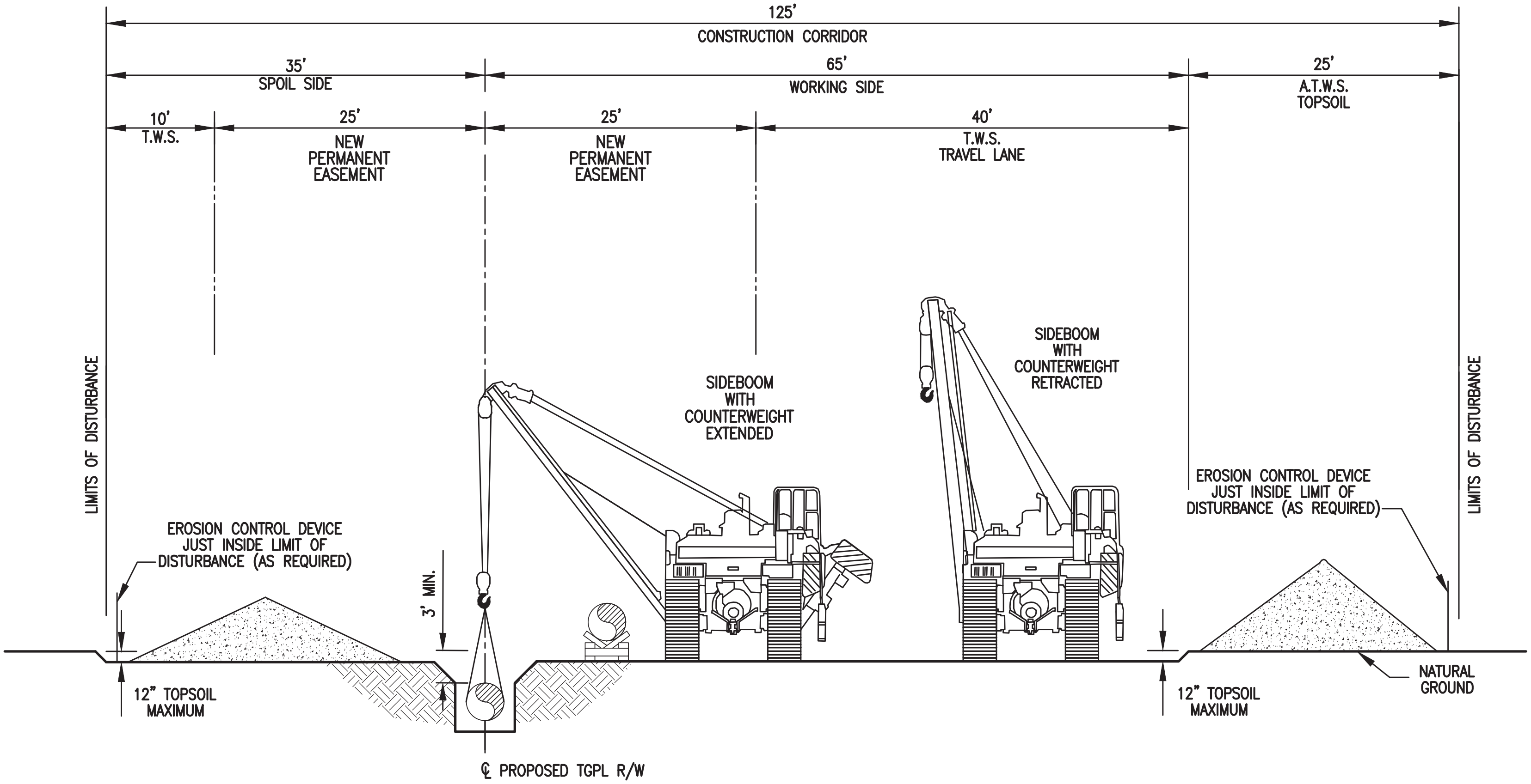
WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 42" PIPELINE
FULL WIDTH TOPSOIL STRIPPING – NOT ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" UNITY LOOP
LYCOMING COUNTY, PENNSYLVANIA

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161145	DP	MJH

DRAWN BY: AT	DATE: 09/12/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 09/12/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 09/12/14	DRAWING NUMBER: F-XS-LL119.8-D-01	SHEET 10
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WOOD GROUP MUSTANG, INC.

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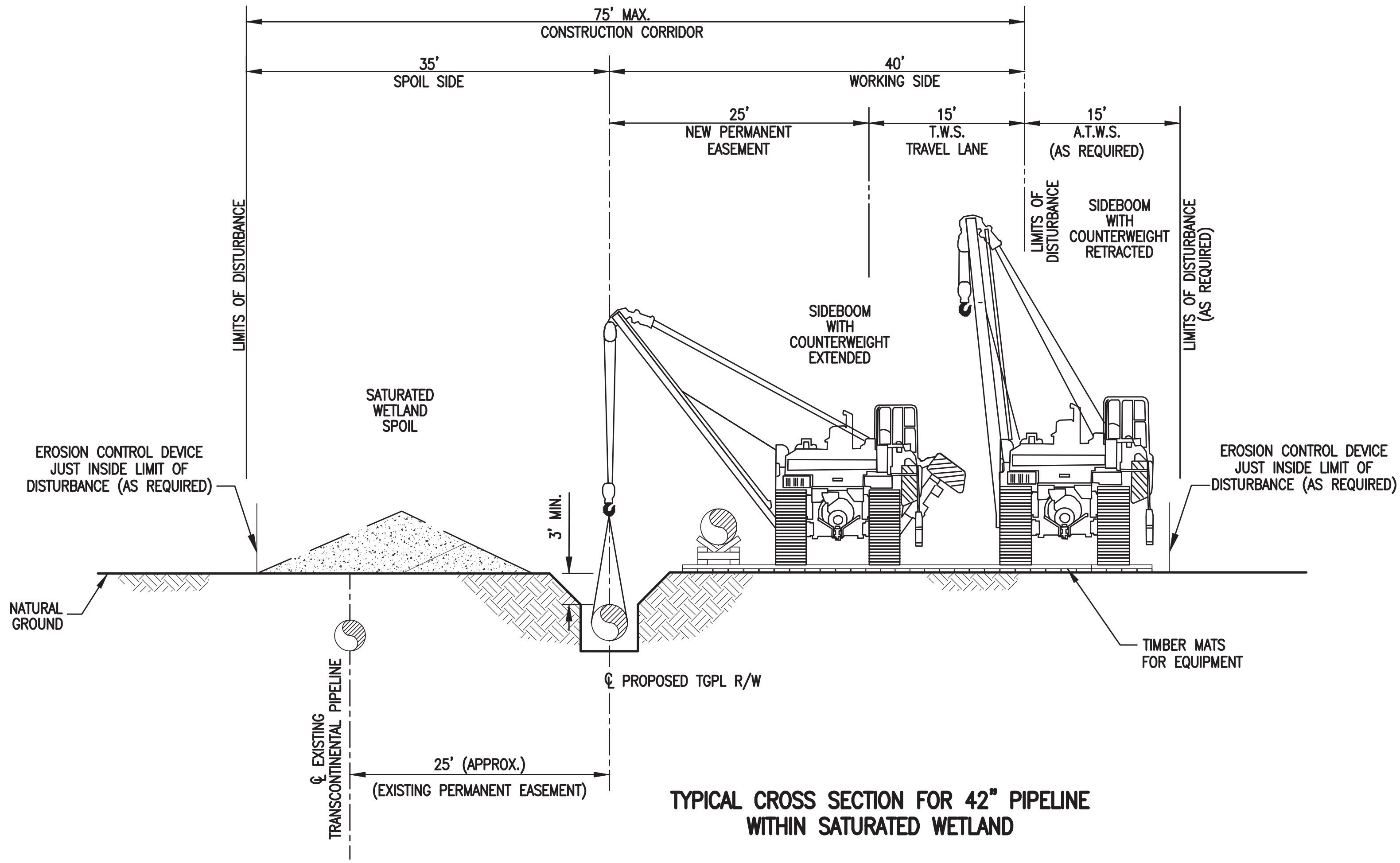

TYPICAL CROSS SECTION FOR 42" PIPELINE WITHIN SATURATED WETLAND

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161145	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" UNITY LOOP
LYCOMING COUNTY, PENNSYLVANIA

Williams.

DRAWN BY: AT	DATE: 09/12/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 09/12/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 09/12/14	DRAWING NUMBER: F-XS-LL119.8-D-01	SHEET 11
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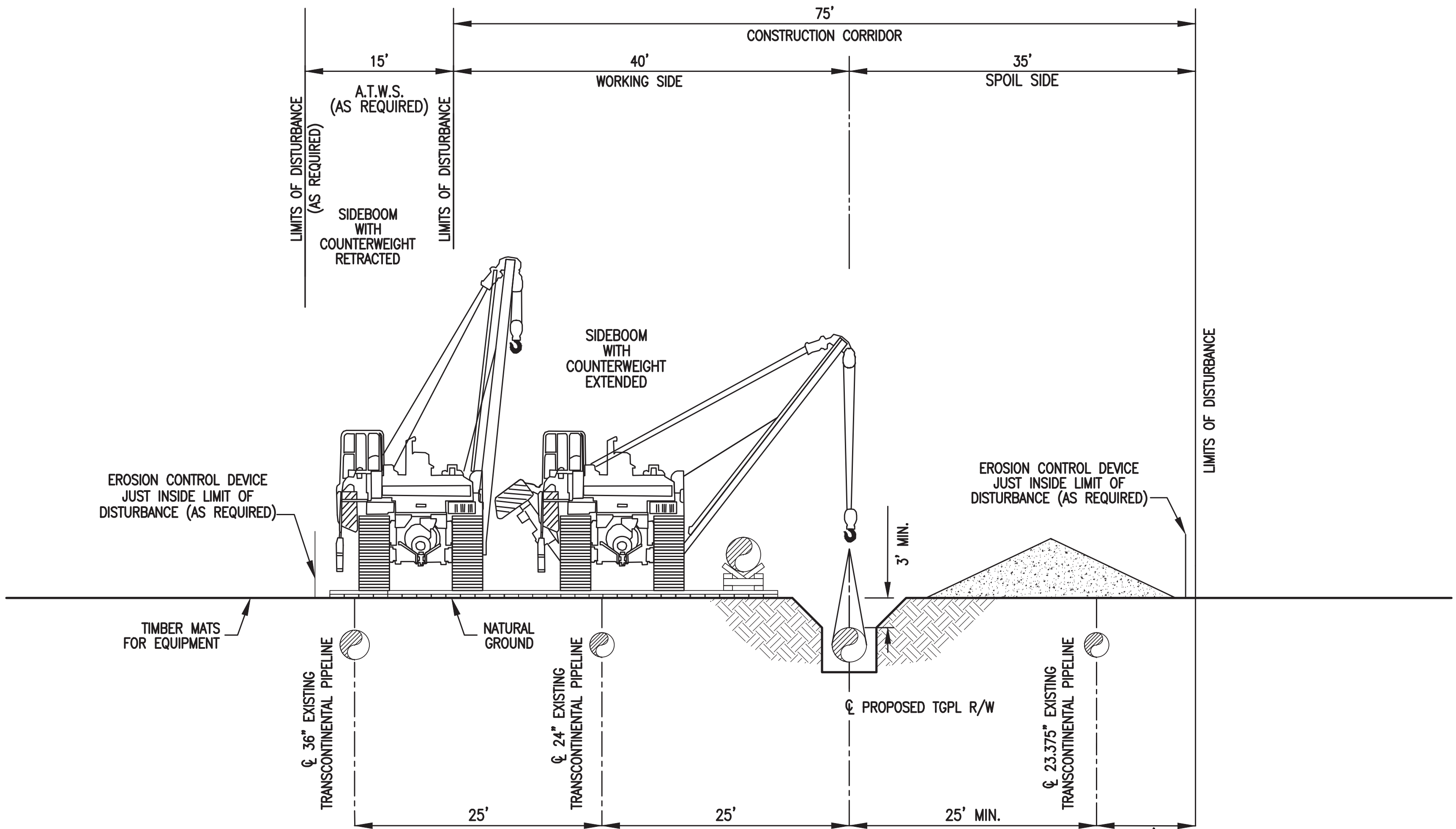

**TYPICAL CROSS SECTION FOR 42" PIPELINE
WITHIN SATURATED WETLAND AREAS OVER EXISTING LINES**

DRAWING NO.	REFERENCE TITLE

**TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 42" UNITY LOOP
LYCOMING COUNTY, PENNSYLVANIA**

Williams.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161145	DP	MJH

DRAWN BY: AT	DATE: 09/12/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 09/12/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 09/12/14	DRAWING NUMBER: F-XS-LL119.8-D-01	SHEET 12
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WOOD GROUP
MUSTANG, INC.

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Williams

Transcontinental Gas Pipe Line Company LLC

TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" MAINLINE "A" AND "B" VIRGINIA REPLACEMENTS
M.P. 1578.67 TO M.P. 1583.32
PRINCE WILLIAM COUNTY, VIRGINIA

F-XS-1578.7-AB-01

DATE: 03/31/2015 REV. 0

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DOCUMENT NAME	SHEET NUMBER	ROW WIDTH (FT)	DESCRIPTION	REVISION	DATE
F-XS-1578.7-AB-01	01		COVERSHEET	0	03/31/2015
F-XS-1578.7-AB-01	02		TABLE OF CONTENTS	0	03/31/2015
F-XS-1578.7-AB-01	03	150	TOPSOIL STRIPPING AS REQUIRED - ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE	0	03/31/2015
F-XS-1578.7-AB-01	04	150 ~ 165	TOPSOIL STRIPPING AS REQUIRED - ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE	0	03/31/2015
F-XS-1578.7-AB-01	05	150 ~ 165	WITHIN SATURATED WETLAND AREAS - ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE	0	03/31/2015
F-XS-1578.7-AB-01	06	150 ~ 165	WITHIN UNSATURATED WETLAND AREAS - ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE	0	03/31/2015
F-XS-1578.7-AB-01	07	150	TOPSOIL STRIPPING AS REQUIRED - ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE	0	03/31/2015
F-XS-1578.7-AB-01	08	150 ~ 165	TOPSOIL STRIPPING AS REQUIRED - ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE	0	03/31/2015
F-XS-1578.7-AB-01	09	150 ~ 165	WITHIN SATURATED WETLAND AREAS - ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE	0	03/31/2015
F-XS-1578.7-AB-01	10	150 ~ 165	WITHIN UNSATURATED WETLAND AREAS - ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE	0	03/31/2015

WOOD GROUP MUSTANG, INC.

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161536	DP	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" MAINLINE "A" AND "B"
VIRGINIA REPLACEMENTS
PRINCE WILLIAM COUNTY, VIRGINIA

Williams.

DRAWN BY: AT	DATE: 10/06/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/09/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/09/14	DRAWING NUMBER: F-XS-1578.7-AB-01	SHEET 02 OF 10
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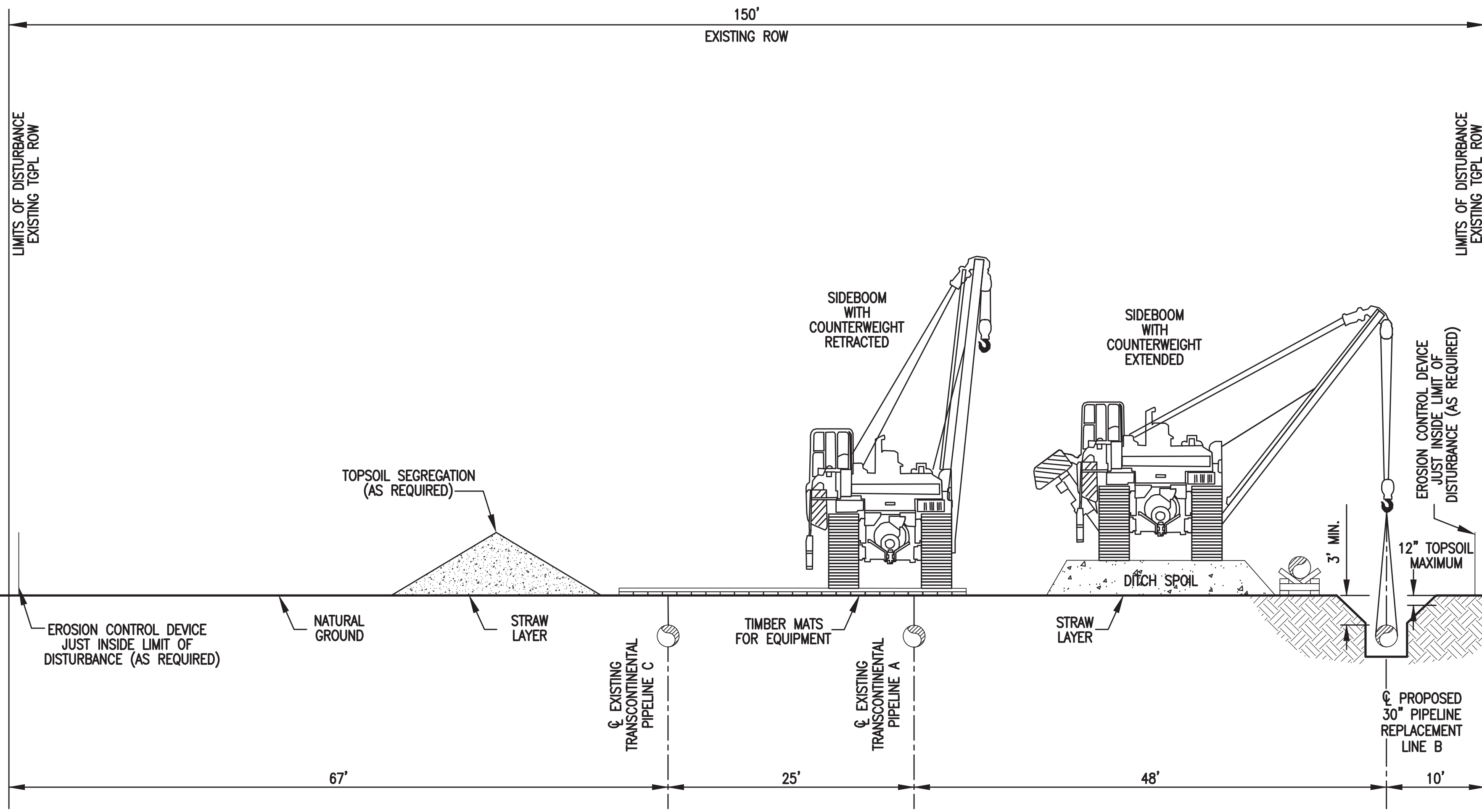

TYPICAL CROSS SECTION FOR 30" PIPELINE REPLACEMENT LINE B
TOPSOIL STRIPPING AS REQUIRED – ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161536	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" MAINLINE "A" AND "B"
VIRGINIA REPLACEMENTS
PRINCE WILLIAM COUNTY, VIRGINIA

Williams.

DRAWN BY: AT	DATE: 10/06/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/09/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/09/14	DRAWING NUMBER: F-XS-1578.7-AB-01	SHEET 03 OF 10
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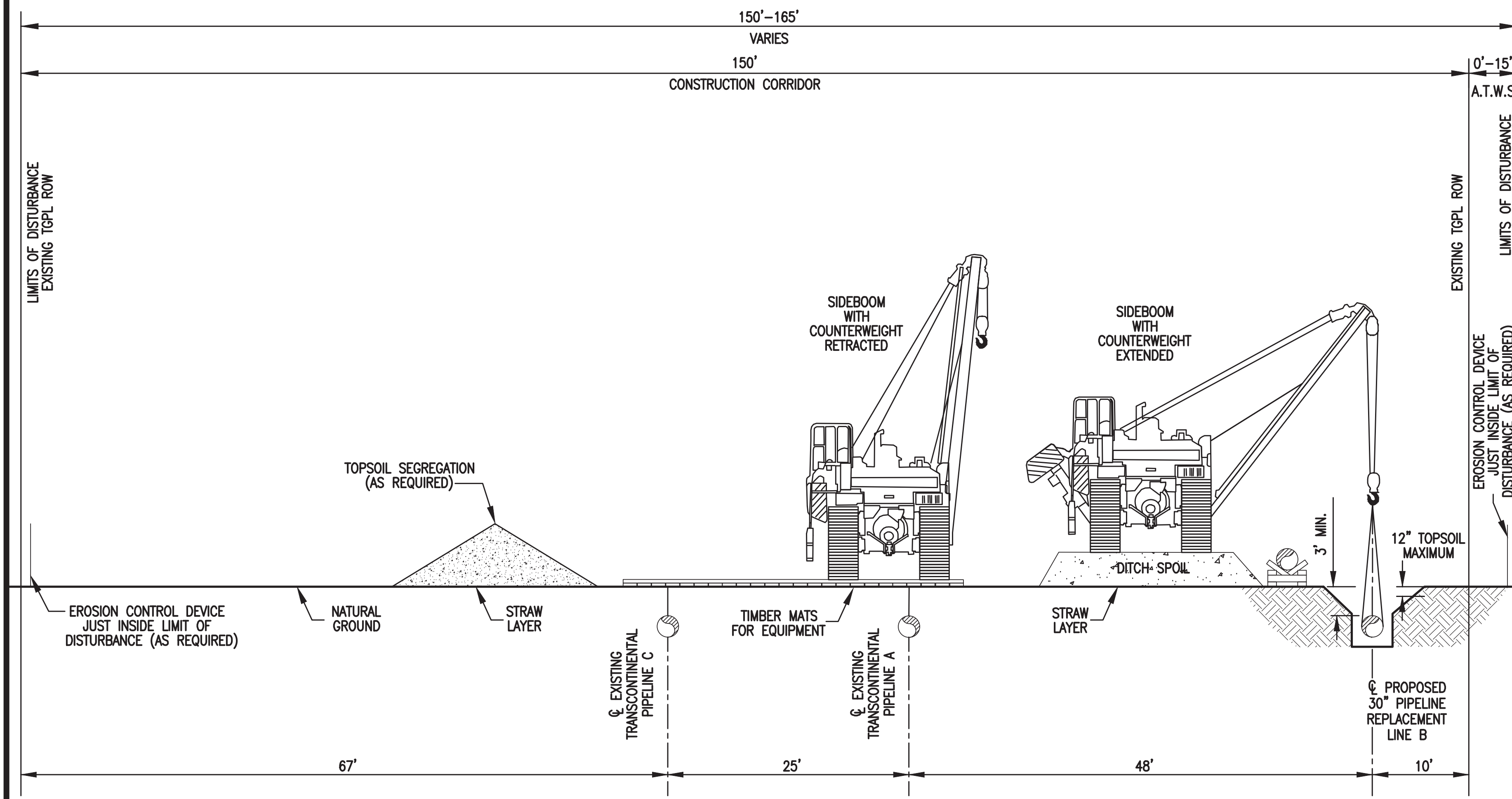

TYPICAL CROSS SECTION FOR 30" PIPELINE REPLACEMENT LINE B
TOPSOIL STRIPPING AS REQUIRED – ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161536	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" MAINLINE "A" AND "B"
VIRGINIA REPLACEMENTS
PRINCE WILLIAM COUNTY, VIRGINIA

Williams.

DRAWN BY: AT	DATE: 10/06/14	ISSUED FOR BID:	SCALE: NTS
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APPROVED BY: MJH	DATE: 10/09/14	DRAWING NUMBER: F-XS-1578.7-AB-01	SHEET 04
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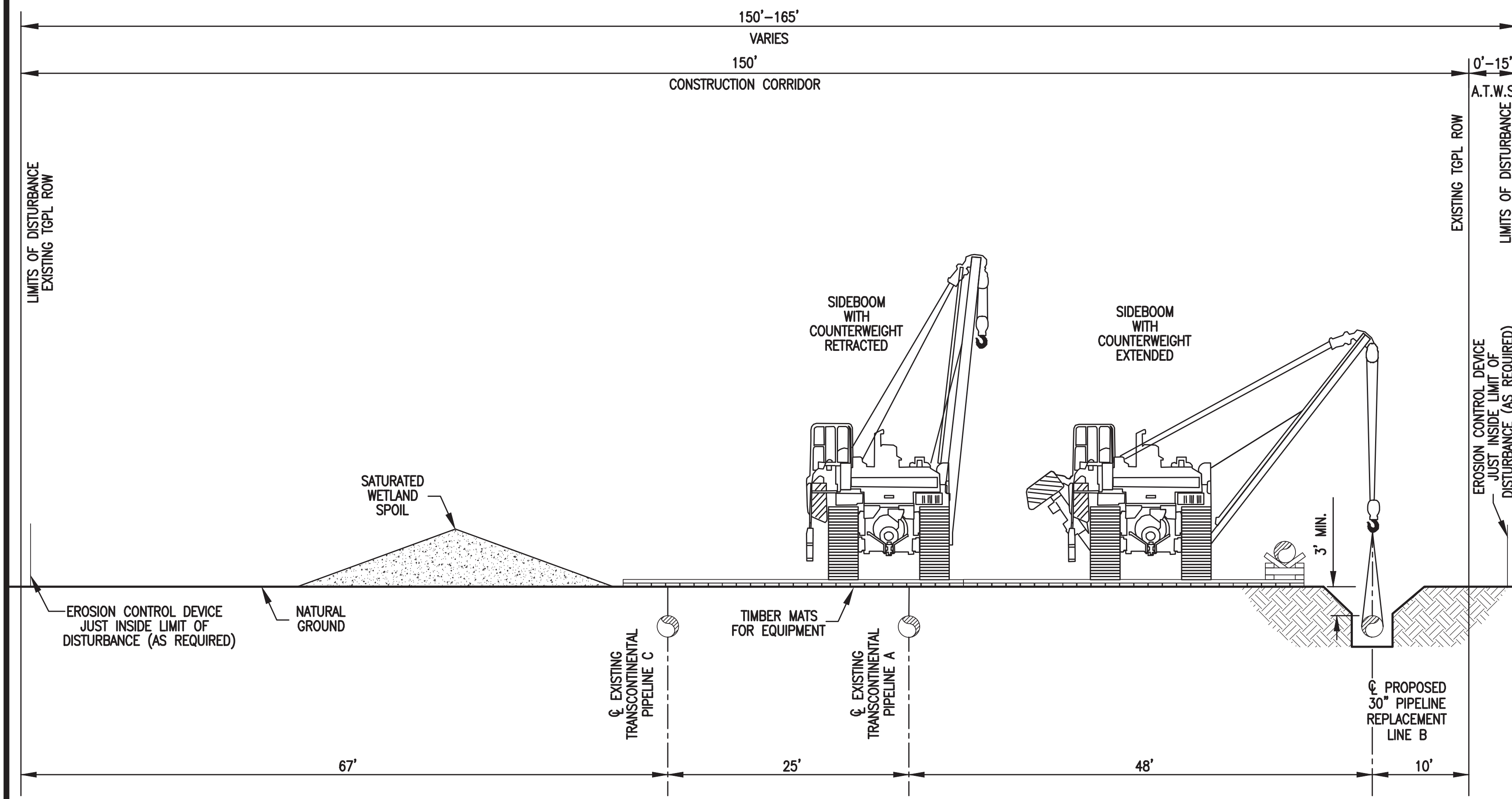

TYPICAL CROSS SECTION FOR 30" PIPELINE REPLACEMENT LINE B WITHIN SATURATED WETLAND AREAS – ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161536	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" MAINLINE "A" AND "B"
VIRGINIA REPLACEMENTS
PRINCE WILLIAM COUNTY, VIRGINIA

Williams.

DRAWN BY: AT	DATE: 10/06/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/09/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/09/14	DRAWING NUMBER: F-XS-1578.7-AB-01	SHEET 05 OF 10
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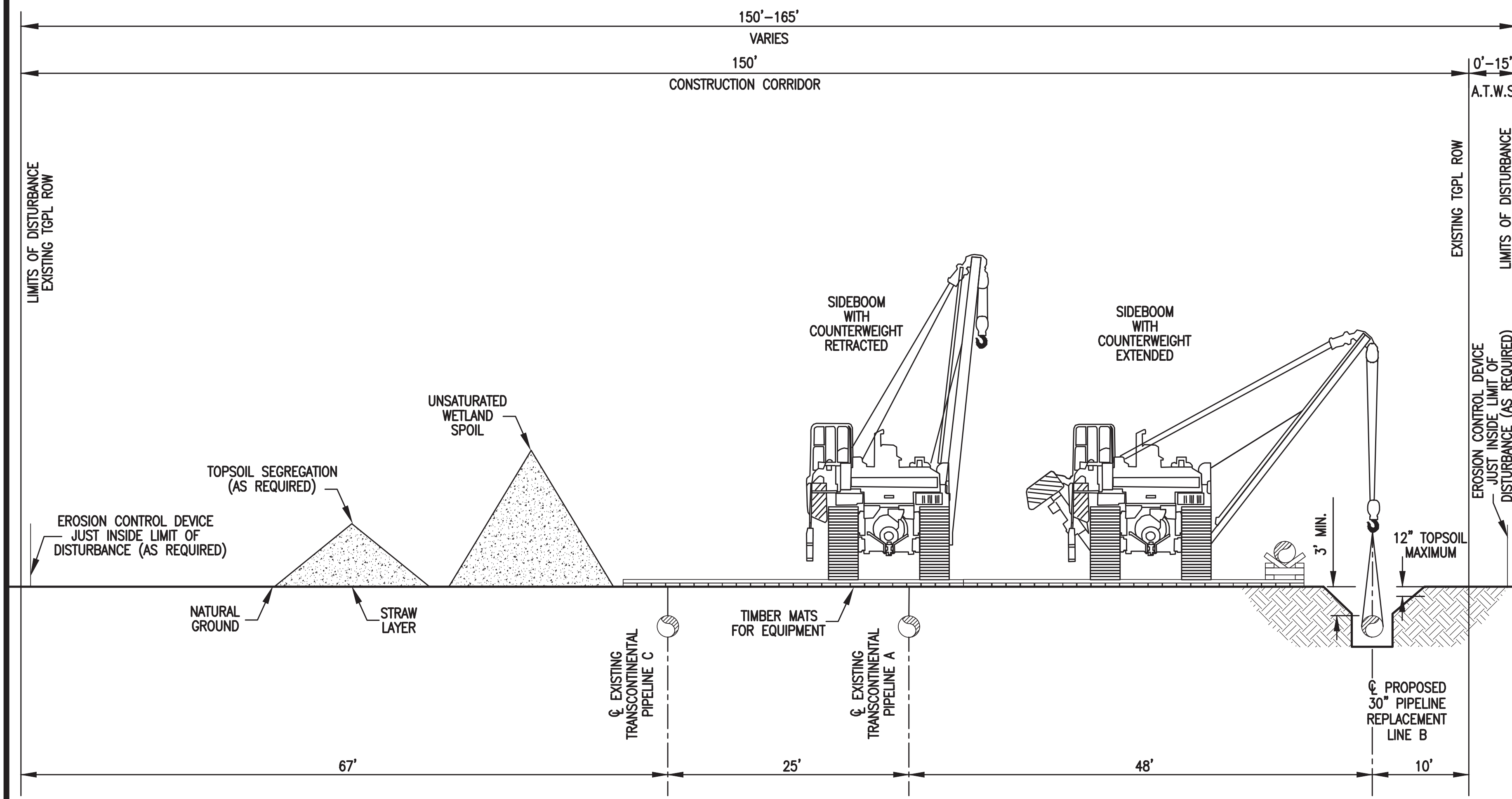

TYPICAL CROSS SECTION FOR 30" PIPELINE REPLACEMENT LINE B
WITHIN UNSATURATED WETLAND AREAS – ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161536	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT–OF–WAY CROSS–SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" MAINLINE "A" AND "B"
VIRGINIA REPLACEMENTS
PRINCE WILLIAM COUNTY, VIRGINIA

Williams.

DRAWN BY: AT	DATE: 10/06/14	ISSUED FOR BID:	SCALE: NTS
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APPROVED BY: MJH	DATE: 10/09/14	DRAWING NUMBER: F–XS–1578.7–AB–01	SHEET 06
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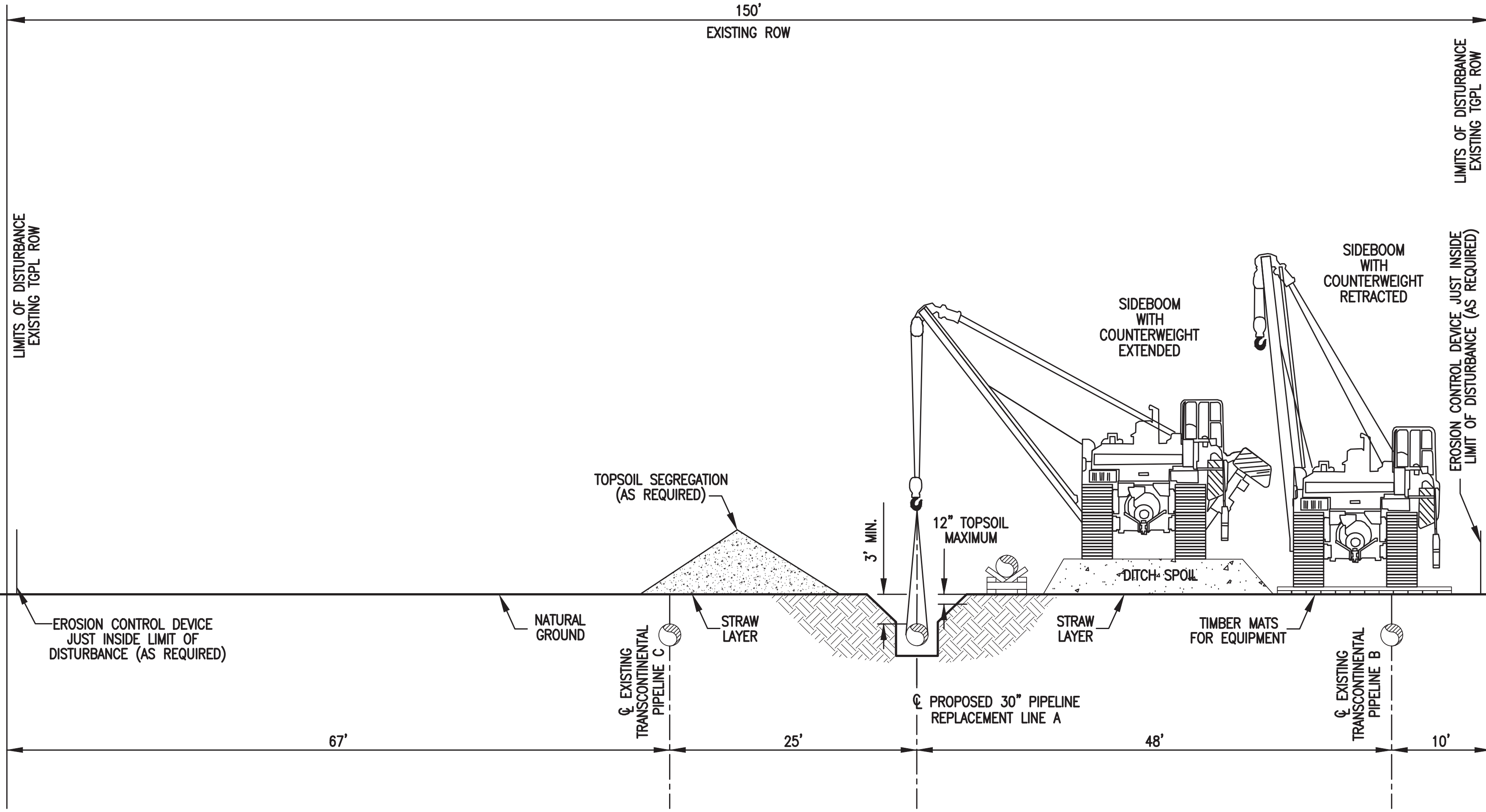

TYPICAL CROSS SECTION FOR 30" PIPELINE REPLACEMENT LINE A
TOPSOIL STRIPPING AS REQUIRED – ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161536	DP	MJH

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" MAINLINE "A" AND "B"
VIRGINIA REPLACEMENTS
PRINCE WILLIAM COUNTY, VIRGINIA

Williams.

DRAWN BY: AT	DATE: 10/06/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/09/14	ISSUED FOR CONSTRUCTION:	REV: 0
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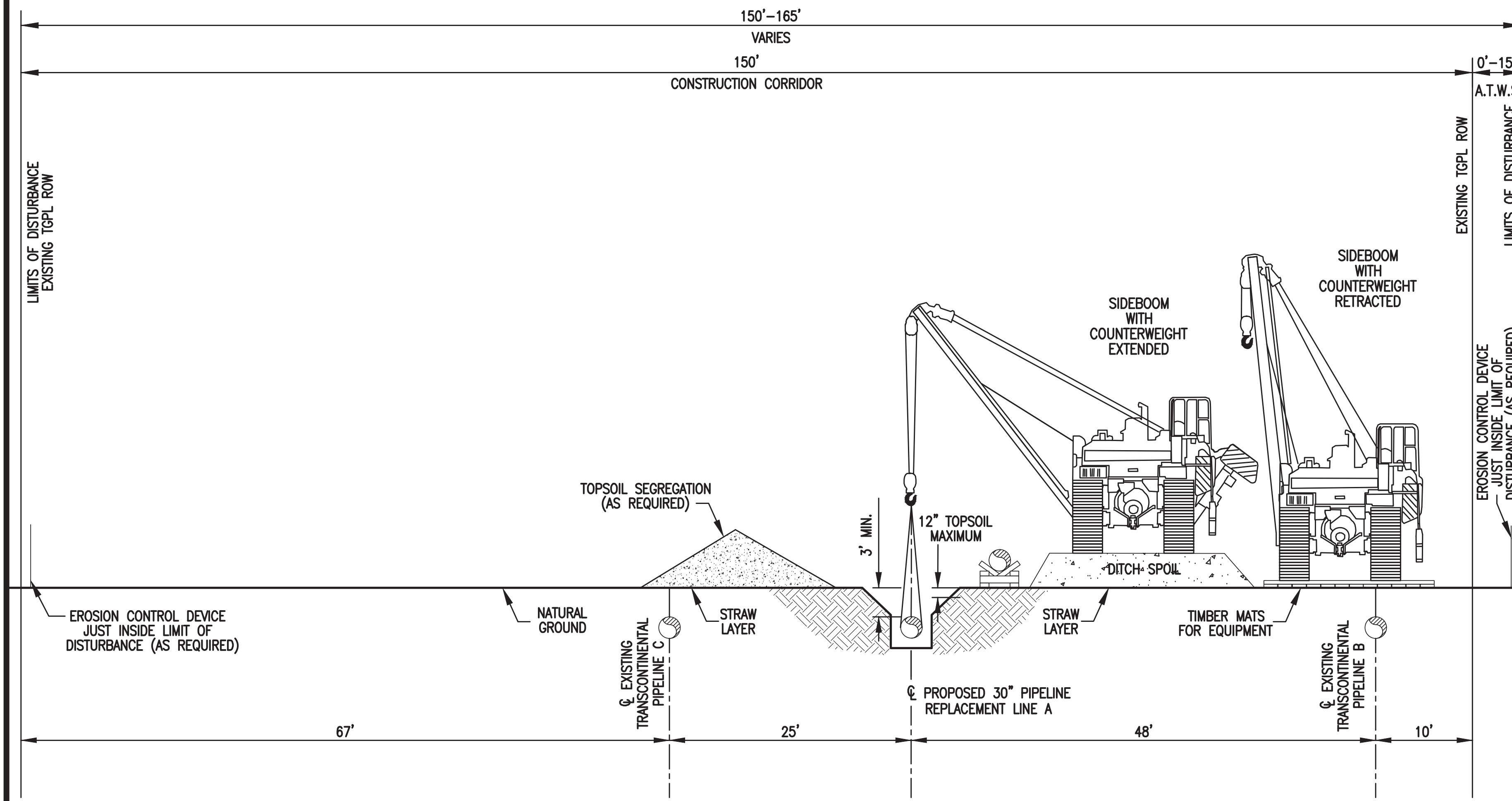
WOOD GROUP MUSTANG, INC.



TYPICAL CROSS SECTION FOR 30" PIPELINE REPLACEMENT LINE A
TOPSOIL STRIPPING AS REQUIRED – ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161536	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT–OF–WAY CROSS–SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" MAINLINE "A" AND "B"
VIRGINIA REPLACEMENTS
PRINCE WILLIAM COUNTY, VIRGINIA

Williams.

DRAWN BY: AT	DATE: 10/06/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/09/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/09/14	DRAWING NUMBER: F–XS–1578.7–AB–01	SHEET 08 OF 10
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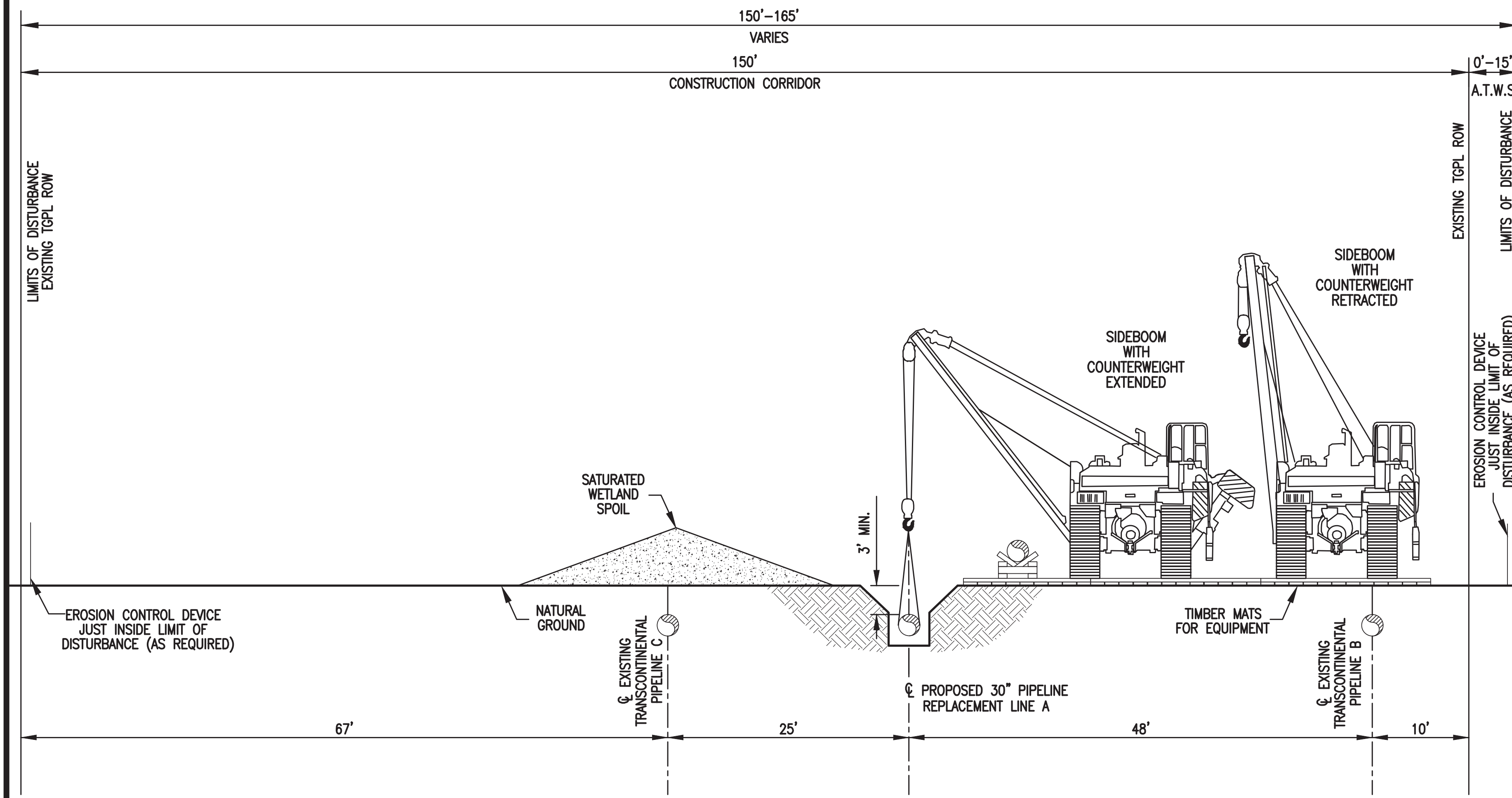

TYPICAL CROSS SECTION FOR 30" PIPELINE REPLACEMENT LINE A WITHIN SATURATED WETLAND AREAS – ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161536	DP	MJH

WOOD GROUP MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT–OF–WAY CROSS–SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" MAINLINE "A" AND "B"
VIRGINIA REPLACEMENTS
PRINCE WILLIAM COUNTY, VIRGINIA

Williams.

DRAWN BY:	AT	DATE:	10/06/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY:	EP	DATE:	10/09/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY:	MJH	DATE:	10/09/14	DRAWING NUMBER: F–XS–1578.7–AB–01	SHEET 09 OF 10
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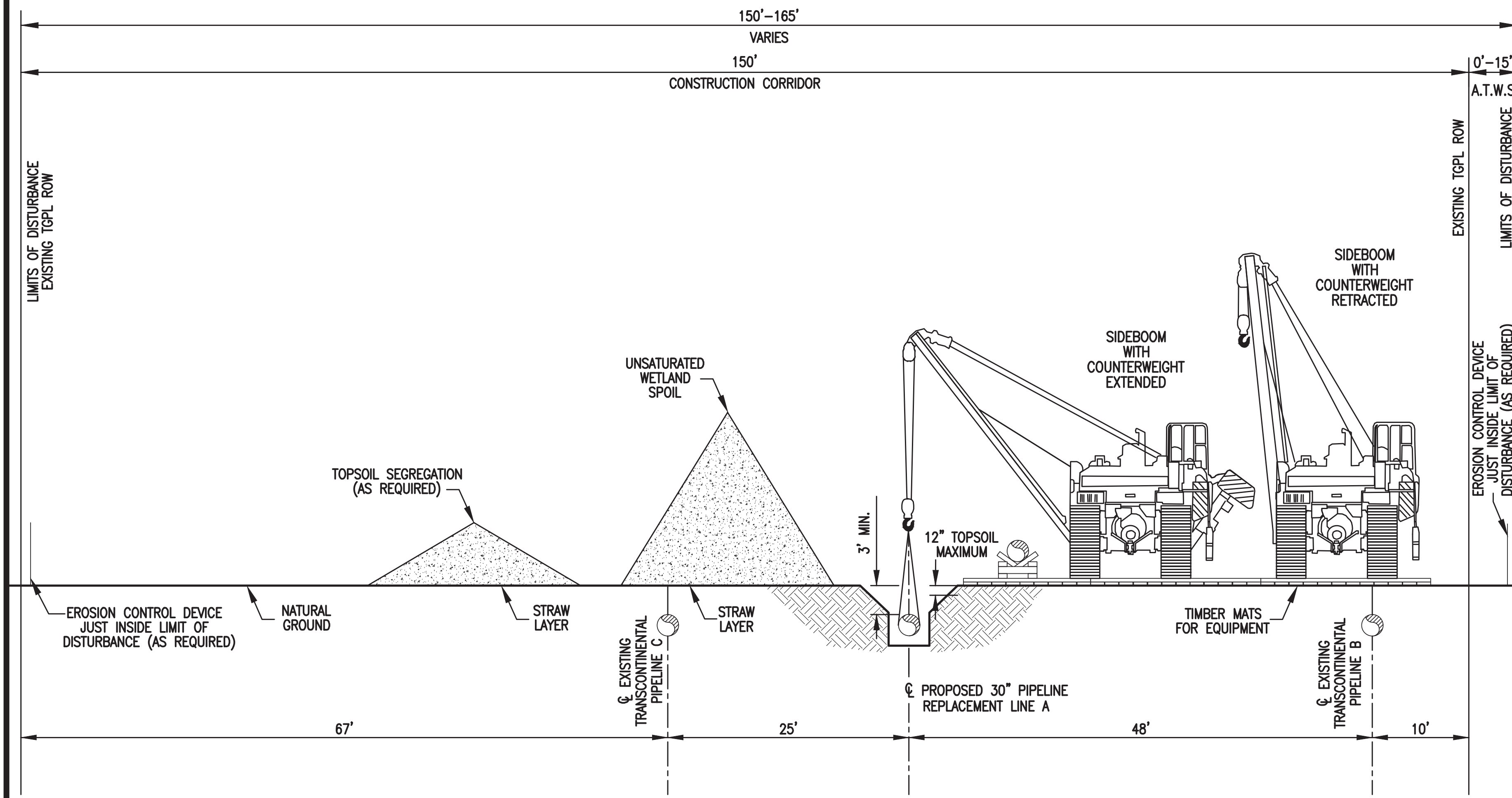

TYPICAL CROSS SECTION FOR 30" PIPELINE REPLACEMENT LINE A
WITHIN UNSATURATED WETLAND AREAS – ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

DRAWING NO.	REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/31/15	AT	ISSUED FOR FERC FILING	1161536	DP	MJH

WOOD GROUP
MUSTANG, INC.

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
TYPICAL RIGHT–OF–WAY CROSS–SECTION
ATLANTIC SUNRISE PROJECT
PROPOSED 30" MAINLINE "A" AND "B"
VIRGINIA REPLACEMENTS
PRINCE WILLIAM COUNTY, VIRGINIA

Williams.

DRAWN BY: AT	DATE: 10/06/14	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: EP	DATE: 10/09/14	ISSUED FOR CONSTRUCTION:	REV: 0
APPROVED BY: MJH	DATE: 10/09/14	DRAWING NUMBER: F–XS–1578.7–AB–01	SHEET 10
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