Federal Energy Regulatory Commission

Office of Energy Projects

February 2020

National Fuel Gas Supply Corporation — **Docket No. CP19-491-000**
Transcontinental Gas Pipe Line Company, LLC — **Docket No. CP19-494-000**

FM100 Project
&
Leidy South Project

Environmental Assessment

Cooperating Agencies

US Army Corps of Engineers®

Washington, DC 20426

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas 4
National Fuel Gas Supply Corporation
Transcontinental Gas Pipe Line
Company, LLC
Docket Nos. CP19-491-000 and
CP19-494-000

TO THE INTERESTED PARTY:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared an environmental assessment (EA) for the FM100 Project and the Leidy South Project (collectively referred to as "the Projects"), proposed by National Fuel Gas Supply Corporation (National Fuel) and Transcontinental Gas Pipe Line Company, LLC (Transco), respectively, in the above-referenced dockets. National Fuel requests authorization to construct, operate, and maintain new natural gas facilities in McKean and Potter Counties; install new compressor stations in McKean and Clinton Counties; abandon existing pipeline facilities in Cameron, Clearfield, Elk, and Potter Counties; and abandon an existing compressor station in Potter County (all in Pennsylvania), to modernize National Fuel's existing transmission system and provide an additional 330,000 dekatherms per day (Dth/d) of incremental natural gas transportation capacity to Transco. Transco requests authorization to construct, operate, and maintain new natural gas facilities in Clinton and Lycoming Counties; install new compressor stations in Luzerne and Schuylkill Counties; add additional compression at existing compressor stations in Wyoming and Columbia Counties; and abandon an existing pipeline in Clinton County (all in Pennsylvania), to provide 582,400 Dth/d of firm natural gas transportation service from shale producing areas in northern and western Pennsylvania to Transco's industrial, commercial, and residential customers in the eastern United States.

The EA assesses the potential environmental effects of the construction and operation of the Projects in accordance with the requirements of the National Environmental Policy Act of 1969 (NEPA). The FERC staff concludes that approval of the proposed Projects, with appropriate mitigating measures, would not constitute a major federal action significantly affecting the quality of the human environment.

The U.S. Army Corps of Engineers (Baltimore and Pittsburgh Districts) and the U.S. Environmental Protection Agency participated as cooperating agencies in the preparation of the EA. Cooperating agencies have jurisdiction by law or special expertise with respect to resources potentially affected by the proposal and participate in the NEPA analysis.

The Projects would include the following facilities (all located in Pennsylvania):

FM100 Project

- approximately 29.5 miles of new 20-inch-diameter pipeline in McKean and Potter Counties (Line YM58);
- approximately 1.4 miles of new 24-inch-diameter pipeline loop[1] in Potter County (Line YM224);
- approximately 0.4 mile of 12-inch-diameter pipeline extension in McKean County (Line KL Extension);
- a new 15,165-horsepower (hp) compressor station in McKean County (Marvindale Compressor Station);
- a new 22,220-hp compressor station in Clinton County (Tamarack Compressor Station);
- a new producer interconnect station in McKean County (Marvindale Interconnect);
- a new over pressure protection (OPP) station in Potter County (Carpenter Hollow OPP Station);
- modification of the existing Leidy Interconnect LDC 2245 at the Leidy Metering and Regulation Station in Clinton County;
- appurtenant facilities including valves, pig launchers, pig receivers, and anode beds;
- abandonment of approximately 44.9 miles of 12-inch-diameter pipeline and associated appurtenant facilities in Cameron, Clearfield, Elk, and Potter Counties (Line FM100);
- abandonment of a 1,440-hp compressor station and associated facilities in Potter County (Costello Compressor Station); and

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

- abandonment of aboveground piping and measurement and over pressurization equipment in Potter County (Station WHP-MS-4317X).

Leidy South Project

- approximately 6.3 miles of new 36-inch-diameter pipeline and associated abandonment by removal of approximately 5.8 miles of existing 23.375-inch-diameter pipeline Leidy Line A in Clinton County (Hensel Replacement);

- approximately 2.4 miles of new 36-inch-diameter pipeline looping in Clinton County (Hilltop Loop);

- approximately 3.5 miles of new 42-inch-diameter pipeline looping in Lycoming County (Benton Loop), including a new 90-foot-tall communication tower;

- uprate of the two existing compressor units to increase total hp from 30,000 hp to 42,000 hp at Compressor Station 605 in Wyoming County;

- uprate of the two existing compressor units to increase total hp from 40,000 hp to 42,000 hp and install a new 31,871-hp compressor unit at Compressor Station 610 in Columbia County;

- a new 46,930-hp compressor station in Luzerne County (Compressor Station 607), including a new 190-foot-tall, free-standing communication tower;

- a new 31,871-hp compressor station in Schuylkill County (Compressor Station 620); and

- appurtenant facilities including valves, pig launchers, and pig receivers.

Additionally, both National Fuel and Transco propose to use temporary access roads and staging areas to support construction activities and would establish new permanent access roads to support operation of the new facilities.

The Commission mailed a copy of the *Notice of Availability* for the EA to federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; Native American tribes; potentially affected landowners and other interested individuals and groups; and newspapers and libraries in the area of the Projects. The EA is only available in electronic format. It may be viewed and downloaded from FERC's website (www.ferc.gov), on the Environmental Documents page (http://www.ferc.gov/industries/gas/enviro/eis.asp). In addition, the EA may be accessed by using the eLibrary link on FERC's website. Click on the eLibrary link

(https://www.ferc.gov/docs-filing/elibrary.asp), click on General Search, and enter the docket number in the "Docket Number" field, excluding the last three digits (i.e., CP19-491 and/or CP19-494). Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at: FercOnlineSupport@ferc.gov or toll free at (866) 208-3676, or for TTY, contact (202) 502-8659.

Any person wishing to comment on the EA may do so. Your comments should focus on the EA's disclosure and discussion of potential environmental effects, reasonable alternatives, and measures to avoid or lessen environmental impacts. The more specific your comments, the more useful they will be. To ensure that the Commission has the opportunity to consider your comments prior to making its decision on the Projects, it is important that the Commission receive your comments on or before 5:00 p.m. Eastern Time on **March 9, 2020.**

For your convenience, there are three methods you can use to file your comments with the Commission. In all instances, please reference the Projects' docket numbers (CP19-491-000 and/or CP19-494-000) with your submission. The Commission encourages electronic filing of comments and has expert staff available to assist you at (866) 208-3676 or FercOnlineSupport@ferc.gov.

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

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

(3) You can file a paper copy of your comments by mailing them to the following address. Be sure to reference the Projects' docket numbers (CP19-491-000 and/or CP19-494-000) with your submission: Kimberly D. Bose, Secretary, Federal Energy Regulatory Commission, 888 First Street NE, Room 1A, Washington, DC 20426

Any person seeking to become a party to the proceeding must file a motion to intervene pursuant to Rule 214 of the Commission's Rules of Practice and Procedures (18 CFR 385.214). Motions to intervene are more fully described at https://www.ferc.gov/resources/guides/how-to/intervene.asp. Only intervenors have the

right to seek rehearing or judicial review of the Commission's decision. The Commission may grant affected landowners and others with environmental concerns intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding which no other party can adequately represent. **Simply filing environmental comments will not give you intervenor status, but you do not need intervenor status to have your comments considered.**

Additional information about the Projects is available from the Commission's Office of External Affairs, at **(866) 208-FERC**, or on the FERC website (www.ferc.gov) using the eLibrary link. The eLibrary link also provides access to the texts of 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 http://www.ferc.gov/docs-filing/esubscription.asp.

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ABBREVIATIONS AND ACRONYMS

AMD	acid mine damage
AP-42	EPA's Compilation of Air Pollutant Emission Factors
AQCR	air quality control regions
ATWS	additional temporary workspace
Audubon	National Audubon Society
BCC	Birds of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
BO	Biological Opinion
CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
Commission	Federal Energy Regulatory Commission
Companies	National Fuel and Transco
CWA	Clean Water Act
dBA	decibels on the A-weighted scale
DOT	U.S. Department of Transportation
Draft ISMP	Transco's Draft Invasive Species Management Plan
Dth/d	dekatherms per day
EA	Environmental Assessment
Ecological Associates	Ecological Associates, LLC
ECP	Transco's Environmental Compliance Plan
EI	Environmental Inspector
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESCAMP	National Fuel's Erosion and Sediment Control and Agricultural Mitigation Plan
ESCGP-3	Erosion and Sediment Control Plan Review and Permit
^oF	degrees Fahrenheit
FERC	Federal Energy Regulatory Commission
g	Gravity
GHG	greenhouse gases
GP-5	PADEP Bureau of Air Quality General Permit
HAP	hazardous air pollutants
HCA	high consequence area
HDD	horizontal directional drill
HDD Plan	National Fuel's Horizontal Directional Drill and Inadvertent Return Contingency Plan
Herpetological Associates	Herpetological Associates, Inc.
hp	Horsepower
HUC	hydrologic unit code
IBA	Important Bird Area
IRR	Integra Reality Resources
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
LiDAR	Light Detection and Ranging

$\mu g/m^3$	microgram per cubic meter
M	magnitude
M&R	Metering and Regulation
MBTA	Migratory Bird Treaty Act
Memorandum	Memorandum of Understanding on Natural Gas Transportation Facilities
MLV	mainline valve
MMI	Modified Mercalli Intensity
MOU	Memorandum of Understanding Between the Federal Energy Regulatory Commission and the U.S. Department of the Interior United States Fish and Wildlife Service Regarding Implementation of Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds"
MP	milepost
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
National Fuel	National Fuel Gas Supply Corporation
NEPA	National Environmental Policy Act of 1969
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
NGA	Natural Gas Act
NHPA	National Historic Preservation Act
NIWCP	National Fuel's Noxious and Invasive Weed Control Plan
NOI	Notice of Intent to Prepare an Environmental Assessment for the Planned FM100 Project and Leidy South Project and Request for Comments on Environmental Issues, and Notice of Public Scoping Sessions
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSA	noise-sensitive area
NSPS	New Source Performance Standards
NSR	New Source Review
O_3	Ozone
OEP	Office of Energy Projects
OPP	over pressure protection
PAC	Pennsylvania Administrative Code
PADCNR	Pennsylvania Department of Conservation and Natural Resources
PADEP	Pennsylvania Department of Environmental Protection
PAFBC	Pennsylvania Fish and Boat Commission
PASGP-5	Water Obstruction and Encroachment Permit – Pennsylvania Programmatic General Permit
PDA	Pennsylvania Department of Agriculture
PennDOT	Pennsylvania Department of Transportation
PGC	Pennsylvania Game Commission
PHMSA	Pipeline and Hazardous Materials Safety Administration
Plan	Upland Erosion Control, Revegetation, and Maintenance Plan
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to 10 microns
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than or equal to 2.5 microns
ppb	parts per billion
ppm	parts per million
Procedures	Wetland and Waterbody Construction and Mitigation Procedures

Projects	FM100 Project and Leidy South Project
PSD	Prevention of Significant Deterioration
PSU	Pennsylvania State University
REC	recognized environmental condition
RCP	Residential Construction Plans
Secretary	Secretary of the Commission
SGL	state game land
SHPO	Pennsylvania Historical and Museum Commission – State Historic Preservation Office
SIL	Significant Impact Level
SO_2	sulfur dioxide
Spill Plan	Transco's Spill Prevention and Response Procedures for Oil and Hazardous Materials
SPRP	National Fuel's Spill Prevention and Response Procedures
TGP	Tennessee Gas Pipeline
tpy	tons per year
Transco	Transcontinental Gas Pipe Line Company, LLC
USC	U.S. Code
USDA	U.S. Department of Agriculture
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compounds

SECTION A – PROPOSED ACTION

A.1 INTRODUCTION

The staff of the Federal Energy Regulatory Commission (Commission or FERC) prepared this Environmental Assessment (EA) to assess the environmental impacts of two discrete projects, the FM100 Project and the Leidy South Project (collectively, "the Projects"). These Projects have separate purposes and needs (see section A.2, below); however, the Projects are interdependent and therefore the Commission staff is assessing the Projects together in one EA.

On July 18, 2019 and July 31, 2019, National Fuel Gas Supply Corporation (National Fuel) and Transcontinental Gas Pipe Line Company, LLC (Transco) (collectively, "companies" or "applicants") filed their respective applications with the Commission (Docket Nos. CP19-491-000 and CP19-494-000) pursuant to section 7 of the Natural Gas Act (NGA), as amended, seeking authorization to develop, construct, operate, maintain, and abandon the pipeline, compression, and other aboveground facilities (including pressure uprates), as presented in more detail below in section A.5. The FM100 Project would allow National Fuel to modernize a portion of its existing system and provide an additional 330,000 dekatherms per day (Dth/d) of incremental natural gas transportation capacity, all of which is fully subscribed to Transco. The Leidy South Project would provide 582,400 Dth/d of firm natural gas transportation service from shale producing areas in northern and western Pennsylvania to Transco's customers in the eastern United States. Prior to filing their applications, National Fuel and Transco participated in the Commission's Pre-filing Process for these Projects under Docket Nos. PF17-10-000 and PF19-1-000, respectively.

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. Section 7(b) of the NGA specifies that no natural gas company shall abandon any portion of its facilities subject to the Commission's jurisdiction without the Commission first finding that the abandonment will not negatively affect the present or future public convenience and necessity. The Commission is an independent regulatory agency and therefore conducts a complete independent review of project proposals, including environmental review of proposed facilities. The Commission bases its decision on financing, rates, market demand, gas supply, environmental impact, and other issues concerning a proposed project.

We[1] prepared this EA in compliance with the requirements of the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality regulations for implementing NEPA (Title 40 of the Code of Federal Regulations Parts 1500-1508 [40 CFR 1500-1508]), and the Commission's implementing regulations under 18 CFR 380.

The EA is an integral part of the Commission's decision-making process on whether to issue National Fuel and Transco Certificates to construct and operate the proposed facilities and to abandon select facilities. Our principal purposes in preparing this EA are to:

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

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

National Fuel has requested a Certificate by August 2020 in order to begin pipeline and aboveground facility construction in early 2021 and place the new facilities into service by December 2021. National Fuel would begin abandonment activities in May 2022 and complete them by September 2022. Transco has requested a Certificate by July 1, 2020 in order to begin construction in winter 2020/2021 and place the Leidy South Project facilities into service by December 2021.

A.2 PURPOSE AND NEED

FM100 Project

According to National Fuel, the proposed FM100 Project is necessary to enhance the reliability and safety of the existing Line FM100 pipeline system, National Fuel's only connecting pipeline between its western and eastern operating systems. The FM100 Project facilities would modernize a portion of National Fuel's existing pipeline system through abandonment and replacement of existing aging facilities identified in National Fuel's risk analysis by expanding the diameter of the replacement pipeline and by making modifications to certain other facilities. The FM100 Project would provide 330,000 Dth/d of firm natural gas transportation capacity from the Sergeant Township area to Transco at Leidy, Pennsylvania.

Leidy South Project

According to Transco, the Leidy South Project is necessary to provide 582,400 Dth/d of firm natural gas (fully subscribed from National Fuel via the FM100 Project) from the Marcellus and Utica Shale production areas in northern and western Pennsylvania to Transco's mainline in Lancaster County, Pennsylvania by December 2021. Transco held an open season in October 2018 to affirm and quantify market growth opportunities, which resulted in long-term, binding precedent agreements with Cabot Oil & Gas Company; Seneca Resources Company, LLC; and UGI Utilities for the entire firm transportation capacity of the project. Transco asserts that the Leidy South Project would provide enhanced access to Marcellus and Utica Shale supplies, support reliability and diversification of energy infrastructure along the Atlantic coast, promote competitive markets, and enhance security of natural gas supplies.

A.3 SCOPE OF ENVIRONMENTAL ASSESSMENT

The topics addressed in section B of this EA include geology; soils; groundwater, surface water, and wetlands; fisheries, vegetation, wildlife, and special status species; land use, recreation, and visual resources; cultural resources; socioeconomics; air quality and noise; reliability and safety; and cumulative impacts. Section C of this EA assesses the no-action alternative, system alternatives, route alternatives, and site alternatives. The EA describes the affected environment as it currently exists, discusses the environmental consequences of the proposed Projects, identifies measures proposed by National Fuel and Transco to reduce impacts, and presents our additional recommended mitigation measures, which are summarized in section D.

As the lead federal agency for the NEPA review of these Projects, FERC is required to comply with section 7 of the Endangered Species Act (ESA), as amended, and section 106 of the National Historic Preservation Act (NHPA). These statutes have been considered in the preparation of this EA. In addition to FERC, other federal, state, and local agencies may use this EA in approving or issuing any authorizations required for all or part of the proposed Projects. Permits, approvals, and consultations for the Projects are discussed in section A.11 of this EA.

The U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) Baltimore and Pittsburgh Districts are participating as cooperating agencies in the preparation

of this EA because they have jurisdiction by law or special expertise with respect to resources potentially affected by the proposal and participate in the NEPA analysis.

We received comments during the scoping period recommending that an Environmental Impact Statement (EIS), rather than an EA, be prepared to assess the impact of the Projects. An EA is a concise public document for which a federal agency is responsible that serves to provide sufficient evidence and analysis for determining a finding of no significant impact. The Commission's regulations at 18 CFR 306(b) state that "If the Commission believes that a proposed action…may not be a major federal action significantly affecting the quality of the human environment, an EA, rather than an EIS, will be prepared first. Depending on the outcome of the EA, an EIS may or may not be prepared." In preparing this EA, we are fulfilling our obligation under NEPA to consider and disclose the environmental impacts of the Projects. As noted above, this EA addresses the impacts that could occur on a wide range of resources should the Projects be approved and constructed. Based on our analysis, the extent and content of comments received during the scoping period and considering that the Projects would primarily involve pipeline looping and modifications to existing facilities, we conclude in section D that the impacts associated with the Projects can be sufficiently mitigated to support a finding of no significant impact and, thus, an EA is warranted.

We also received comments indicating that the Leidy South Project was segmented from our environmental review of Transco's Atlantic Sunrise Pipeline Project (ASP Project; Docket No. CP15-138-000), and that the FM100 Project was segmented from our environmental reviews of National Fuel's Northern Access 2016 Project (Northern Access Project; Docket No. CP15-115-000), and National Fuel's Line YM28 and Line FM120 Modernization Project (Docket No. CP17-74-000).[2]

The Leidy South Project, although dependent on the facilities constructed as part of the ASP Project, is an entirely separate project. Transco's ASP Project was authorized on February 3, 2017 and placed into service on October 6, 2018, 10 months before Transco submitted the application for the Leidy South Project, therefore the projects were never under Commission review at the same time. Transco did not even enter the Pre-filing Process until a month after the ASP Project was placed in service. Further, the purpose of the Leidy South Project is to meet an additional delivery of gas above and beyond what was certificated and could be provided by the ASP Project.

Similarly, National Fuel's Northern Access Project was authorized on February 3, 2017, and National Fuel's Line YM528 and Line FM120 Modernization Project was authorized on March 15, 2018, more than a year before National Fuel submitted its application for the FM100 Project. It should further be noted that the purpose of the Northern Access Project is to provide approximately 350,000 Dth/d of incremental firm transportation capacity to markets in the northeastern United States and Canada, whereas the purpose of the FM100 Project is to modernize National Fuel's facilities and in doing so, create additional capacity to ship gas in the opposite direction, southward to the Transco system. The Northern Access Project and the FM100 Project are not dependent on each other's facilities for operation and meeting each project's purpose and need. While the FM100 Project and the Line YM528 and Line FM120 Modernization Project share a similar purpose—namely to enhance the reliability and safety of the National Fuel system—the Commission has previously determined the projects were not connected actions for purposes of segmentation, as National Fuel's decision to modernize one portion of its system has no impact on its decision to modernize an entirely different portion of its system.[3]

[2] Specific information on each of these projects can be found in their respective docket numbers on FERC's eLibrary at https://www.ferc.gov/docs-filing/elibrary.asp.

[3] *National Fuel Gas Supply Corp.* 162 FERC ¶ 61,139, at PP 35-39 (2018).

Future projects will always arise that are designed based on existing infrastructure and build off of and rely on that infrastructure, but this in and of itself does not make two projects connected. However, because we agree that the FM100 Project and Leidy South Project *are* interconnected and directly rely on each other, we are combining both Projects into a single EA. We do however, consider the ASP Project, the Line YM528 and Line FM120 Modernization Project, and the Northern Access Project in our cumulative impact assessment in section B.11.

A.4 PUBLIC REVIEW AND COMMENT

The FERC's Director of the Office of Energy Projects (OEP) granted National Fuel's and Transco's requests to utilize our Pre-filing Process on September 21, 2017 and November 19, 2018, respectively. This review process was established to facilitate and encourage early involvement by citizens, governmental entities, non-governmental organizations, and other interested parties. As part of this process, FERC assigned the FM100 Project pre-filing Docket No. PF17-10-000 and the Leidy South Project pre-filing Docket No. PF19-1-000.

During the Pre-filing Process, we worked with National Fuel, Transco, and stakeholders to identify and resolve issues, where possible, prior to National Fuel's and Transco's filings of a formal application with FERC. National Fuel identified multiple route alternatives that were considered during design and development of the FM100 Project. Similarly, Transco identified route alternatives and considered alternative sites for its proposed new compressor stations. Both applicants chose routes near existing rights-of-way where possible and in consideration of stakeholder feedback. Specific to the Leidy South Project, the proposed route for the Hensel Replacement addresses concerns raised during pre-filing regarding avoidance of impacts on the Tamarack Swamp Natural Area, as further discussed in section C.4.

We participated in two public open houses sponsored by National Fuel in November 2017 and November 2018, and in four public open houses sponsored by Transco in December 2018 and February 2019 to explain our environmental review process to interested stakeholders.

On November 29, 2017, we issued a *Notice of Intent to Prepare an Environmental Assessment for the Planned FM100 Modernization Project and Request for Comments on Environmental Issues*[4] in Docket No. PF17-10-000. This initial notice was issued prior to the addition of the Leidy South Project to the scope of our review; therefore, after the Leidy South Project entered pre-filing, we issued an additional notice. On March 5, 2019, we issued a *Notice of Intent to Prepare an Environmental Assessment for the Planned FM100 Project and Leidy South Project and Request for Comments on Environmental Issues, and Notice of Public Scoping Sessions* (NOI) in Docket Nos. PF17-10-000 and PF19-1-000. The NOI was mailed to approximately 1,288 entities, including affected landowners (as defined in the Commission's regulations); federal, state, and local officials; Native American tribes; agency representatives; environmental and public interest groups; and local libraries and newspapers.

We conducted four public scoping sessions in the area of the Projects to provide an opportunity for agencies and the general public to learn more about the Projects and to participate in the environmental analysis by identifying issues to be addressed in the EA. Sessions were held between March 18 to 21, 2019, in Dallas, Hegins, Port Allegany, and Renovo, Pennsylvania. During the scoping sessions, 14 verbal comments were provided on the Projects, and 47 written comments were received.

During pre-filing, we participated in meetings via conference calls held by the applicants. We participated in conference calls held by National Fuel with various agencies, including the USACE, U.S.

[4] The FM100 Project was initially known as the FM100 Modernization Project.

Fish and Wildlife Service (USFWS), Pennsylvania Fish and Boat Commission (PAFBC), and Pennsylvania Game Commission (PGC). Additionally, we participated in bi-weekly conference calls held by Transco with various agencies, including the USACE, USFWS, EPA, Pennsylvania Department of Environmental Protection (PADEP), Pennsylvania Department of Conservation and Natural Resources (PADCNR), PAFBC, PGC, and the Pennsylvania Historical and Museum Commission – State Historic Preservation Office (SHPO).

Between November 24, 2017 and January 6, 2020, the Commission received 153 comments.[5] Written comments were submitted by the EPA; USFWS; PADCNR; Pennsylvania Department of Transportation (PennDOT); Pennsylvania Department of Agriculture (PDA); U.S. Senator Robert P. Casey, Jr.; Pennsylvania State Senator David G. Argall; Pennsylvania State Representative Michael G. Tobash; Schuylkill County; Hegins Township; Teamsters National Pipeline Training Fund; Mountain Water Authority; and 104 other individuals, some of whom commented multiple times.

This EA addresses the potential environmental impacts of National Fuel's and Transco's proposed Projects, the concerns identified by commentors and permitting or resource agencies, and our independent evaluation of environmental resource impacts and other issues. The environmental comments received in response to the NOI are summarized below in table A.4-1 and are further addressed, as applicable, in the relevant sections of this EA.

TABLE A.4-1

Environmental Issues and Concerns Raised During Public Scoping for the Projects

Issue/Concern	EA Section Addressing Issue
GENERAL	
Purpose and Need	A.2
Segmentation of Projects	A.3
Scope of NEPA document, Need for an EIS	A.3
Future expansion of compressor station facilities	A.9
ABANDONMENT	
Requests for removal of FM100 pipeline	B.5.3
GEOLOGY	
Impacts on nearby oil and gas wells	B.1.2
SOILS	
Impacts on prime farmland	B.2.1
Potential spills and leaks	B.2.5
WATERBODIES AND WETLANDS	
Impacts on surface water quality and use	B.3.2.1
Impacts on springs and water supply wells	B.3.1
VEGETATION, WILDLIFE, AND PROTECTED SPECIES	
Impacts on threatened and endangered species	B.4.4.3, B.4.4.4, B.4.4.5
Impacts on protected species (e.g., eagles) and critical habitat	B.4.4
Impacts on trout streams	B.4.1
Impacts on the Tamarack Swamp Natural Area	B.4.2, B.5.5.1, C.4

[5] Three comments were received during the scoping period from November 29, 2017 through December 29, 2017 and 94 comments were received during scoping period from March 5, 2019 to April 4, 2019. In addition, the Commission received 56 comments outside of the scoping periods.

TABLE A.4-1 (cont'd)

Environmental Issues and Concerns Raised During Public Scoping for the Projects

Issue/Concern	EA Section Addressing Issue
LAND USE	
Impacts on nearby residences	B.5.2.7
Impacts on agricultural land and organic egg farm	B.5.2.4
Visual impacts from aboveground facilities	B.5.8
Zoning consistency	B.5.2.4
SOCIOECONOMICS	
Loss of property value	B.7.6
Jobs for local workers	B.7.1
Impacts on local traffic and road infrastructure	B.7.5
Identify if any impacts on minority and low-income communities	B.7.7
AIR QUALITY	
Impacts on air quality; respiratory health	B.8.3, B.8.4, B.8.5
Increased emissions during compressor station blowdowns	B.8.4
NOISE	
Increase in noise impacts near compressor stations	B.9.2, B.9.3
RELIABILITY AND SAFETY	
Emergency response preparedness in event of incident	B.7.4, B.10.5
CUMULATIVE IMPACTS	
Association with the Atlantic Sunrise Project (FERC Docket No. CP15-138-000)	A.3, B.11
ALTERNATIVES	
Alternative sites for Compressor Stations 607 and 620	C.5.2, C.5.3
Electric-driven versus natural-gas driven compressors	C.5.4

A.5 PROPOSED FACILITIES

The FM100 Project would include the construction of the following facilities, all in Pennsylvania:

- approximately 29.5 miles of new 20-inch-diameter pipeline in McKean and Potter Counties (Line YM58);
- approximately 1.4 miles of new 24-inch-diameter pipeline loop[6] in Potter County (Line YM224);
- approximately 0.4 mile of 12-inch-diameter pipeline extension in McKean County (Line KL Extension);
- a new 15,165-horsepower (hp) compressor station in McKean County (Marvindale Compressor Station);
- a new 22,220-hp compressor station in Clinton County (Tamarack Compressor Station);
- a new producer interconnect station in McKean County (Marvindale Interconnect);

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

- a new over pressure protection (OPP) station in Potter County (Carpenter Hollow OPP Station);
- modification of the existing Leidy Interconnect LDC 2245 at the Leidy Metering and Regulation (M&R) Station in Clinton County; and
- appurtenant facilities including valves, pig launchers, pig receivers, and anode beds.

The FM100 Project would also include the abandonment of the following facilities, all in Pennsylvania:

- approximately 44.9 miles of 12-inch-diameter pipeline and associated appurtenant facilities in Cameron, Clearfield, Elk, and Potter Counties (Line FM100);
- removal of a 1,440-hp compressor station and associated facilities in Potter County (Costello Compressor Station); and
- removal of aboveground piping and measurement and over pressurization equipment in Potter County (Station WHP-MS-4317X).

Additionally, National Fuel proposes to use 58 access roads and 8 staging areas to support abandonment and construction activities, and 16 permanent access roads to support operation of the FM100 Project.

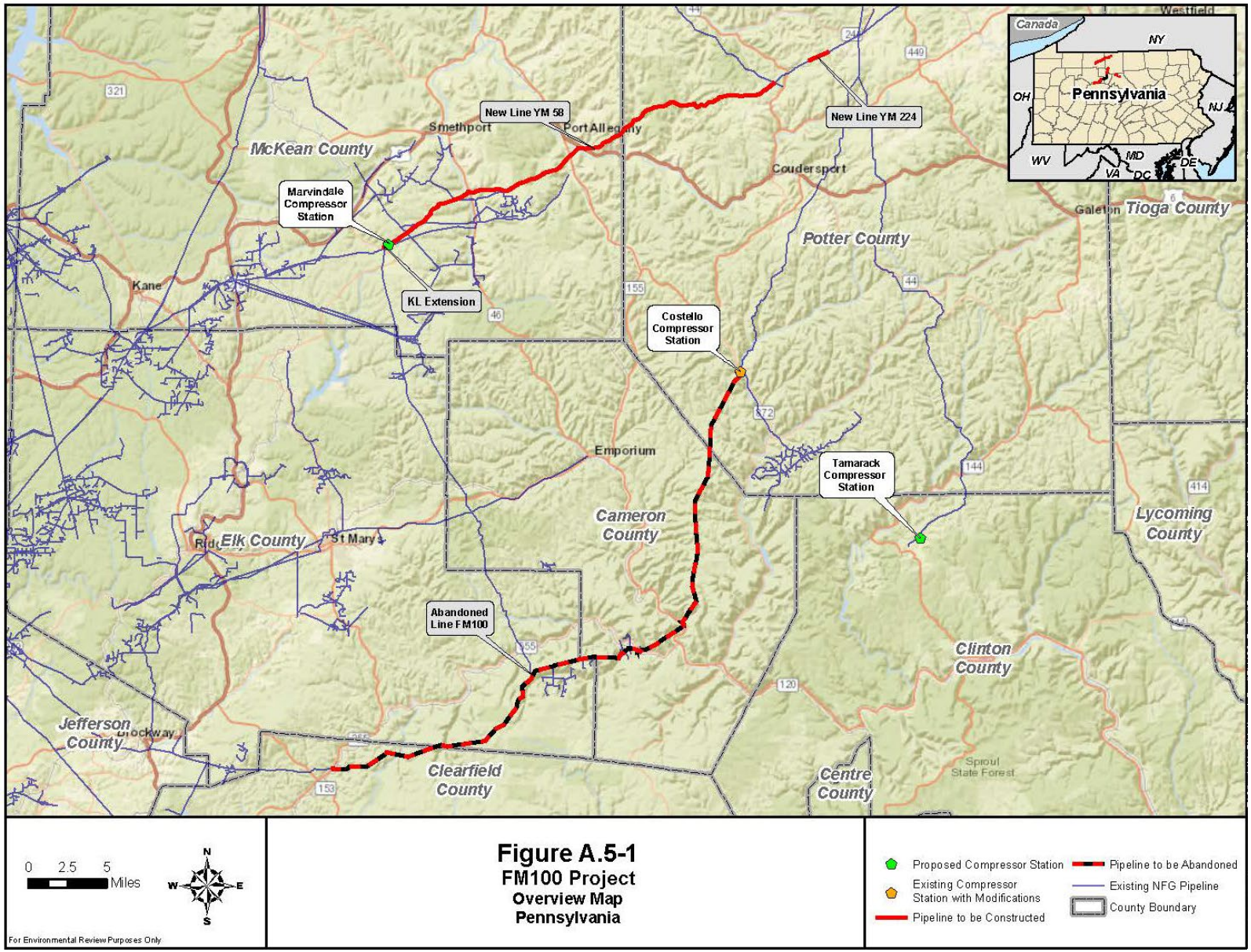
The Leidy South Project would include the construction and/or upgrades of the following facilities, all in Pennsylvania:

- approximately 6.3 miles of new 36-inch-diameter pipeline and associated abandonment by removal of approximately 5.8 miles of existing 23.375-inch-diameter pipeline Leidy Line A in Clinton County (Hensel Replacement);
- approximately 2.4 miles of new 36-inch-diameter pipeline looping in Clinton County (Hilltop Loop);
- approximately 3.5 miles of new 42-inch-diameter pipeline looping in Lycoming County (Benton Loop), including a new 90-foot-tall communication tower;
- uprate of the two existing compressor units to increase total hp from 30,000 hp to 42,000 hp at Compressor Station 605 in Wyoming County;
- uprate of the two existing compressor units to increase total hp from 40,000 hp to 42,000 hp and install a new 31,871-hp compressor unit at Compressor Station 610 in Columbia County;
- a new 46,930-hp compressor station in Luzerne County (Compressor Station 607), including a new 190-foot-tall, free-standing communication tower;
- a new 31,871-hp compressor station in Schuylkill County (Compressor Station 620); and
- appurtenant facilities including valves, pig launchers, and pig receivers.

The abandonment work associated with the Hensel Replacement would include the abandonment and removal of approximately 5.0 miles of Leidy Line A within the same workspace used for installation of the Hensel Replacement pipeline. The remaining 0.8 mile of Leidy Line A would be abandoned in place to avoid impacts on the Tamarack Swamp Natural Area.

Additionally, Transco proposes to use 17 access roads and 21 staging areas to support construction and abandonment activities, and 4 permanent access roads to support operation of the Leidy South Project.

The general locations of the FM100 Project and Leidy South Project are show in figures A.5-1 and A.5-2, and more detailed USGS 7.5-minute quadrangle topographic maps depicting the Projects' new and abandoned facility locations are included in appendix A.


New Line YM 58
New Line YM 224
Marvindale Compressor Station
KL Extension
Costello Compressor Station
Tamarack Compressor Station
Abandoned Line FM100
McKean County
Potter County
Tioga County
Elk County
Cameron County
Lycoming County
Clinton County
Clearfield County
Centre County
Jefferson County
Kane
Emporium
Coudersport
Smethport
St Marys
Canada
NY
Pennsylvania
OH
WV
VA
MD
DC
DE
NJ
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For Environmental Review Purposes Only
Figure A.5-1
FM100 Project
Overview Map
Pennsylvania
Proposed Compressor Station
Existing Compressor Station with Modifications
Pipeline to be Constructed
Pipeline to be Abandoned
Existing NFG Pipeline
County Boundary

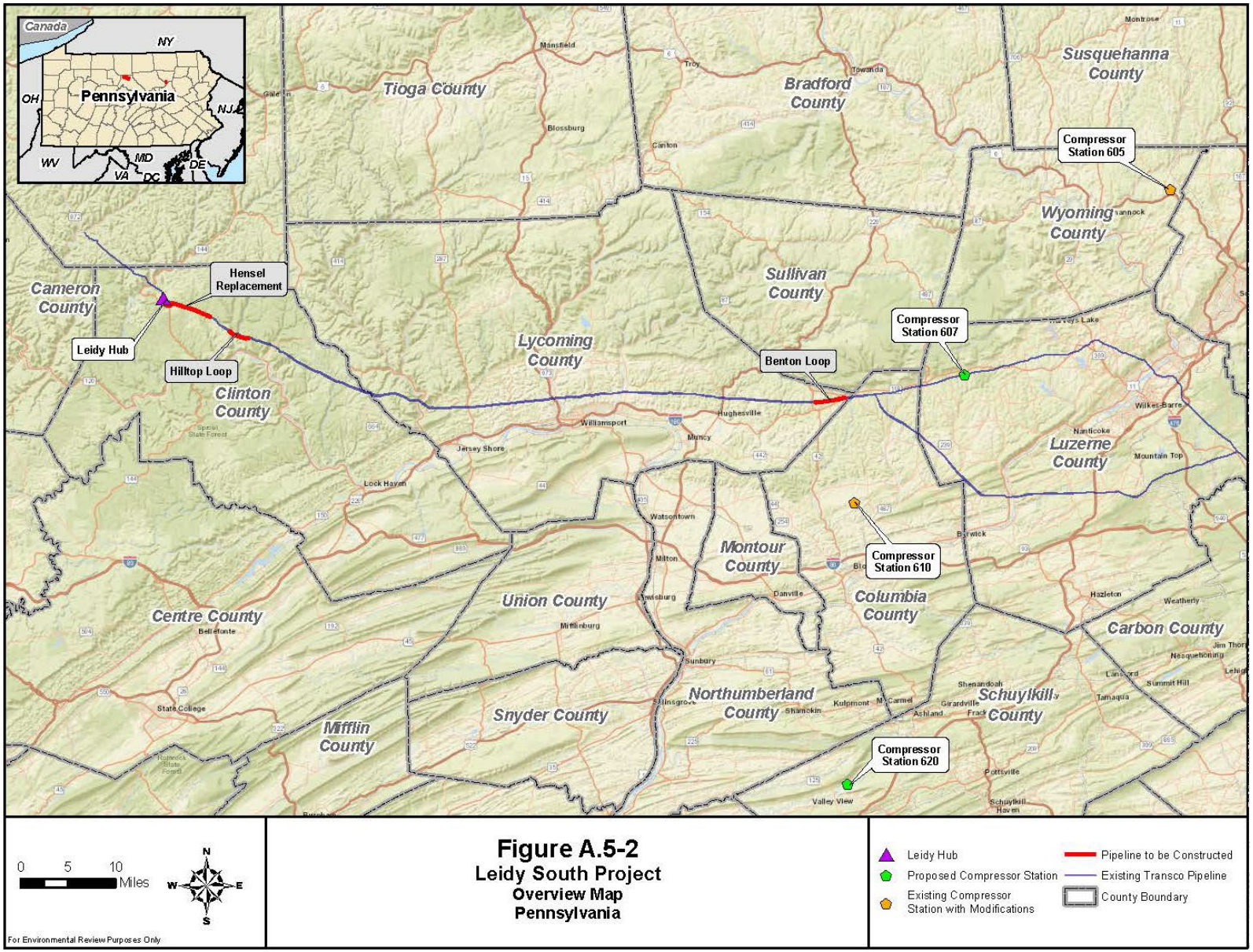
Canada
NY
Pennsylvania
OH
NJ
WV
MD
VA
DC
DE
Tioga County
Bradford County
Susquehanna County
Wyoming County
Sullivan County
Cameron County
Lycoming County
Clinton County
Luzerne County
Montour County
Columbia County
Union County
Centre County
Carbon County
Northumberland County
Schuylkill County
Snyder County
Mifflin County
Hensel Replacement
Leidy Hub
Hilltop Loop
Benton Loop
Compressor Station 605
Compressor Station 607
Compressor Station 610
Compressor Station 620
Mansfield
Blossburg
Towanda
Canton
Williamsport
Hughesville
Muncy
Jersey Shore
Lock Haven
Watsontown
Milton
Danville
Bloomsburg
Mifflinburg
Sunbury
Selinsgrove
Shamokin
Kulpmont
Mt. Carmel
Shenandoah
Girardville
Ashland
Frackville
Tamaqua
Summit Hill
Lansford
Jim Thorpe
Nesquehoning
Weatherly
Hazleton
Berwick
Nanticoke
Mountain Top
Wilkes-Barre
Harveys Lake
Bellefonte
State College
Valley View
Pottsville
Schuylkill Haven
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Figure A.5-2
Leidy South Project
Overview Map
Pennsylvania
Leidy Hub
Proposed Compressor Station
Existing Compressor Station with Modifications
Pipeline to be Constructed
Existing Transco Pipeline
County Boundary

A.6 LAND REQUIREMENTS

National Fuel and Transco would require about 979.0 acres of land for construction and abandonment of the Projects. Operation of the Projects would require a total of 356.3 acres, which would be maintained as new permanent right-of-way or new aboveground facility area. About 621.9 acres of temporary workspace would revert to preconstruction use and condition. Land requirements for construction and operation of the Projects are summarized in table A.6-1. See section B.5.1 for more detailed information regarding land uses affected by the Projects.

TABLE A.6-1

Land Use Summary for the FM100 Project and Leidy South Project

Project, Facility	Construction Impacts (acres)	Operation Impacts (acres)
FM100 PROJECT		
Pipeline Facilities [a]		
Line YM58	296.6	179.6
Line YM224 Loop	14.5	9.0
Line KL Extension	5.2	4.5
Pipeline Facilities Subtotal	**316.6**	**193.3**
Aboveground Facilities		
Tamarack Compressor Station	4.3	4.3
Marvindale Compressor Station	11.8	3.7
Marvindale Interconnect	7.9	1.7
Carpenter Hollow OPP Station	0.2	0.2
Aboveground Facilities Subtotal	**24.2**	**9.9**
Abandonment Facilities		
Line FM100 Abandonment	9.6	0.0
Costello Compressor Station Abandonment	1.3	0.0
WHP-MS-4317X Station Abandonment	0.5	0.0
Abandonment Facilities Subtotal	**11.4**	**0.0**
Access Roads	**149.8**	**77.1**
Staging Areas	**45.7**	**0.0**
FM100 Project Total	**547.7**	**280.3**
LEIDY SOUTH PROJECT		
Pipeline Facilities		
Hensel Replacement	93.2	7.0
Hilltop Loop	41.4	7.2
Benton Loop	63.5	11.6
Pipeline Facilities Subtotal	**198.1**	**25.8**
Aboveground Facilities		
Compressor Station 605	0.0	0.0
Compressor Station 607	18.0	12.8
Compressor Station 610	34.0	0.0
Compressor Station 620	45.3	24.2
Mainline Valves [b]	0.5	0.5
Aboveground Facilities Subtotal	**97.8**	**37.5**
Access Roads	**23.5**	**12.7**
Contractor/Pipe Yards	**111.9**	**0.0**
Leidy South Project Total	**431.3**	**76.0**
Projects Total	**979.0**	**356.3**

[a] Pipeline facility totals include the impacts from mainline valves.
[b] Valve assemblies, including pig launchers/receivers.
Note: Addends may not sum due to rounding.

FM100 Project

Construction of the FM100 Project would disturb about 547.7 acres of land, including 316.6 acres for construction of the pipeline facilities, 24.2 acres for construction of new aboveground facilities, 9.6 acres for the abandonment of Line FM100, 1.8 acres for the abandonment of aboveground facilities, 149.8 acres for access roads, and 45.7 acres for staging areas. The total acreage required for operation of all FM100 Project facilities is about 280.3 acres, which includes 9.9 acres for permanent aboveground facilities. Land requirements for the pipeline and aboveground facilities are further described in section B.5.2.

Line YM58 Pipeline would extend from the proposed Marvindale Interconnect near the proposed Marvindale Compressor Station site in Sergeant Township, McKean County to the proposed Carpenter Hollow OPP Station adjacent to the existing Station HEP0 840T in Hebron Township, Potter County. The pipeline would predominantly parallel the existing Tennessee Gas Pipeline (TGP) Line 300 corridor, a short segment of Dominion Energy Transmission, Inc.'s Line LN-20 corridor, and a short segment of National Fuel's Line Y2T. Line KL Extension would extend the existing Line KL to the proposed Marvindale Compressor Station, and the extension would be constructed in the same right-of-way as the proposed Line YM58 pipeline.

Line YM224 Loop would accommodate the redirected transportation services from Ellisburg Compressor Station on Line YM224. The loop is bounded by Dwight Road and Nelson Run Road, and would parallel the existing Line YM224.

National Fuel would typically use a 75-foot-wide construction right-of-way along Line YM58, the Line KL Extension, and the Line YM224 Loop, except in certain areas where specialized construction procedures are required, as described in section A.8.1.4. Following construction, the permanent right-of-way for the pipeline would be 50 feet wide (except where it abuts National Fuel's existing right-of-way), of which National Fuel would maintain a 50-foot-wide area in upland areas and a 30-foot-wide area through wetlands for operation and maintenance activities in accordance with the ESCAMP. A total of 76.7 percent of the FM100 Project construction right-of-way would be collocated with the existing TGP 300 Line's right-of-way (68.3 percent), the Dominion Energy Transmission, Inc.'s Line LN-20 right-of-way (3.8 percent), and National Fuel's existing Line YM224 right-of-way (4.5 percent). Typical right-of-way construction diagrams for National Fuel are provided in appendix B.

National Fuel intends to maintain a 30-foot offset between Line YM58 and the nearest TGP Pipeline, where possible, which is depicted in the typical right-of-way construction diagrams in appendix B. In McKean County, TGP generally has an undefined right-of-way width (where TGP's right-of-way is undefined it is assumed to be 50 feet in width). Line YM58's permanent right-of-way would generally overlap TGP's assumed permanent right-of-way by 20 feet in all areas where National Fuel is directly paralleling TGP's pipelines in McKean County. In Potter County, TGP generally has a 200-foot-wide right-of-way. Line YM58's temporary construction workspace would overlap TGP's pipeline by 5 feet, which would allow National Fuel to confirm the depth of the TGP pipeline at any given milepost. In Potter County, National Fuel's entire 50-foot-wide permanent right-of-way would generally be within TGP's 200-foot-wide permanent right-of-way.

Line YM224 Loop would generally be installed with a 25-foot offset from the existing Line YM224 and would overlap workspace within the permanent maintained easement. National Fuel would acquire an additional 25 feet of permanent right-of-way for operation, adjacent to its existing 50-foot-wide permanent easement.

Additional temporary workspace (ATWS) of varying widths would be required adjacent to the construction right-of-way in certain locations for specialized construction methods such as horizontal

directional drill (HDD) and conventional bores, road and stream crossings, and pipeline crossovers. ATWS for the FM100 Project would temporarily impact 32.8 acres, which would be restored to pre-existing condition after construction, with no permanent impact. In addition, four anode beds would be constructed on land adjacent to National Fuel's Line YM58, impacting 4.7 acres.

The new Tamarack Compressor Station would be on National Fuel's existing Line YM53 near the Leidy M&R Station, on an 8.8-acre site under an option agreement by National Fuel. The new Marvindale Compressor Station would be at the western terminus of Line YM58 on a 173-acre site owned in fee by Seneca Resources Company, LLC, a National Fuel affiliate. The Marvindale Interconnect would be constructed adjacent to the Marvindale Compressor Station.

The new Carpenter Hollow OPP Station would be at the eastern terminus of Line YM58 on property owned by National Fuel and adjacent to National Fuel's existing Station HEP0 840. Four mainline valves (MLVs) and one valve set would be constructed, including two MLVs on National Fuel's new Line YM58 and two MLVs on the Line YM224 Loop, all within the new permanent rights-of-way for those pipelines. One valve set would be constructed on the Line KL Extension. The valves would be graveled and surrounded by chain link fence, as necessary, and a drive gate and man gate would provide access.

Abandonment of Facilities

National Fuel has proposed that Line FM100 would primarily be abandoned in place and not require ground-disturbing activities, with the exception of 34 locations, including 3 locations where landowners or agencies have requested the pipeline be removed from their property after abandonment; 14 locations where valves, rectifiers, and/or fencing would be removed; and 17 locations where the pipeline would be exposed, as necessary, to cut, cap, and grout across certain features (e.g., waterbodies, roads, railroads). Once abandoned National Fuel indicates they would no longer maintain the easement. However, they do not plan to relinquish the easement to landowners with the exception of any requirements as part of the right-of-way or license agreement on state lands. Table A.6-2 summarizes the locations where abandonment activities would involve ground-disturbing activities. A description of National Fuel's abandonment procedures for pipeline facilities is provided in section A.8.2.1, and additional discussion about removal of the abandoned pipeline is provided below. Landowner requests for abandonment of the pipeline on specific parcels are discussed in section B.5.3.

TABLE A.6-2

Location of Line FM100 Abandonment Activities

County	MP Begin	MP End	Workspace (acres)	Proposed Work
Clearfield	0.0	0.0	0.1	Remove valve setting and fencing
Clearfield	0.1	0.1	0.1	Grout at crossing of State Highway 255; cut and cap crossing Bennett Branch Sinnemahoning Creek
Clearfield	0.1	0.1	<0.1	Cut, cap, and grout at railroad crossing
Clearfield	0.1	0.3	1.6	Pipe Removal; cut and cap
Clearfield	0.3	0.3	0.2	Grout and remove rectifier facilities and fencing
Clearfield	1.8	1.8	0.1	Cut and cap at the crossing of Tyler Road
Clearfield	4.8	4.8	<0.1	Cut, cap, and grout at waterbody crossing of Laurel Run
Clearfield	4.9	4.9	0.1	Cut, cap, and grout at waterbody crossing of Laurel Run
Elk	7.8	7.8	0.1	Cut, cap, and grout at Medix Run Road and waterbody crossing of Medix Run
Elk	7.8	7.9	0.1	Grout and remove valve setting and fencing; grout at Medix Run Road and waterbody crossing of Medix Run

TABLE A.6-2 (cont'd)

Location of Line FM100 Abandonment Activities

County	MP Begin	MP End	Workspace (acres)	Proposed Work
Elk	10.0	10.0	0.1	Remove rectifier facilities and fencing
Elk	11.1	11.1	<0.1	Cut, cap, and grout crossing Quehanna Highway
Elk	11.1	11.1	0.1	Cut, cap, and grout crossing Quehanna Highway
Elk	11.4	11.4	0.1	Grout and remove rectifier facilities and fencing
Elk	12.0	12.0	0.1	Cut and cap crossing Grant Trail Road
Elk	12.8	12.8	0.1	Cut and cap crossing Grant Trail Road
Elk	15.8	15.8	<0.1	Remove valve setting, rectifier facilities, and fencing
Cameron	22.1	22.1	<0.1	Cut and cap at waterbody crossing of Mix Run
Cameron	22.3	22.3	0.2	Remove valve setting, rectifier facilities, and fencing
Cameron	22.9	23.0	0.8	Abandon in place where pipeline is greater than 5 feet below surface (HDD crossing); cut and cap and remove pipe where within 5 feet of surface if in the future the landowner determines the pipeline conflicts with future property improvements
Cameron	23.1	23.2	0.5	Cut, cap, and grout at the crossing of Bennett Branch Sinnemahoning Creek
Cameron	23.4	23.5	0.8	Cut, cap, and grout at the crossing of Bennett Branch Sinnemahoning Creek and Low Grade Road
Cameron	23.5	23.6	0.4	Cut, cap, and grout crossing Low Grade Road
Cameron	26.1	26.1	0.2	Remove rectifier facilities and fencing
Cameron	26.9	27.0	0.9	Cut, cap, and grout crossing Driftwood Branch Sinnemahoning Creek
Cameron	27.0	27.0	<0.1	Cut, cap, and grout crossing Driftwood Branch Sinnemahoning Creek and Bucktail Trail Highway
Cameron	29.6	29.6	0.2	Remove rectifier facilities
Cameron	30.7	31.0	2.0	Pipe removal requested; cut and cap
Cameron	33.4	33.4	<0.1	Remove rectifier facilities
Cameron	33.4	33.4	0.2	Remove valve facilities
Cameron	38.2	38.2	<0.1	Remove rectifier facilities
Potter	40.1	40.1	<0.1	Remove rectifier facilities
Potter	40.5	40.5	0.5	Remove rectifier facilities and MLV
Potter	44.1	44.1	1.3	Compressor station abandonment
		Total	**10.9**	

Note: Addends may not sum due to rounding.

Access roads would be needed to access the construction right-of-way, ATWS, anode beds, aboveground facilities, and areas to be disturbed by abandonment activities, impacting a total of 149.8 acres. A total of 35 existing roads and 5 proposed new roads would be used for site access during construction activities and 18 existing roads would be used for site access during abandonment activities. Of these, 24 would be restored to preconstruction conditions or better after construction use, and 16 would be maintained for operations and maintenance activities. Table A.6-3 identifies the temporary and permanent access roads proposed for the FM100 Project.

TABLE A.6-3

Access Roads for the FM100 Project

Project, Facility, Access Road	Nearest Milepost	New/Existing	Temporary/ Permanent	Surface	Length (miles)	Road Width (feet)	Construction Impacts (acres)	Improvements
Lines YM58 and KL Extension								
PAR-3	2.6	Existing	Permanent	Gravel/Dirt	1.3	30	4.6	None
PAR-5	4.5	Existing	Permanent	Gravel/Dirt	6.5	30	12.7	None
PAR-9	8.1	New	Permanent	Gravel/Dirt	<0.1	15	<0.1	Grading
PAR-14	11.3	Existing	Permanent	Gravel/Dirt	2.4	30	9.0	None
PAR-12	9.6	Existing	Permanent	Gravel/Dirt	2.2	30	7.9	None
PAR-21	14.1	Existing	Permanent	Gravel/Dirt	<0.1	30	0.1	None
PAR-37	15.6	New	Permanent	Gravel/Dirt	<0.1	15	<0.1	Grading
PAR-25	17.7	Existing	Permanent	Gravel/Dirt	4.3	30	15.7	None
PAR-30	21.2	Existing	Permanent	Gravel/Dirt	3.6	30	13.1	None
PAR-31	23.6	Existing	Permanent	Gravel/Dirt	1.2	30	3.7	None
PAR-33	25.2	Existing	Permanent	Gravel/Dirt	1.0	30	3.9	None
PAR-35	29.5	Existing	Permanent	Gravel/Dirt	0.6	30	0.2	None
TAR-4	2.6	Existing	Temporary	Gravel/Dirt	0.2	30	0.5	None
TAR-6	4.9	Existing	Temporary	Gravel/Dirt	2.1	30	7.7	None
TAR-7	6.5	Existing	Temporary	Gravel/Dirt	0.1	30	0.4	None
TAR-8	6.9	New	Temporary	Gravel/Dirt	<0.1	30	0.1	Grading
TAR-10	9.1	Existing	Temporary	Gravel/Dirt	1.7	30	6.1	None
TAR-11	9.1	Existing	Temporary	Gravel/Dirt	0.5	30	1.7	None
TAR-13	9.6	Existing	Temporary	Gravel/Dirt	2.1	30	7.7	None
TAR-15	12.0	Existing	Temporary	Gravel/Dirt	0.3	30	1.0	None
TAR-16	12.2	Existing	Temporary	Gravel/Dirt	0.3	30	1.2	None
TAR-17	12.6	Existing	Temporary	Gravel/Dirt	1.8	30	6.4	None
TAR-18	12.6	Existing	Temporary	Gravel/Dirt	0.4	30	1.3	None
TAR-19	12.7	Existing	Temporary	Gravel/Dirt	0.0	30	<0.1	None
TAR-20	12.9	Existing	Temporary	Gravel/Dirt	0.2	30	0.7	None
TAR-38	14.2	Existing	Temporary	Paved	0.1	50	0.3	None
TAR-22	14.8	Existing	Temporary	Paved	0.4	30	2.6	None
TAR-23	14.4	Existing	Temporary	Gravel/Dirt	0.3	30	1.2	None
TAR-24	17.0	Existing	Temporary	Gravel/Dirt	0.6	30	2.4	None
TAR-26	18.0	Existing	Temporary	Gravel/Dirt	1.4	30	5.0	None
TAR-28	18.0	Existing	Temporary	Gravel/Dirt	<0.1	30	0.1	None
TAR-27	18.4	Existing	Temporary	Gravel/Dirt	0.3	30	1.0	None

TABLE A.6-3 (cont'd)

Access Roads for the FM100 Project

Project, Facility, Access Road	Nearest Milepost	New/Existing	Temporary/ Permanent	Surface	Length (miles)	Road Width (feet)	Construction Impacts (acres)	Improvements
TAR-29	18.4	Existing	Temporary	Gravel/Dirt	<0.1	30	0.1	None
TAR-32	24.0	Existing	Temporary	Gravel/Dirt	1.0	30	4.0	None
TAR-34	25.2	Existing	Temporary	Gravel/Dirt	0.6	30	2.3	None
Line YM224 Loop								
PAR-36	0.0	Existing	Permanent	Gravel/Dirt	0.2	30	1.4	None
PAR-40	1.4	New	Permanent	Gravel/Dirt	<0.1	15	<0.1	Grading
Marvindale Compressor Station								
PAR-1	0.0	Existing	Permanent	Pavement	0.5	50	3.3	Widening
TAR-2	0.2	Existing	Temporary	Gravel/Dirt	0.2	30	0.6	None
Tamarack Compressor Station								
PAR-41	N/A	New	Permanent	Gravel/Dirt	0.3	20	0.7	Grading
Line FM100 Abandonment								
HSC-832-Access	0.0	Existing	Temporary	Gravel/Dirt	<0.1	30	0.2	None
RR Access	0.1	Existing	Temporary	Gravel/Dirt	0.3	30	0.3	None
Rectifier 167, 168 Access	11.4	Existing	Temporary	Gravel/Dirt	0.3	30	1.0	None
MLV BZE0-5810 Access	12.0	Existing	Temporary	Gravel/Dirt	1.0	30	3.4	None
MLV GIC0-5042 Access	22.3	Existing	Temporary	Gravel/Dirt	0.6	30	2.1	None
Rectifier 170, 146 Access	23.0	Existing	Temporary	Gravel/Dirt	<0.1	30	<0.1	None
RR North Access	23.0	Existing	Temporary	Gravel/Dirt	<0.1	30	<0.1	None
RR South Access	23.1	Existing	Temporary	Gravel/Dirt	0.1	30	<0.1	None
Rectifier 171 Access	23.5	Existing	Temporary	Gravel/Dirt	0.2	30	0.5	None
SR 555 North Access	23.6	Existing	Temporary	Gravel/Dirt	0.3	30	1.0	None
Rectifier 173, 182 Access	26.1	Existing	Temporary	Gravel/Dirt	<0.1	30	0.0	None
RR Access	26.2	Existing	Temporary	Gravel/Dirt	1.2	30	4.3	None
Rectifier 174 Access	27.0	Existing	Temporary	Gravel/Dirt	<0.1	30	<0.1	None
SR 120 North Access	27.4	Existing	Temporary	Gravel/Dirt	0.4	30	1.4	None
Rectifier 873, 872 Access	29.7	Existing	Temporary	Gravel/Dirt	0.3	30	1.0	None
MLV LUC0-5039 Access	33.4	Existing	Temporary	Gravel/Dirt	0.1	30	0.7	None
POP0 4317 Access	40.3	Existing	Temporary	Gravel/Dirt	0.5	30	1.8	None
POP0 1370 Access	44.1	Existing	Temporary	Gravel/Dirt	0.1	30	0.5	None
Total					**44.1**	**1,725**	**149.9**	

PAR = Permanent Access Road
TAR = Temporary Access Road

National Fuel would use 8 staging areas of various sizes on a temporary basis during project construction, which would be restored to pre-existing condition after construction, with no permanent impact anticipated. Table A.6-4 identifies the staging areas required for construction of the FM100 Project.

TABLE A.6-4

Staging Areas for the FM100 Project

Project, Facility, Staging Area	Nearest Milepost	Construction Impacts (acres)	Existing Land Use
Line YM58			
SA-2	2.7	2.3	Industrial/Commercial
SA-3	8.1	0.6	Open Land
SA-6	14.1	8.1	Industrial/Commercial
SA-4	14.2	2.5	Industrial/Commercial
SA-5	29.5	13.8	Open Land
SA-7	N/A	11.7	Industrial/Commercial
Marvindale Compressor Station			
SA-1	0.1	5.0	Open Land, Industrial/Commercial
Tamarack Compressor Station			
SA-8	N/A	1.6	Open Land, Industrial/Commercial
Total		**45.6**	

SA = Staging Area

Leidy South Project

Construction of the Leidy South Project would disturb about 431.3 acres of land, including 198.1 acres for construction of the pipeline facilities, abandonment of Leidy Line A, and re-contouring the existing two-tone grade along Leidy Line A and B within the Sproul State Forest; and 97.8 acres for construction and modification of the aboveground facilities. The total acreage required for operation of the Leidy South Project facilities is about 76.0 acres, which includes 25.8 acres for the pipeline facilities, 37.5 acres for the aboveground facilities, and 12.7 acres for new permanent access roads. Land requirements for construction and operation of the Leidy South Project are summarized in table A.6-1.

For the Hensel Replacement, Transco would install 6.3 miles of 36-inch-diameter pipeline collocated with the existing Transco Leidy Lines between approximate mileposts 188.51 and 194.00 in Clinton County. This pipeline would replace the capacity of a segment of Transco's existing 23.375-inch-diameter Leidy Line A pipeline, totaling 5.8 miles, which would be abandoned and removed (with the exception of 0.8 mile as further discussed below). The Hilltop Loop would be collocated with the existing Transco Leidy Lines between mileposts 183.55 and 186.01 in Clinton County. The Benton Loop would be collocated with the existing Transco Leidy Lines between approximate mileposts 116.95 and 120.44 in Lycoming County. Once placed into operation, Transco would refer to the Hensel Replacement, the Hilltop Loop, and the Benton Loop as Leidy Line D.

Transco would typically use a 90-foot-wide construction right-of-way for the Hensel Replacement and the Hilltop Loop and a 100-foot-wide construction right-of-way for the Benton Loop. Workspace for these loops would overlap to varying degrees with portions of Transco's existing rights-of-way. Transco would typically use a 75-foot-wide construction right-of-way across wetlands, except in areas where additional workspace is justified (see additional discussion in section A.8.1.4). A total of 97.5 percent of the Leidy South Project construction right-of-way would be collocated with the existing

Transco Leidy Line System. Typical right-of-way construction diagrams for Transco are provided in appendix B.

During construction of the Hensel Replacement pipeline, Transco would abandon the existing Leidy Line A by removal, including about 0.4 mile adjacent to the existing Leidy Lines B, C, and D from approximate mileposts 188.1 to 188.5, and about 4.5 miles while installing the new Hensel Replacement pipeline at a reduced offset from the existing Leidy Line B from approximate mileposts 188.5 to 193.0. Where the Leidy Line A is removed on Sproul State Forest land, between approximate mileposts 191.1 to 192.6, Transco would regrade the existing Leidy Line A and B rights-of-way to eliminate an existing two-tone grade and restore approximate original contours. The new pipeline would be offset 25 feet where it is adjacent to Leidy Line B, which is closer than the existing 47-foot-wide Leidy Line A offset. As a result, no additional permanent right-of-way would be cleared or maintained for the Hensel Replacement pipeline where it is adjacent to Leidy Line B.

Beginning at approximately milepost 193.0, the Hensel Replacement pipeline would divert from the existing Leidy Line A right-of-way to follow an existing electric transmission powerline within a new 30-foot-wide permanent right-of-way to Transco's existing Leidy Line C at approximate milepost 193.1. The new pipeline would then follow the Leidy Line C right-of-way, offset about 25 feet, to the existing Leidy Hub at approximate milepost 194.0. Beginning at approximate milepost 193.0, on the eastern edge of the Tamarack Swamp Natural Area, approximately 0.8 mile of the existing Leidy Line A pipeline would be abandoned in place to avoid disturbance in the Tamarack Swamp Natural Area. Transco does not plan to maintain the right-of-way after abandonment within the Tamarack Swamp Natural Area. Beginning at the western edge of the Tamarack Swamp Natural Area to the Leidy Hub, approximately 0.3 mile of the existing Leidy Line A would be abandoned by removal.

Both the Hilltop and Benton Loops would be constructed with a 25-foot-wide offset from Transco's existing pipelines. The Hilltop Loop would initially be offset from Leidy Line C beginning at approximate mileposts 183.5 to 183.8, then cross over to follow the existing Leidy Line A to approximate milepost 185.5, and then follow Leidy Line C to its end at approximate milepost 186.0. The Benton Loop would initially be offset from Leidy Line A from approximate mileposts 117.0 to 117.7, then cross over to follow Leidy Line C to its end at approximate milepost 120.4. Following construction of the Hilltop and Benton Loops, Transco would retain an additional 35-foot-wide permanent right-of-way adjacent to its existing rights-of-way.

Following construction, Transco would maintain an additional 35 feet of permanent right-of-way along the proposed Hilltop Loop and Benton Loop, and up to 30 feet of permanent right-of-way along the proposed Hensel Replacement in accordance with its ECP.

Modifications to Transco's Compressor Station 605 would occur wholly within the existing facility footprint and not impact any additional land during construction or operation. Modifications to Transco's existing Compressor Station 610 would occur on previously disturbed land owned wholly by Transco.

Transco is negotiating the purchase of 93 acres of land for the Compressor Station 607 site and 105.5 acres of land for the Compressor Station 620 site. These sites are adjacent to Transco's existing pipeline system.

Construction of the two new launchers/receivers and MLVs sites would take place within the existing Leidy Line right-of-way and adjacent land.

ATWS of varying widths would be required during construction in areas such as roadway, waterbody, wetland, and utility crossings; areas of steep slope; and areas of other specialized construction activities. ATWS for the Leidy South Project would temporarily impact 57.6 acres, which would be restored to preconstruction conditions with no permanent impact. Access roads would be needed to access the construction right-of-way and ATWS. A total of 16 existing roads and 1 proposed new road would be used for site access during construction activities. Of these, 13 would be restored to preconstruction conditions or better after construction use, and 4 would be maintained for operations and maintenance activities. Table A.6-5 identifies the temporary and permanent access roads proposed for the Leidy South Project.

TABLE A.6-5

Access Roads for the Leidy South Project

Project, Facility, Access Road	Nearest Milepost	New/Existing	Temporary/ Permanent	Surface	Length (miles)	Road Width (feet)	Construction Impacts (acres)	Improvements
Hensel Replacement								
AR-188.3	188.3	New	Permanent	N/A	0.1	25	0.6	Clear trees, grade, and gravel
AR-189.5	189.5	Existing	Permanent	Dirt	2.5	40	12.0	Grade, gravel, and widen
AR-192.6	192.6	Existing	Temporary	Gravel	0.3	25	1.0	Grade, gravel, and widen
AR-192.7	192.7	Existing	Temporary	Gravel	0.5	25	1.6	Grade, gravel, and widen
AR-192.9-S	192.9	Existing	Temporary	Gravel	0.0	25	<0.1	Grade, gravel, and widen
AR-193.2	193.2	Existing	Temporary	Dirt	0.0	16	<0.1	Install mats
AR-193.2-EXT	193.2	Existing	Temporary	Gravel	0.1	16	0.2	None
AR-193.9	193.9	New	Temporary	Gravel	0.1	25	0.1	None
Hilltop Loop								
AR-185.2-N	185.2	Existing	Temporary	Unpaved	0.6	10	0.7	Clear, grade, and widen
AR-185.2-S	185.2	Existing	Temporary	Unpaved	0.8	10	1.0	Clear, grade, and widen
AR-185.7-N	185.7	Existing	Temporary	Unpaved	0.2	25	0.7	Clear, grade, and widen
AR-185.7-S	185.7	Existing	Existing Permanent	Unpaved	1.4	25	4.1	Clear, grade, and widen
Benton Loop								
AR-117.0	117.0	Existing	Permanent	Gravel	0.1	25	0.2	Clear, grade, and widen
AR-117.0-EXT	117.0	Existing	Temporary	Gravel	0.0	25	<0.1	Clear, grade, and widen
AR-119.4	119.5	Existing	Temporary	Unpaved	0.2	25	0.6	Clear, grade, and widen
AR-120.3	120.3	Existing	Temporary	Unpaved	0.0	25	0.2	Clear, grade, and widen
AR-120.4	120.4	Existing	Temporary	Gravel	0.1	25	0.4	Clear, grade, and widen
Total					**7.2**	**392**	**23.4**	

AR = Access Road

Transco would temporarily use 21 contractor/pipe yards and staging areas of various sizes for pipe and equipment storage, staging of crews, and equipment parking. These areas would be restored to preconstruction conditions with no permanent impact. Table A.6-6 identifies the contractor/pipe yards and staging areas required for construction of the Leidy South Project.

TABLE A.6-6

Staging Areas for the Leidy South Project

Project, Facility, Staging Area	Nearest Milepost	Construction Impacts (acres)	Existing Land Use
Hensel Replacement			
CY-003	N/A	8.6	Open Land
CSA-018	188.52	1.9	Open Land, Industrial/Commercial, Forest/Woodland
CSA-019	188.52	9.5	Open Land, Industrial/Commercial, Forest/Woodland
CSA-020	190.58	0.2	Industrial/Commercial
CSA-021	193.73	4.2	Open Land, Industrial/Commercial
CSA-022	193.97	2.7	Open Land, Industrial/Commercial, Forest/Woodland
Hilltop Loop			
CY-004	N/A	9.6	Open Land, Industrial/Commercial, Forest/Woodland
CY-005	N/A	6	Forest/Woodland, Agricultural
CY-008	N/A	15.1	Open Land
CSA-014	183.55	1.3	Open Land, Industrial/Commercial, Forest/Woodland
CSA-015	183.56	2.1	Forest/Woodland, Industrial/Commercial, Wetland
CSA-016	184.47	1.2	Forest/Woodland
CSA-017	186.01	1.2	Open Land, Industrial/Commercial, Forest/Woodland
Benton Loop			
CY-001	N/A	4.2	Industrial/Commercial
CY-002	N/A	15.1	Open Land, Forest/Woodland
CSA-008	116.95	0.7	Open Land, Forest/Woodland
CY-009	116.98	18.3	Open Land, Agricultural
CY-010	116.98	1.9	Agricultural
CSA -011	117.5	0.2	Open Land
CSA -012	119.39	1.1	Industrial/Commercial, Agricultural
CSA -013	120.35	7.4	Open Land
Total		**112.5**	

CSA = Contactor Staging Area
CY = Contractor Yard

Table A.6-1 lists the land requirements for ATWS, access roads, and staging areas on the Leidy South Project.

Although both National Fuel and Transco have identified areas where extra workspace or staging areas would be required, additional or alternative areas, as well as minor route alignments, additional access roads, or modification to construction methods could be identified in the future due to changes in site-specific construction requirements, unforeseen conditions in the field, or construction or contractor planning requirements. National Fuel and Transco would be required to file information on each of those areas for FERC review and approval prior to use.

A.7 CONSTRUCTION SCHEDULE

FM100 Project

National Fuel proposes to begin pipeline and aboveground facility construction in early 2021 to place the FM100 Project into service by December 2021. National Fuel proposes to begin abandonment activities in May 2022 and complete them by September 2022. Revegetation and restoration measures would be employed as soon as possible following construction per federal and state permit conditions, and disturbed areas would be stabilized and reclaimed, weather permitting, by spring 2022. National Fuel would monitor the success of revegetation for up to 3 years following construction, or until revegetation is successful.

Construction would generally take place Monday through Saturday during daylight hours, from 7 a.m. to 7 p.m.; however, National Fuel states that hydrostatic testing, waterbody crossings, and HDD activities may extend beyond normal construction hours and into Sunday, as necessary. HDD crossings may be conducted continuously (24 hours per day) at critical times. If HDD activities need to take place outside normal daytime working hours, noise mitigation measures would be implemented as described in section B.9.2.

Leidy South Project

Transco proposes to begin construction in the winter of 2020/2021 to place the Leidy South Project into service by December 2021. Revegetation and restoration measures would be employed as soon as possible following construction per federal and state permit conditions, and disturbed areas would be stabilized and reclaimed, weather permitting. Transco would monitor the success of revegetation for up to 3 years following construction, or until revegetation is successful.

Transco anticipates using multiple construction spreads[7] for the Leidy South Project. Construction of the pipeline components of the Leidy South Project would take about 6 to 7 months to complete, modifications to Compressor Station 605 would take approximately 2 weeks to complete, modifications to Compressor Station 610 would take about 10 months to complete, and construction of the new compressor stations would take about 16 months to complete.

Construction would generally take place Monday through Saturday during daylight hours, from 7 a.m. to 7 p.m.; however, Transco states that certain activities may extend beyond normal construction hours and into Sunday, as necessary. Activities that may require extended construction hours include preparing for and conducting strength and leak testing of pipeline segments; final tie-in welds and X-ray of welds; electrical conductor installation into conduit runs and wiring raceways at compressor stations; termination and verification of conductors at compressor stations; and certain pre-commissioning and commissioning activities. Additional activities Transco has identified that may require unplanned construction activity outside of typical work hours include completion of tie-in initiated earlier in the day; completion of wetland or waterbody crossings that have had unforeseen circumstances; maintenance on construction equipment for operations the following day; heating of concrete when temperatures are below 40 degrees Fahrenheit (°F); re-pressurization to continue in-progress hydrostatic testing; and completion of post-hydrostatic test drying pig runs that were initiated earlier in the day.

[7] A "spread" is an individual segment of the overall project staffed by its own labor and equipment.

A.8 CONSTRUCTION, OPERATION, MAINTENANCE, AND ABANDONMENT PROCEDURES

A.8.1 Construction Procedures

The Projects would be designed, constructed, operated, and maintained to conform to, or exceed, the requirements of the U.S. Department of Transportation (DOT) in 49 CFR 192, *Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards*. National Fuel and Transco would also construct, restore, and maintain the Projects according to the measures described in our *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures), which are best management practices developed to minimize the environmental impact of construction and operation of interstate natural gas transmission facilities. National Fuel prepared its Erosion and Sediment Control and Agricultural Mitigation Plan[8] (ESCAMP) and Transco prepared its Environmental Compliance Plan[9] (ECP), each incorporating the FERC Plan and Procedures. In accordance with the ESCAMP and the ECP, National Fuel and Transco are requesting a right-of-way width greater than 75 feet in specific wetlands based on site-specific conditions, which are evaluated in section B.3.3.1. National Fuel and Transco have also requested and provided the required site-specific justifications to allow workspaces within 50 feet of wetlands and waterbodies. These are further discussed and evaluated in sections B.3.2.1 and B.3.3.1, and outlined in appendix E.

In addition, National Fuel would also implement construction, restoration, and mitigation plans, including the following:

- Spill Prevention and Response Procedures[10] (SPRP);
- Stormwater Pollution Prevention Plan (included in its ESCAMP);
- Noxious and Invasive Weed Control Plan[11] (NIWCP); and
- Winter Construction Plan (included in its ESCAMP).

In addition, Transco would also implement construction, restoration, and mitigation plans, including the following, all of which are included in the ECP:

- Transco Plan;
- Transco Procedures;
- Construction Spill Prevention and Response Procedures for Oil and Hazardous Materials;

8 Available on eLibrary under accession no. 20190718-5087. To access the public record for this proceeding, go to FERC's Internet website (http://www.ferc.gov), click on "Documents & Filings" and select the "eLibrary" feature. Click on "Advanced Search" from the eLibrary menu and enter the accession number for the document of interest.

9 Available on eLibrary at http://www.ferc.gov under accession no. 20190731-5049.

10 Available on eLibrary at http://www.ferc.gov under accession no. 20190718-5087.

11 Available on eLibrary at http://www.ferc.gov under accession no. 20190718-5087.

- Transco Unanticipated Discovery of Contamination Plan;
- Transco Unanticipated Discovery for Cultural Resources;
- Blasting Plan;
- Winter Construction Plan;
- Traffic Management Plan;
- Fugitive Dust Control Plan;
- Draft Invasive Species Management Plan (Draft ISMP); and
- Unanticipated Discovery Plan for Paleontological Resources.

These plans are available for review on each project's docket in FERC's E-Library. We have reviewed these construction and mitigation plans, and have found them acceptable, with one exception to Transco's ECP which we recommend be revised and is further discussed in section B.2.3.1.

A.8.1.1 General Pipeline Construction

Standard pipeline construction consists of specific activities that make up a linear construction sequence. Figure A.8.1-1 depicts the typical sequence of cross-country pipeline construction. National Fuel and Transco would notify affected landowners prior to initiating preconstruction surveys. The crews would then survey the route and stake the proposed pipeline centerlines, foreign pipeline and utility crossings, and workspace limits, along with wetland boundaries and other environmentally sensitive areas. Temporary soil erosion and sedimentation controls would be installed in accordance with National Fuel's ESCAMP and Transco's ECP, and maintained throughout construction. Clearing crews would then cut vegetation and either chip it for use as mulch on upland areas of the right-of-way or dispose of it in accordance with landowner requirements and local regulations. Burning may be conducted if permitted. Large trees would be removed from the approved workspace only if necessary. In certain areas, clearing would be conducted within specified timing windows to avoid or minimize impacts on special status species habitat. After clearing, the right-of-way would be graded to create a generally level and safe work surface.

The trench for installation of the pipelines would be excavated by track-mounted backhoes or similar equipment. Spoil from the trench would typically be stored on the opposite side of the trench from the construction equipment, or in approved ATWS. The trench would then be excavated to provide a minimum of 3 feet of cover over the pipe after backfilling; however, the pipeline could be installed with less than 3 feet of cover in areas of shallow bedrock in accordance with DOT regulations. In agricultural and residential areas, up to 12 inches of topsoil would be removed and stored separately from the subsoil. Water trucks would be used as necessary to control dust along the construction travel lane.

After trench excavation, pipe sections would be delivered to the right-of-way and placed on skids adjacent to the trench. Professional welders, qualified according to applicable industry standards and each company's requirements, would weld the pipe sections together, and certified inspectors would utilize visual and non-destructive methods to test the integrity of the welds according to industry protocol. Previously uncoated pipe ends would be field coated with an industry-approved anti-corrosion coating; inspectors would check the entire pipe for defects in the coating and make repairs as needed. The trench would then be cleaned of any debris, and side booms would be used to lower the pipeline into the trench.

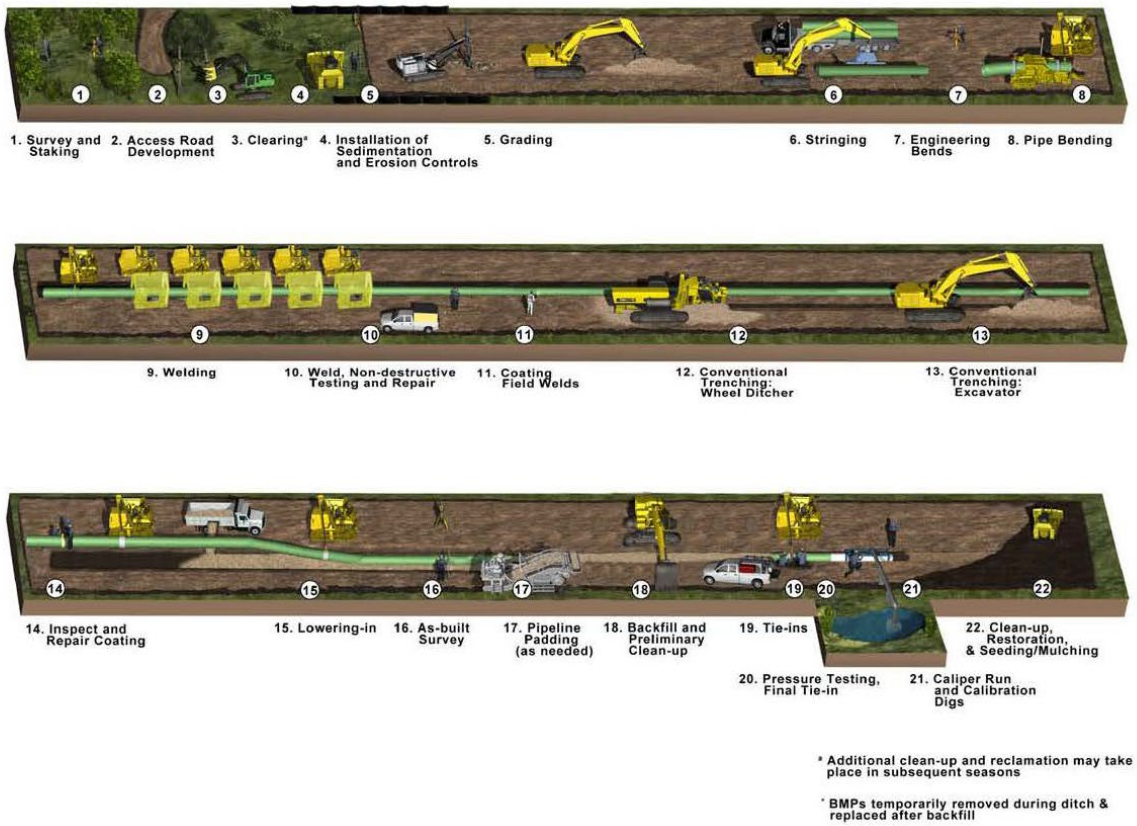

Figure A.8.1-1
FM100 Project and Leidy South Project
Typical Pipeline Construction Sequence

After the pipe is positioned in the trench, crews would backfill the trench with the previously excavated material. Where topsoil is stored separately from subsoil, the crews would backfill the subsoil first and then replace the topsoil over the subsoil. In residential and agricultural areas, compacted subsoil would be disked[12] prior to topsoil replacement. Surplus construction material and debris would be removed and disposed of at appropriate disposal sites, and all work areas would be graded to match surrounding contours. Following backfilling and before being placed into service, the new pipelines would be hydrostatically tested to ensure that they can operate safely at the design pressure. Hydrostatic testing would be conducted in accordance with applicable permits, and no chemicals would be added to the test water. Finally, crews would install permanent erosion controls within the right-of-way, if necessary, and initiate revegetation measures in accordance with National Fuel's ESCAMP and Transco's ECP, and applicable permit requirements.

A.8.1.2 Additional Temporary Workspaces, Contractor/Pipe Storage Yards, Contractor Staging Areas, and Access Roads

National Fuel and Transco would use ATWS along the pipeline rights-of-way for various road, wetland, and waterbody crossings; in conjunction with construction of new and modified aboveground facilities; and for specialized construction technique areas (e.g., steep side slopes). In general, ATWS and contractor/pipe yards would be cleared and graded for use during construction in accordance with National Fuel's ESCAMP and Transco's ECP.

National Fuel and Transco would modify private roads for access during construction and/or operation of the Projects and would construct new roads for access to the pipeline rights-of-way and new aboveground facilities. Modification and construction of access roads would involve trimming or removal of vegetation, grading, and placement of gravel surfacing. Roads only used for construction would be restored to previous conditions or in accordance with landowner agreements. The environmental impacts associated with the use of ATWS, contractor/pipe yards, and access roads, and the measures the companies would implement to minimize impacts, are discussed in appropriate sections of this EA.

A.8.1.3 Aboveground Facilities

Construction and modifications of aboveground facilities would typically include clearing, grading, compacting the site where necessary, pouring concrete foundations, and erecting/installing aboveground equipment, buildings, and piping. Limited direct ground disturbance (e.g., grading and excavation) would be needed to complete the facility modifications. Erosion and sediment controls would be installed around disturbed areas prior to the start of facility construction to minimize the potential for erosion and the potential for impacts on offsite wetlands and waterbodies.

Construction of new compressor stations would generally involve excavation as necessary to accommodate the concrete foundations for the new compressors and buildings. The compressor station equipment typically would be shipped to the site by truck and stored onsite. The equipment would then be positioned on foundations, leveled, grouted where necessary, and secured with anchor bolts. The buildings would be erected in accordance with industry standards and building codes, as applicable. All components in high-pressure natural gas service would be hydrostatically tested and all controls and safety equipment and systems, emergency shutdown equipment, relief valves, and gas measurement and control equipment would be commissioned prior to being placed in service. The areas disturbed by construction would be graded, restored, and landscaped, including any visual screening measures that are

[12] Disking the subsoil typically involves the use of tractors equipped with steel disk blades, or similar equipment, to loosen soils that have been compacted by construction activities.

necessary. Graveled areas, paved areas, or areas with aboveground facilities would not be restored. The compressor stations would be enclosed by security fence and controlled access gates.

The proposed modifications at existing compressor stations would occur within National Fuel's and Transco's existing compressor station sites. The proposed work at MLV, pig launcher/receiver, and other aboveground facility sites would be completed in conjunction with construction of the pipeline facilities.

A.8.1.4 Special Pipeline Construction Procedures

In addition to the standard pipeline construction methods described above, National Fuel and Transco would implement special construction procedures due to site-specific conditions and to reduce overall project impacts. These special pipeline construction procedures are described in the following subsections.

Wetlands

Wetland crossings would be accomplished in accordance with the FERC Procedures that have been incorporated into National Fuel's ESCAMP and Transco's ECP, which are designed to minimize wetland impacts and facilitate wetland restoration, and in accordance with other applicable federal and state permit requirements. In general, the companies would implement construction procedures similar to those used in upland areas to cross wetlands that are unsaturated at the time of construction, including segregating and replacing topsoil. In wetlands with saturated soil or standing water at the time of construction, the companies would utilize timber mats or other temporary surface material adjacent to the trench to provide a stable work area. They also may string and assemble the pipeline crossing segments in an adjacent upland workspace to minimize construction time within the wetland. Topsoil segregation would not be conducted in wetlands with saturated soil or standing water. Soils impacts and mitigation measures are further addressed in section B.2.2.1.

In addition, each company would limit the construction right-of-way width to 75 feet in wetlands and set temporary extra workspaces a minimum of 50 feet back from wetland boundaries, unless otherwise requested and approved by FERC on a site-specific basis in accordance with National Fuel's ESCAMP and Transco's ECP. Figures depicting the proposed wetland crossing methods are included in National Fuel's ESCAMP and Transco's ECP. Each company has also prepared construction alignment sheets that depict the delineated extent of wetlands that would be affected by construction and the workspace limits in proximity to each wetland crossing. Wetland crossings are further described in section B.3.3.1.

Waterbodies

Waterbody crossings would be constructed in accordance with the FERC Procedures incorporated into National Fuel's ESCAMP and Transco's ECP, and in accordance with other applicable federal and state permit requirements. National Fuel would use one of the following methods to cross each waterbody:

- standard upland construction techniques would be used at ephemeral and intermittent waterbodies that are less than 10 feet wide and are without flow at the time of construction;
- dry crossing methods, which would utilize either a flume or a dam and pump system to temporarily divert water around the crossing location, would be used at certain perennial streams as well as ephemeral and intermittent streams with flow at the time of crossing; and

- HDD, which is a trenchless crossing method, would be used to avoid direct impacts on sensitive resources, such as wetlands and waterbodies, by boring beneath the resource.

Transco also would also use the above methods but is not planning any HDD crossings. Each company would also utilize temporary bridges to provide equipment crossing and vehicle access across waterbodies in as described in National Fuel's ESCAMP and Transco's ECP. Additional information regarding waterbodies affected by the Projects and waterbody crossing methods, including potential impacts, are discussed in section B.3.2.1

Horizontal Directional Drill

National Fuel proposes to utilize two HDDs on the FM100 Project; Transco is not planning any HDD crossings. The HDD method utilizes specialized drilling equipment and work crews to install pipeline segments beneath the ground surface, typically to avoid sensitive environmental resources or in constricted construction areas. The design and feasibility of an HDD is determined by a number of factors, including the length, depth, and curvature (i.e., profile) of the proposed drill; surrounding topography; pipeline diameter; availability and orientation of land on which to assemble the HDD pipeline segment; land use constraints; and geotechnical suitability of the subsurface environment. National Fuel has prepared site-specific plans for each HDD crossing that identify the planned workspaces, entry and exit points, and profiles of the drill path.

The HDD method is initiated by drilling a small-diameter pilot hole along a pre-determined underground path. A reaming tool is then used to enlarge the pilot hole to a diameter slightly greater than the diameter of the pipeline and a pre-assembled segment of pipeline is then pulled back through the hole. After the pipeline segment is pulled into place, it is hydrostatically tested and welded to the remainder of the pipeline at each end of the HDD. The HDD process includes the use of drilling fluid to lubricate the drill bit, return cuttings to the surface, and maintain the borehole. National Fuel would use a non-hazardous drilling fluid comprised primarily of water, inert solids, and bentonite (a naturally occurring clay mineral).

Drilling fluid can be inadvertently released outside of the drill path and migrate to the land surface or within the resource being crossed, resulting in pooling on the ground surface or turbidity and sedimentation in waterbodies and wetlands. In order to minimize the potential for adverse impacts from inadvertent releases, National Fuel has developed a plan to monitor for, respond to, and clean up inadvertent releases during drilling. National Fuel's Horizontal Directional Drill and Inadvertent Return Contingency Plan[13] (HDD Plan) is included in its ESCAMP. We have reviewed National Fuel's HDD Plan and find it acceptable.

Residential Areas

National Fuel and Transco would implement the construction and restoration measures described in their ESCAMP and ECP, respectively, and as detailed in their site-specific Residential Construction Plans (RCP) (see appendix C) to reduce construction-related impacts in residential areas. In general, each company would reduce construction workspace, as practicable, to minimize inconvenience to landowners, minimize the clearing of trees, limit workspace to the confines of Transco's existing right-of-way where possible, maintain access for landowners affected during Project construction, and make every effort to ensure that cleanup is thorough. Each company would also take steps to protect drinking water wells (see section B.3.1.1), and each company has developed Landowner Complaint Resolution Procedures that

[13] Available on eLibrary at http://www.ferc.gov under accession no. 20190926-5159.

outline the steps it would take to address landowner issues during and after construction. Transco would also utilize the following measures to minimize impacts on residences:

- working over or between existing pipelines at select locations to reduce the construction workspace;
- utilizing crossovers to reduce impacts on residences;
- reducing the offset between the existing and proposed pipelines to reduce the construction workspace; and/or
- using a stove-pipe or drag-section construction method (described below).

Stove-Pipe or Drag-Section

In the event that the construction right-of-way is restricted due to an existing structure or steep slopes, Transco would use the stove-pipe method, which involves installing the pipeline one joint at a time and conducting welding and coating activities within the trench, thereby minimizing the amount of workspace required. Alternatively, Transco may also utilize the drag-section method that involves trenching, installing a pre-fabricated section of pipe containing several pipe segments, then backfilling, all in one day. If necessary, steel plates, equipment mats, or safety fencing would be used to ensure safety when backfilling cannot be completed in a single day.

Stove piping may be used by Transco during construction through difficult terrain where winching operations are required and/or where it would be infeasible to safely operate multiple pieces of equipment and stage pipe along an open trench. In scenarios of difficult terrain, the overall construction right-of-way width may not be able to be reduced as it could near a residence, but the pipe would still be installed one joint at a time, in which the welding, weld inspection, and coating activities would be performed in the open trench. Transco would use stove-pipe construction methods on the Hensel Replacement throughout most of its length due to limited workspace on the working side of the construction right-of-way and difficult terrain that would require winching; exceptions to this approach include stream and road crossings. Transco would also use stove-pipe on the Hilltop Loop from approximate mileposts 184.5 to 184.9 and from approximate mileposts 185.1 to 185.5 due to steep slopes and difficult terrain at those locations. Additional discussion about Transco's construction near existing structures is provided in section B.5.2.7.

National Fuel has not identified the need to use stove-pipe or drag-section methods.

Railroad and Road Crossings

National Fuel and Transco would cross major paved highways and railroads where traffic cannot be interrupted using the bore crossing method. Smaller roads with low traffic volume would be crossed by the open-cut method and then restored to preconstruction condition. The pipeline would conform to DOT standards, typically buried to a depth of at least 5 feet below the road surface and would be designed to withstand anticipated external loading.

The bore crossing method involves use of an auger drill to install the pipeline below the ground surface. The bore method requires excavation pits on each side of the feature and ATWS to store the spoil from the pits. The pipe would typically be bored a minimum depth of 5 feet below the surface to allow the pipeline to withstand expected external loadings. Depending on permit conditions, the pipe may or may not be cased at road crossings. The bore crossing method allows the roadway to remain in

service while the installation process takes place. As a result, there is little or no disruption to traffic at roadway crossings that are crossed by this method.

With the open-cut crossing method, the trench is excavated, and the pipe installed using the standard cross-country construction methods described above. Temporary closure of the road to traffic and establishment of detours may be required. If no reasonable detour is feasible, at least one lane of the road being crossed would be kept open to traffic.

Utility Crossings

National Fuel and Transco would participate in the Pennsylvania "Call Before You Dig" and national 811 systems to identify utilities that may be crossed and would consult with utility companies to determine the exact locations of utilities in relation to the pipelines and protective measures that would be implemented during construction.

Blasting

Based on its prior pipeline construction experience in the area of the Projects, National Fuel and Transco do not anticipate that blasting would be necessary for construction. Both companies would use rock hammers and ripping tools as the preferred method for trenching the pipelines into weathered or unconsolidated rock. However, if bedrock is encountered that requires blasting, National Fuel and Transco would implement measures to minimize blasting effects on nearby wells, springs, structures, and other resources. Blasting would be conducted by licensed personnel and in compliance with applicable federal, state, and local regulations. Affected landowners, nearby businesses, and other nearby parties would be notified in advance of blasting activity. Additional discussion of impacts related to blasting is included in section B.1.1.2.

Winter Construction

In the event that construction would need to occur during extended periods of freezing or snowfall events, National Fuel and Transco have developed project-specific winter construction plans that are provided in their ESCAMP and ECP, respectively. These plans include measures that would be implemented to manage snow, work with frozen soils, and discharge hydrostatic pressure test water under freezing conditions. We have reviewed National Fuel's and Transco's winter construction plans and find them acceptable.

Steep Slopes and Side-Slopes

In areas of steep slopes, equipment would typically be anchored to the top of the slope and "winched" up and down the slope to facilitate construction. Temporary and permanent slope breakers would be installed across the slope and permanent trench breakers would be keyed-into the trench walls during installation around the pipeline. Where construction would take place in locations with side-slopes, two-toning would be used. Two-toning involves grading or terracing slopes to create level working areas, typically by cutting the uphill side of the construction right-of-way and using the cut material to level out the downhill side. Upon completion of construction, the excavated material would be put back and contours restored to the approximate pre-construction profile. Additional discussion of impacts related to slopes is included in section B.1.3.2 and typical drawings are included in appendix B.

Agricultural Land

In actively cultivated or rotated croplands and pastures, National Fuel and Transco would strip topsoil up to 12 inches in depth, keep it segregated from subsoil, and replace it on the ground surface during restoration to preserve soil productivity. Each company would work with landowners prior to construction to identify and locate any existing drain tile or irrigation systems, and to repair or replace any systems damaged by construction trenching or heavy equipment operation. In addition, each company would remove excess rock from the upper 12 inches of the soil during restoration. Additional discussion of impacts related to agricultural lands is included in sections B.2.1 and B.5.2.1.

A.8.2 Abandonment Procedures

FM100 Project

National Fuel's abandonment and removal procedures would be coordinated to minimize the total time a tract of land is disturbed, reducing erosion potential and loss of land use. Removal activities would be confined to National Fuel's existing right-of-way and access roads and would be conducted in accordance with its ESCAMP. The environmental inspection program would apply to any areas identified for abandonment in this plan. Abandonment procedures would vary by site; a general description of the removal procedures for each project is provided below.

National Fuel would abandon the pipeline in place with the exception of isolated sections identified in table A.6.1-2. Where landowners or agencies have requested the pipeline be removed, National Fuel would excavate a trench either directly above or adjacent to the pipe and then the exposed pipe would be pulled into the excavated trench and removed. The pipe would be cut and capped at the property lines and the pipe hauled away to one of the proposed contractor yards or another appropriate site (such as a scrap yard). The trenchline would be backfilled immediately after removal of the pipe. National Fuel would minimize impacts by implementing its ESCAMP. Typical pipeline construction equipment would be used to expose and remove pipe sections and appurtenances, backfill the trench, restore the grade and contour of the disturbed workspace, and revegetate the disturbed areas.

In cases where the pipe would be abandoned in-place, grouting or expandable foam would be used to fill and plug the pipeline to avoid creating a conduit for water across certain road/railroad crossings, waterbodies, wetlands, and other locations. At these locations, typical pipeline construction equipment would be used to expose and cut a hole in the pipe to allow access for a grout/foam plug to be inserted into a section of pipe. Following grouting the bell hole excavation would be backfilled, the grade and contour of the disturbed workspaces restored, and workspaces revegetated. National Fuel would minimize impacts by implementing its ESCAMP.

The remainder of Line FM100 would be abandoned in place after the cleaning and purging of the pipeline. National Fuel would use a pig to clean the pipeline and then use an inert gas to purge the pipeline of natural gas. Any cleaning fluids produced from this process would be collected and disposed of as hazardous waste.

National Fuel would abandon and remove the Costello Compressor Station, including the two gas-fired compressor units, one backup generator, and all ancillary buildings. Once the facility and equipment have been removed and hauled away, National Fuel would grade and seed the site.

National Fuel would abandon and remove aboveground valve and meter stations by cutting the facilities just below grade and blind flanging the pipe. Once these activities are complete, the sites would be regraded and restored to surrounding conditions. Other aboveground facilities such as rectifiers,

milepost markers, casting vents, and other appurtenances would be removed with no ground disturbance and capped, as necessary. All abandoned and removed equipment would be hauled offsite.

Leidy South Project

Specifically for the Hensel Replacement, Transco would use similar procedures to abandon pipeline by removal as National Fuel, including excavating the existing pipeline, cutting the pipe out, backfilling the trench with excavated material, restoring the grade to approximate original contours, and revegetating the disturbed area. Where the pipeline is abandoned in place, Transco would expose the pipeline to pump in grout and cap it on either end once grouting is in place. After the grouting has been completed, Transco would cap the access points, replace excavated materials, and revegetate the disturbed areas.

A.8.3 Environmental Compliance Inspection and Mitigation Monitoring

In preparing construction drawings and specifications for the Projects, National Fuel and Transco would incorporate the mitigation measures identified in their FERC applications, as well as additional requirements of federal, state, and local agencies. The companies would provide the construction contractors with copies of applicable environmental permits, as well as copies of "approved for construction" environmental construction alignment sheets and construction drawings and specifications.

National Fuel and Transco would conduct training for its construction personnel, including Environmental Inspectors (EIs), contractors, and their employees, regarding proper field implementation of their environmental and other Project-specific plans and mitigation measures. The training would cover the Projects' environmental documents, Project-specific conditions contained in the Commission Order, and other applicable federal, state, and local permits and approvals.

Both companies would be represented by a Chief Inspector, who would be responsible for quality assurance and compliance with mitigation measures, other applicable regulatory requirements, and company specifications. The Chief Inspector would be assisted by at least one full-time Craft Inspector and EI(s). The EIs would have authority to stop activities that violate the measures set forth in the Projects' documents and authorizations and would have the authority to order corrective action. National Fuel's ESCAMP and Transco's ECP identify additional responsibilities of the EIs. FERC would also conduct routine inspections during construction to determine compliance with any conditions attached to an Order and to inspect the construction conditions of the Projects' facilities.

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

A.8.4 Operation, Maintenance, and Safety Controls

Operational activities on the pipelines would be limited to maintenance of the right-of-way and inspection, repair, and cleaning of the pipeline. Periodic aerial and ground inspections by pipeline personnel would assist in identification of the following conditions: soil erosion that may expose the pipe, surface visual clues that may indicate a leak in the line, conditions of the vegetation cover and erosion

control measures, unauthorized encroachment on the right-of-way, excavation activities in the vicinity of the right-of-way, and other conditions that could present a safety hazard or require preventative maintenance or repairs. The pipeline cathodic protection systems also would be monitored and inspected by pipeline personnel periodically to ensure proper and adequate corrosion protection. Appropriate corrective action to conditions observed during inspection would be taken as necessary.

To maintain accessibility of the right-of-way and to accommodate pipeline integrity surveys, vegetation on the new permanent rights-of-way would be maintained by mowing and clearing in all areas except for active agricultural areas and wetlands. The right-of-way would be allowed to revegetate; however, large brush and trees would be periodically removed as described in National Fuel's ESCAMP and Transco's ECP. Trees or deep-rooted shrubs could damage the pipeline's protective coating, obscure periodic surveillance and inspection, or interfere with potential repairs, and thus would not be allowed to grow near the pipeline. In particular, large tree growth would typically be restricted within 25 feet of either side of the pipeline in uplands. 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 clearly indicate the presence of the pipeline and provide a telephone number and address where a company representative can be reached in the event of an emergency or prior to any third-party excavation in the area of the pipeline. Both companies would participate in the Pennsylvania One-Call system.

Each company's safety controls are detailed in section B.10.3 and include monitoring the pipeline systems using a supervisory control and data acquisition system. This system gathers information related to system pressures, flows, and customer deliveries 24 hours per day, 365 days per year and transfers the information to each company's gas control center. Existing compressor station crews would operate and maintain the compressor station equipment and perform routine checks of the facilities, including calibration of equipment and instrumentation, inspection of critical components, and scheduled and routine maintenance of equipment. Safety equipment, such as pressure relief, fire detection, and gas detection systems, would be tested periodically for proper operation. National Fuel and Transco would take corrective action for any identified problem.

A.9 FUTURE PLANS AND ABANDONMENT

National Fuel states the FM100 Project has been designed to meet that project's purpose and need. National Fuel has no current plans to expand or abandon project facilities. In the event that National Fuel proposes any expansion or abandonment in the future, National Fuel would be required to seek the appropriate approvals from the Commission and other applicable state and federal agencies.

We received comments that raised concern about future expansion of the Leidy South Project, particularly with regard to compressor station footprints. Transco states that the Leidy South Project has been designed to meet that project's purpose and need and that Transco has no current plans to expand or abandon project facilities. In the event that Transco proposes any expansion or abandonment in the future, Transco would be required to seek the appropriate approvals from the Commission and other applicable state and federal agencies.

A.10 NON-JURISDICTIONAL FACILITIES

Under section 7 of the NGA, the Commission is required to consider, as part of its decision to authorize jurisdictional facilities, all factors bearing on the public convenience and necessity. Occasionally, proposed projects have associated facilities that do not come under the jurisdiction of FERC. These non-jurisdictional facilities may be integral to a project (e.g., a natural gas-fueled power plant at the end of a jurisdictional pipeline) or they may be minor, non-integral components of the jurisdictional facilities that would be constructed and operated because of a proposed project.

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The new Marvindale and Tamarack Compressor Stations would require the installation of electric powerlines and communication lines, which would be installed by the local utilities company. The construction of these utility lines is anticipated to occur within the compressor station boundaries and the proposed workspaces, and therefore impacts associated with these facilities have been incorporated into the overall impacts discussed throughout section B.

Leidy South Project

Transco did not identify any specific non-jurisdictional facilities, with the exception of possible power and communication service. Existing Compressor Stations 605 and 610 already have power and communication service therefore we do not anticipate new non-jurisdictional facilities associated with these facilities, however Transco indicated the utility companies may need to replace or add poles within the existing utility corridors. New Compressor Stations 607 and 620 would require the installation of electric power. Because the new compressor stations would be in areas currently serviced by electric power, we do not anticipate the need for any new aboveground powerline or communication facilities for the compressor stations. We assume the electric power and communication lines required at the compressor stations would drop from existing lines to the compressor station properties and therefore, we assume the impacts of these powerlines are accounted for in the impacts described for each of the new compressor stations.

A.11 PERMITS AND APPROVALS

Tables A.11-1 and A.11-2 list the major federal, state, and local permits, approvals, and consultations for construction and operation of the FM100 Project and the Leidy South Project, respectively, and provide the current status of each associated permit, approval, and consultation. National Fuel and Transco would be responsible for obtaining and abiding by all permits and approvals required for construction and operation of their respective projects regardless of whether they appear in the tables or not.

TABLE A.11-1

Permits, Approvals, and Consultations for the FM100 Project [a]

Permitting/Approval Agency	Permit, Approval, or Consultation	Anticipated or Actual File Date	Receipt Date (Anticipated)
FEDERAL			
Federal Energy Regulatory Commission	Certificate of Public Convenience and Necessity	7/18/2019	(Pending)
U.S. Army Corps of Engineers, Baltimore and Pittsburgh Districts	Department of the Army permit under section 404 of the Clean Water Act (CWA) / Joint Permit Application for Pennsylvania Chapter 105 Water Obstruction and Encroachment Permit	11/18/2019	(Q2 2020)
	Department of the Army permit under section 10 of the Rivers and Harbors Act	11/18/2019	(Q2 2020)
U.S. Fish & Wildlife Service, Pennsylvania Ecological Services Field Office	Endangered Species Act, section 7 Consultation; Fish and Wildlife Coordination Act Consultation; Migratory Bird Treaty Act Consultation; Bald and Golden Eagle Protection Act Consultation	8/29/2017	6/5/2019

TABLE A.11-1 (cont'd)

Permits, Approvals, and Consultations for the FM100 Project [a]

Permitting/Approval Agency	Permit, Approval, or Consultation	Anticipated or Actual File Date	Receipt Date (Anticipated)
STATE			
Pennsylvania Department of Environmental Protection, Regional Bureaus of Waterways Engineering and Wetlands	CWA 401 Water Quality Certification	11/18/2019	(Q2 2020)
	Chapter 105 Water Obstruction and Encroachment Permit – Pennsylvania Programmatic General Permit (PASGP-5)	11/18/2019	(Q2 2020)
Pennsylvania Department of Environmental Protection, Bureau of Clean Water	CWA section 402 National Pollution Discharge Elimination System – Individual Permit for Hydrostatic Test Water Discharge Permit/Approval	Status Unknown	(Q2 2020)
	Chapter 102 Erosion and Sediment Control Plan Review and Permit (ESCGP-3) for Construction Activities	11/18/2019	(Q2 2020)
Pennsylvania Department of Environmental Protection, Bureau of Air Quality	General Permit (GP-5)	12/19/2019	(Q1 2020)
Pennsylvania Fish and Boat Commission	Aid to Navigation Plans (if required)	Status Unknown	(Q2 2020)
	Stream Blasting Permit (if required)	Status Unknown	(Q2 2020)
	Consultation (rare aquatic and amphibian species)	11/19/2019	10/8/2019
Pennsylvania Department of Transportation	Highway Occupancy Permit	Status Unknown	(Q2 2020)
Pennsylvania Department of Conservation and Natural Resources	Consultation (rare plant species)	8/14/2017	(Q2 2020)
Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry	Consultation (state forest land crossed by Project)	10/3/2019	(Q2 2020)
Pennsylvania Game Commission	Consultation (rare mammalian and avian species)	4/29/2019	(Q2 2020)
	Game Lands Special Permits	Status Unknown	(Q2 2020)
Pennsylvania Historical and Museum Commission, State Historic Preservation Office	Section 106, National Historic Preservation Act Consultation	6/6/2019 9/7/19 9/21/19	6/27/19 10/8/19 10/8/19
LOCAL			
Cameron County Conservation District	Erosion and Sediment Control General Permit 3 (ESCGP-3)	11/18/2019	(Q2 2020)
Clearfield County Conservation District	ESCGP-3	11/18/2019	(Q2 2020)
Clinton County Conservation District	ESCGP-3	11/18/2019	(Q2 2020)
Elk County Conservation District	ESCGP-3	11/18/2019	(Q2 2020)
McKean County Conservation District	ESCGP-3	11/18/2019	(Q2 2020)
Potter County Conservation District	ESCGP-3	11/18/2019	(Q2 2020)

[a] Consultations with Native American Groups are summarized in section B.6.3

TABLE A.11-2

Permits, Approvals, and Consultations for the Leidy South Project [a]

Permitting/Approval Agency	Permit, Approval, or Consultation	Anticipated or Actual File Date	Receipt Date (Anticipated)
FEDERAL			
Federal Energy Regulatory Commission	Certificate of Public Convenience and Necessity	7/31/2019	(Pending)
U.S. Army Corps of Engineers, Baltimore District	Department of the Army permit under section 404 of the CWA	9/27/2019	(Q1 2020)
	Department of the Army permit under section 10 of the Rivers and Harbors Act	9/27/2019	(Q1 2020)
U.S. Fish & Wildlife Service, Pennsylvania Ecological Services Field Office	Endangered Species Act, section 7 Consultation; Fish and Wildlife Coordination Act Consultation; Migratory Bird Treaty Act Consultation; Bald and Golden Eagle Protection Act Consultation	10/31/2018	10/1/2019
INTERSTATE AGENCIES			
Susquehanna River Basin Commission	Water Allocation Permit	Status Unknown	(Q3 2020)
STATE			
Pennsylvania Department of Environmental Protection, Bureau of Waterways Engineering and Wetlands	CWA 401 Water Quality Certification	8/23/2019	(Q3 2020)
	Chapter 105 Application	8/27/2019	(Q4 2020)
	Submerged Land License	8/27/2019	(Q4 2020)
Pennsylvania Department of Environmental Protection, Bureau of Clean Water	CWA section 402 National Pollution Discharge Elimination System – Individual Permit for Hydrostatic Test Water Discharge Permit/Approval	12/12/2019	(Q4 2020)
	Chapter 102 Erosion and Sediment Control Plan Review and Permit (ESCGP-3) for Construction Activities	9/27/2019	(Q4 2020)
Pennsylvania Department of Environmental Protection, Bureau of Air Quality	Air Quality Request for Determination	10/4/2019	(Q2 2020)
	Air Quality General Plan Approval (minor)	10/4/2019	(Q2 2020)
	General Permit (GP-5)	10/4/2019	10/28/2019 (Compressor Station 610) 11/25/2019 (Compressor Stations 607 and 620)
Pennsylvania Fish and Boat Commission	Aid to Navigation Plans	8/5/2019	8/6/2019
	Stream Blasting Permit	Q1 2020	(Q3 2020)
	Consultation (rare aquatic and amphibian species)	10/31/2018	9/26/2019
Pennsylvania Department of Transportation	Highway Occupancy Permit	Q1 2020	(Q3 2020)
Pennsylvania Department of Conservation and Natural Resources	Consultation (rare plant species)	10/31/2018	10/3/2019
Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry	License for Right-of-Way on State Forest Land	12/21/2018	(Q3 2020)
Pennsylvania Game Commission	Consultation (rare mammalian and avian species)	10/31/2018	10/1/2019
Pennsylvania Historical and Museum Commission, State Historic Preservation Office	Section 106, National Historic Preservation Act Consultation	June 2019 July 2019	7/9/2019 8/13/2019 October 1, 2019

[a] Consultations with Native American Tribes are summarized in section B.6.3

SECTION B – ENVIRONMENTAL ANALYSIS

The environmental consequences of constructing, operating, and abandoning the Projects 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 and abandonment with the resource returning to preconstruction or pre-abandonment condition immediately after restoration or within a few months. Short-term impacts could continue for up to 3 years following construction or abandonment. Long-term impacts generally last more than 3 years, but the affected resource eventually recovers to preconstruction or pre-abandonment conditions. Permanent impacts are those that result from activities that modify a resource to the extent that it does not return to preconstruction or pre-abandonment conditions during the operational life of a project, such as the construction of aboveground facilities or permanent removal of forest vegetation. An impact would be considered significant if it would result in a substantial adverse change in the physical environment.

B.1 GEOLOGIC RESOURCES

This section describes the geologic setting, mineral resources, geologic hazards, and paleontological resources associated with the Projects; the measures that National Fuel and Transco would implement to minimize impacts on geologic resources during construction and operation of the Projects; and any Staff recommendations to further avoid or minimize impacts on geologic resources.

As fully described in section A.8.2, the abandonment and modification activities for the Projects would generally be limited to grading and shallow excavation in small, isolated, and previously disturbed areas that would be restored in accordance with National Fuel's ESCAMP and Transco's ECP, which we find acceptable. Similarly, the use of access roads and staging areas would only involve surficial grading, and the roads and staging areas used during construction would be restored in accordance with each company's applicable plans. As a result, the proposed abandonment and modification activities and use of access roads and staging areas would not result in any significant impact on geologic resources. Therefore, the remainder of this section focuses on the geologic setting, mineral resources, geologic hazards, and paleontological resources associated with only the new pipeline and compressor station facilities proposed by National Fuel and Transco.

B.1.1 Geologic Setting

B.1.1.1 Regional Physiography and Geology

The new facilities associated with the Projects occur in north-central Pennsylvania within the Deep Valley Section of the Appalachian Plateau Physiographic Province and the Susquehanna Lowland and Anthracite Upland Section of the Ridge and Valley Physiographic Province (PADCNR, 2000).

In the general area of the Projects, the Appalachian Plateau and the Ridge and Valley Physiographic Provinces are underlain by predominantly clastic Paleozoic sedimentary bedrock formations that occur at or near the land surface. However, the landforms in each Province vary due to the degree of deformation of the bedrock units. In the Deep Valley Section of the Appalachian Plateau Province, the bedrock units are generally flat-lying and moderately folded, and have been incised by streams in angulate or rectangular drainage patterns resulting in deep, angular valleys separated by broad to narrow uplands capped by more resistant rock, with moderate to very high local relief. In contrast, bedrock formations in the Susquehanna Lowland and Anthracite Upland Sections of the Ridge and Valley Province are inclined to a greater degree and more closely folded, resulting in low to moderately high linear ridges and valleys with low to high relief and a trellis or angulate drainage pattern.

Table B.1.1-1 summarizes the topography, underlying rock type, and geologic structure associated with the Projects, and the U.S. Geological Survey (USGS) maps included in appendix A depict the topography and landforms at and near the Projects.

B.1.1.2 Surficial Geology

FM100 Project

The surficial geology of the Line KL Extension, Line YM58, and Line YM224 consists of thin deposits of residuum, colluvium, and alluvium derived from underlying shale, siltstone, and sandstone bedrock, with stratified glacial deposits, silt, sand, and gravel in stream valley floors (PADCNR, 1989; 1997). Residuum is a surface deposit derived from the weathering of underlying bedrock, colluvium is a poorly sorted hillside deposit that has been transported downslope by gravity-driven processes, and alluvium consists of well- to poorly stratified clay, silt, sand, and gravel deposited on valley bottoms by flowing water.

Geotechnical soils borings at the Marvindale and Tamarack Compressor Station sites found generally silty sand and gravel to the top of bedrock, which ranged from depths of 9 to 10 feet at the Marvindale site and 9 to 26 feet at the Tamarack site.

Leidy South Project

The surficial geology of the Hensel Replacement and Hilltop Loop consists of unconsolidated residuum, colluvium, and alluvium (PADCNR, 1989). The surficial geology of the Benton Loop consists of outcropping sandstone and shale bedrock and areas where bedrock is overlain by unconsolidated glacial till, resedimented till, and lag (PADCNR, 2000; 2004). The unconsolidated deposits range from clay and silt to cobbles and boulders.

Transco states that it will provide geotechnical reports for Compressor Station 607 and Compressor Station 620 sites in a subsequent filing to the Commission. The geotechnical reports would identify the near-surface geology at each site, but existing resources describe the surficial geology at Compressor Station 607 as a thin deposit of unconsolidated, sandy glacial till (PADCNR, 1997), and at Compressor Station 620 as unconsolidated residuum derived from sandstone, shale, conglomerate, and coal bedrock units (PADCNR, 1989).

B.1.1.3 Bedrock Geology

The shallowest bedrock formations underlying the Projects are predominantly Pennsylvanian, Mississippian, and Devonian clastic sedimentary rocks, including conglomerate, sandstone, siltstone, and shale, with some coal and limestone seams. These formations include the Liewellyn Formation, Pottsville Formation, Mauch Chunk Formation, Huntley Mountain Formation, Burgoon Sandstone, Shenango Formation through Oswayo Formation (undifferentiated), and Catskill Formation (PADCNR, 1990; 2019a). No hard, shallow igneous or metamorphic formations would be crossed by the Projects.

Shallow Bedrock Crossed by the FM100 Project

Based on a review of the U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) soils datasets (see section B.2), approximately 13.3 miles (45 percent) of Line YM58 and 0.8 mile (57 percent) of the Line YM224 Loop cross areas where bedrock is within 5 feet of the surface. The KL Extension would not cross areas of shallow bedrock.

TABLE B.1.1-1

Physiography and Geology of the FM100 Project and Leidy South Project Areas

Physiographic Province	Physiographic Section	Dominant Topographic Form	Local Relief [a]	Underlying Rock Type	Geologic Structure	Drainage Pattern	Projects Facilities within Province/Section
Appalachian Plateaus	Deep Valleys	Very deep, angular valleys; some broad to narrow uplands	Moderate to very high	Sandstone, siltstone, shale, and conglomerate.	Moderate-amplitude, open folds that control valley orientations	Angulate and rectangular	• FM100 Project o Line YM58 o Line YM224 o Line KL Extension o Marvindale Compressor Station o Tamarack Compressor Station • Leidy South Project o Hensel Replacement o Hilltop Loop
Ridge and Valley	Anthracite Uplands	Upland surface having low, linear to rounded hills, strip mines, and waste piles; upland surrounded by an escarpment, a valley, and a mountain rim	Low to high	Sandstone, shale, conglomerate, and anthracite	Many narrow folds having steep limbs; many faults	Trellis	• Leidy South Project o Compressor Station 620
	Susquehanna Lowland	Low to moderately high, linear ridges; linear valleys; Susquehanna River valley	Low to moderate	Sandstone, siltstone, shale, conglomerate, limestone, and dolomite	Open and closed plunging folds having narrow hinges and planar limbs	Trellis and angulate	• Leidy South Project o Benton Loop o Compressor Station 607

[a] Local relief: 0 to 100 feet, very low; 101 to 300 feet, low; 301 to 600 feet, moderate; 601 to 1,000 feet, high; >1,000 feet, very high. (Relief categories listed here for Pennsylvania do not necessarily apply to other states or countries)

Source: PADCNR, 2000.

Geotechnical investigation of the Marvindale Compressor Station site determined that sandstone bedrock occurs at depths of 9 to 10 feet. According to the geotechnical report, the maximum depth of excavation would be approximately 12 feet; therefore, bedrock could be encountered in the base of some excavations. Geotechnical investigation of the Tamarack Compressor Station site determined that bedrock occurs at depths of 9 to 26 feet and consists of sandstone and interbedded shale with occasional silty clay and limestone seams. According to the geotechnical report, the maximum depth of excavation at the site would be approximately 22 feet; therefore, bedrock would likely be encountered during construction of the station. The geotechnical report concludes that the bedrock at the Tamarack Compressor Station could likely be removed by hard, mechanical ripping.

Shallow Bedrock Crossed by the Leidy South Project

Based on NRCS soil data (see section B.2), approximately 3.2 miles (51 percent) of the Hensel Replacement, 0.3 mile (13 percent) of the Hilltop Loop, and 1.7 miles (49 percent) of the Benton Loop cross areas where bedrock is within 5 feet of the surface.

Transco would probe the pipeline trench area prior to construction to ascertain the depth to bedrock and would provide the results of geotechnical investigations at the Compressor Station 607 and 620 sites to the Commission.

Blasting

As indicated above, the Projects are underlain by unconsolidated surficial deposits and sedimentary bedrock formations. No hard igneous or metamorphic bedrock formations are near the land surface in the area of the Projects. During construction, the unconsolidated deposits would be readily removed by typical excavation methods. However, depending on the type of bedrock and degree of weathering, blasting could be required to remove bedrock if encountered within pipeline trench depth (approximately 8 feet) or in excavations at aboveground facilities.

National Fuel and Transco would both attempt to utilize mechanical means such as ripping, chipping, or rock trenchers to excavate bedrock, and do not anticipate the need for widespread blasting. If blasting is necessary, it would be conducted according to project-specific blasting plans provided by each company. In general, blasting would be conducted by licensed professionals in compliance with applicable state and federal regulations governing the use of explosives. Mitigation measures, including vibration monitoring and the use of mats to control flyrock, would be implemented to avoid or minimize potential impacts on nearby structures. We have reviewed Transco's plan and find it acceptable. Prior to any blasting activities, National Fuel would submit a project-specific blasting plan for approval. Potential impacts of blasting on water resources, including water supply wells, are discussed in sections B.3.1.1 and B.3.2.1.

B.1.2 Mineral Resources

Mineral resources in the area of the Projects include sand and gravel pits, surface and underground coal mines, and oil and natural gas wells.

Based on review of high definition aerial imagery, USGS topographic maps, and information from the PADCNR and other sources, the new pipeline and compressor station facilities associated with the Projects would not cross or be within 0.25 mile of any active surface mines or any active or abandoned underground coal mines (PADCNR, 2015; Pennsylvania State University [PSU], 2019; PADEP, 2019a). In addition, approximately 87.0 percent of the new pipeline facilities proposed by National Fuel and approximately 97.5 percent of the new pipeline facilities proposed by Transco would

be collocated with existing linear infrastructure, which would preclude future surface mining in proximity to the facilities or necessitate their relocation.

The Projects would cross a region of oil and natural gas production. Ninety-one active wells are within 0.25 mile of the new pipeline facilities proposed by National Fuel, and 15 active wells are within 0.25 mile of the new pipeline facilities proposed by Transco. An additional three active wells are within 0.25 mile of the Tamarack Compressor Station site, and three active wells are within 0.25 mile of the Marvindale Compressor Station site (PADEP, 2019b).

Construction and operation of the proposed facilities would not prevent extraction of oil and natural gas, but construction could damage existing wells and gathering pipelines, potentially causing a spill and temporarily interrupting production. National Fuel would coordinate with the owners of nearby oil and gas facilities and would implement best management practices, such as installing orange safety fence around nearby wells to avoid construction-related damage. National Fuel also identified buried utilities in the proposed workspaces and would utilize the One Call 811 system to notify third-party owners and mark existing utilities prior to the start of construction.

Transco indicated that the nearest well to the construction workspace is 49 feet away; therefore, Transco does not anticipate impacting any wells. Transco also identified utilities crossed by the Leidy South Project, including gathering lines, and would implement measures in its ECP and also work with operators to protect and relocate existing facilities as necessary.

By implementing the above measures, we conclude that construction and operation of the Projects would not have a significant impact on mineral resource mining or oil and gas extraction activities in the area.

B.1.3 Geologic Hazards

Geologic hazards are natural, physical conditions that can result in damage to land and structures and injury to people. The geologic hazards that could potentially impact the Projects are seismic hazards (i.e., earthquakes, surface faulting, and soil liquefaction) and landslides.

The gradual or sudden collapse of active or abandoned underground mines could also damage pipelines and other infrastructure at the surface. As noted in section B.1.2, the new pipeline and compressor station facilities associated with the Projects would not cross or be within 0.25 mile of any active or abandoned underground mines (PSU, 2019; PADEP, 2019a). Therefore, underground mines do not pose a geologic hazard to the Projects.

The EPA and other commentors raised concern regarding the potential for karst conditions to adversely affect the Projects, with most concern regarding Transco's proposed Compressor Station 620 in Schuylkill County. Karst features such as sinkholes form by the dissolution of underlying carbonate bedrock such as limestone and dolomite. Karst features can damage overlying pipelines, roads, buildings, and other improvements, particularly if they form suddenly. None of the proposed facilities are underlain by shallow carbonate bedrock formations, and there are no mapped sinkholes or closed depressions (an indicator of subsidence) at or near any of the proposed facilities (PADCNR, 2019a; 2019b). Shallow bedrock units underlying and near the Compressor Station 620 site are comprised of shale, siltstone, and sandstone, which are not susceptible to sinkhole development. One commentor reported sinkhole development near the intersection of Interstate Highway 81 and State Highway 25, approximately 4 miles to the southeast from the proposed compressor station, and the nearest mapped sinkhole or closed depression to the compressor station is approximately 20 miles to the southeast of the site, near Pottsville (PADCNR, 2019b). Based on the type of shallow bedrock underlying the Projects and the known

occurrences of sinkholes and closed depressions, karst geology does not pose a geologic hazard to the Projects. Additionally, both Transco and commentors mentioned the possibility of sinkholes or collapses within a few miles of Compressor Station 620 where historic coal mining activities have occurred. However, our research did not identify any record of historic mining under or immediately adjacent to Compressor Station 620.

B.1.3.1 Seismic Hazards

Seismic hazards include ground shaking due to earthquakes, surface faulting, and soil liquefaction, a phenomenon in which saturated, unconsolidated, granular material loses cohesive strength due to strong, prolonged shaking. Soil and shallow groundwater conditions necessary for liquefaction to occur may exist in portions of the area of the Projects. However, as discussed below, due to the low potential for strong and prolonged ground shaking in the region, the potential for soil liquefaction to occur is also low. In addition, surface displacement along fault lines in the eastern United States is very rare. The USGS does not have any mapped individual surface fault traces or fault areas in Pennsylvania that have been active in at least the last 1.6 million years (USGS, 2019a); therefore, potential hazards associated with soil liquefaction and surface faulting are not discussed further. The following discussion regarding earthquake risk in the area of the Projects is derived from the USGS Earthquake Hazards Program (USGS, 2019b).

The USGS uses the historical occurrence of earthquakes and geologic setting to predict the future earthquake hazard in a region. Since 1900, the strongest recorded earthquakes in proximity to the Projects were a September 9, 1998 magnitude (M) 4.5 event approximately 100 miles to the west of National Fuel's proposed Marvindale Compressor Station, and a May 12, 1964 M4.5 event approximately 25 miles south from Transco's proposed Compressor Station 620. Magnitude measures the energy released during an earthquake, whereas the Modified Mercalli Intensity (MMI) scale characterizes the effects of an earthquake. A M4.5 event generally equates to an MMI VI event that would be felt by all in the area, with slight damage such as fallen plaster or movement of heavy furniture.

The USGS expresses the ground movement during an earthquake as a percentage of the acceleration due to gravity (g). For the majority of the area of the Projects, the USGS predicts that there is a 2 percent probability for an earthquake to occur in the next 50 years that would result in a ground movement of 0.04g to 0.06g. For Transco's proposed Compressor Station 620, the predicted ground movement in the same period is slightly higher, between 0.06g and 0.1g. The perceived shaking from these events would range from light to moderate, with damage to well-built structures ranging from none to light. The USGS also estimates the chance for a minor, damaging earthquake to occur in the general area of the Projects in any given year to be less than 1 percent.

Based on the above analysis, the potential for a significant, damaging earthquake to occur in proximity to the Projects is very low. In addition, the proposed facilities would be constructed and maintained in accordance with DOT requirements detailed in 49 CFR 192, which are designed to ensure the safe operation of the facilities under the range of expected natural conditions. For these reasons, we conclude that the risk of damage to the proposed facilities from seismic activity is not significant.

B.1.3.2 Landslides

The EPA expressed concern regarding potential hazards of steep slope construction of the Projects. Landslides are the mass movement of rock, debris, or earth down a slope, which can be initiated by natural processes or human activity. Many landslides are caused by a combination of factors, including the type of surface and near-surface geologic units involved, heavy precipitation, freeze-thaw cycles, undercutting of the base of slopes by streams or human activity, vegetation loss, and earthquakes.

Landslides can take many forms but generally occur gradually in a process referred to as "creep," or suddenly, as in rock falls, flows, or slumps. The sudden mass movement of material can cause immediate damage to pipelines, roads, buildings, and other infrastructure, whereas creep can damage facilities slowly over time. Areas with steep slopes are particularly susceptible to landslide hazards.

Landslide hazards are typically assessed based on susceptibility and incidence. The degree of landslide susceptibility is based on the geologic and physiographic conditions in an area, whereas the landslide incidence reflects the number of documented landslides in an area. The discussion below is based on several publications including the *Digital Compilation of Landslide Overview Map of the Conterminous United States* (USGS, 1997), *United States Landslide Inventory* (USGS, 2019c), *Landslide Inventory Maps of Pennsylvania* (USGS, 1981), and Project-specific information provided by National Fuel and Transco.

Landslide Hazard of the FM100 Project

National Fuel's new pipeline and compressor station facilities would cross areas of low to moderate landslide susceptibility and moderate incidence of landslides (USGS, 1997).

National Fuel utilized publicly available Light Detection and Ranging (LiDAR) data to identify steep slopes that would be crossed by the new, proposed pipelines. Based on this review:

- 3.2 miles (11 percent) of Line YM58 would cross slopes with greater than 30 percent grade, and 6.8 miles (23 percent) of the pipeline would cross slopes of between 15 and 30 percent grade;
- less than 0.1 mile (7 percent) of Line YM224 would cross slopes with greater than 30 percent grade, and 0.2 mile (14 percent) of the pipeline would cross slopes of between 15 and 30 percent grade; and
- less than 0.1 mile (25 percent) of the Line KL Extension would cross slopes with greater than 30 percent grade.

National Fuel also determined that Line YM58 would cross three mapped landslide features between mileposts 6.9 to 7.4, mileposts 7.7 to 7.8, and at milepost 19.2, and would approach to within 50 to 100 feet of other mapped landslides (USGS, 1981). The referenced USGS mapping identifies various landslide categories, including active or recently active landslides, old landslides, colluvial slopes, areas susceptible to debris flows and debris avalanches, areas susceptible to rock fall, and soil and rock susceptible to sliding. The three features crossed by Line YM58 are all classified as "old landslides," which are defined as an:

> Area of extensive hummocky ground caused by earth flow and earth and rock slump. Lacks clear evidence of sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in area away from edge of toe. Can be reactivated by extensive, rapid excavation, loading, and changes in groundwater or surface water conditions. (USGS, 1981)

National Fuel conducted a project-specific pipeline geohazards review to further assess the landslide hazard. The review included physically inspecting 23 locations where Line YM58 would cross slopes with greater than 40 percent grade, including the old landslide features that would be crossed as identified by USGS mapping. The inspection was conducted over a 3-day period by a Professional Geologist licensed by the Commonwealth of Pennsylvania. Slope measurements were taken and observations were made for evidence of possible historic movement or potential future movement,

including disturbed trees, structures, or utilities; mid-slope springs or saturated ground; vegetation variations; hummocky ground; toe bulge; talus; or ground tension cracks.

Based on the desktop review and field observations, a slope hazard rating was developed to estimate the probability for future slope movement to occur under basic pipeline construction methods (i.e., without additional mitigative measures). Three of the 23 slopes were classified as a low hazard, 3 slopes were classified as a low to moderate hazard, and 17 slopes were classified as a moderate hazard. None of the slopes were classified as a high landslide hazard with active or recently active slope movement. The Professional Geologist recommended that a Professional Engineer or Professional Geologist experienced in slope stability conduct observations during certain periods of construction including post-vegetation clearing, groundbreaking, and final grade restoration. We reviewed the report and agree that the recommended measures are appropriate to help identify situations that could cause landslides and slope failure, and to plan additional stability or mitigation measures if signs of slope instability are observed. National Fuel stated it "will be prepared to implement mitigation recommended in the Geohazard Report…"; however, it is not clear to Commission staff whether such preparations equate to a commitment to do so. **Therefore, we recommend that:**

- **Prior to construction of Line YM58, National Fuel should file with the Secretary of the Commission (Secretary), for review and written approval by the Director of OEP, a plan for implementing the recommendations of the Geohazard Report.**

National Fuel would implement best management practices detailed in its ESCAMP to control water and minimize erosion during construction and operation of the proposed pipelines, including on steep slopes. National Fuel would also implement special construction methods on steep slopes as described in section A.8.1.4. In general, National Fuel would utilize the winch method to manipulate equipment up and down steep slopes. When crossing side-gradient to steep slopes, National Fuel would utilize the two-tone method in which the upslope side of the workspace would be cut and the downslope side of the workspace would be filled to create a level workplace for safe construction activities.

The proposed facilities would be constructed of modern materials in accordance with the DOT's Minimum Federal Standards presented in 49 CFR 192, which are designed to provide adequate protection from unstable soils or landslides. National Fuel would also implement topsoil segregation and replacement and other measures to ensure post-construction revegetation success during operation. In addition, National Fuel would monitor the physical condition of the pipeline rights-of-way and aboveground facilities as described in section A.8.3 and has stated that periodic internal inspections during operation of the pipeline may also detect deflections indicative of slope movement.

We conclude that the overall landslide risk is low to moderate and that National Fuel's implementation of the above construction, restoration, and monitoring measures, along with our recommendation, would adequately reduce landslide hazards.

Landslide Hazard of the Leidy South Project

Transco's new pipeline and compressor station facilities would be constructed in areas of low to moderate landslide incidence and susceptibility, with the exception of the proposed Compressor Station 620 site, which is in an area with moderate to high susceptibility and moderate incidence of landslide activity (USGS, 1997). However, the proposed location of Compressor Station 620 is on a valley floor with relatively low relief, with high-relief ridges rising to the north and south of the site. We concur with Transco's assessment that the potential for a landslide at the Compressor Station 620 site is low. None of the Leidy South Project facilities cross documented landslide features (USGS, 1981; USGS, 2019c).

Transco also utilized LiDAR data to identify steep slopes that would be crossed by the new, proposed pipelines. Based on this review:

- 1.9 miles (30 percent) of the Hensel Replacement would cross slopes with greater than 30 percent grade, and 0.8 mile (13 percent) of the pipeline would cross slopes of between 15 and 30 percent grade;
- 0.6 mile (25 percent) of the Hilltop Loop would cross slopes with greater than 30 percent grade, and 0.6 mile (25 percent) of the pipeline would cross slopes of between 15 and 30 percent grade; and
- eight short (<0.1 mile) segments of the Benton Loop would cross slopes with greater than 30 percent grade, and 1.1 miles (31 percent) of the pipeline would cross slopes of between 15 and 30 percent grade.

Transco would implement best management practices detailed in its ECP to control water and minimize erosion during construction on steep slopes. Transco states that implementation of these measures would be based on its experience in the region and with Pennsylvania Erosion and Sediment Control Guidelines. Transco would also implement special construction methods on steep slopes as described in section A.8.1.4. In general, Transco would also utilize the winch method when crossing perpendicular to steep slopes and the two-tone method when crossing steep side slopes.

The proposed facilities would be constructed of modern materials in accordance with the DOT's Minimum Federal Standards presented in 49 CFR 192, which are designed to provide adequate protection from unstable soils or landslides. After installation of the pipelines, Transco would install permanent trench breakers in the ditch and over and around the new pipelines in areas with high erosion potential and would regrade the workspace to preconstruction conditions. Transco would also implement topsoil segregation and replacement and other measures to ensure post-construction revegetation success during operation. In addition, Transco would monitor the physical condition of the pipeline rights-of-way and aboveground facilities as described in section A.8.3 and would take mitigative measures as necessary to maintain the right-of-way and facilities.

We conclude that Transco's proposed facilities would be in an area with a low susceptibility and incidence of landslide activity and that Transco's implementation of the above construction, restoration, and monitoring measures would adequately reduce landslide hazards.

B.1.4 Paleontological Resources

As indicated in section B.1.1.2, Paleozoic shale, siltstone, sandstone, conglomerate, and coal bedrock formations occur at or near the land surface in the area of the Projects and could be encountered during trenching and excavation activities. These formations contain fossilized vertebrates, invertebrates, and plants. The PADCNR defines rare or unique fossil localities as individual or small group exposures of bedrock or surficial material that display outstanding or noteworthy examples of fossil specimens.

FM100 Project

National Fuel acknowledges the potential to encounter paleontological resources during construction of the FM100 Project. National Fuel does not anticipate impacts on important resources but would provide training to environmental inspection staff and construction contractors on recognizing fossil resources. In the event that unique or significant fossils are discovered, excavation would be stopped and the landowner and applicable state agency would be notified. We conclude that National

Fuel's plan would be protective of important paleontological resources, if discovered during construction of the FM100 Project.

Leidy South Project

Transco' consultations with the Pennsylvania State Museum Curator also identified the potential to encounter important paleontological resources during construction of the Leidy South Project, particularly in conjunction with the Hensel Replacement and Hilltop Loop (Jasinski, 2019a; 2019b). Transco contends that the potential to find important fossils is low due to the shallow depth of excavations but would implement its Unanticipated Discovery Plan for Paleontological Resources to minimize potential impacts on important fossils. This plan also includes training EIs and construction contractors to recognize fossiliferous material, stopping work if fossils are discovered, and consulting with the Pennsylvania Geologic Survey to determine the significance of the find. If the decision is made to collect and save the fossils, Transco would work with the Pennsylvania Geologic Survey to excavate, remove, and safeguard the fossils. We conclude that Transco's plan would adequately protect important paleontological resources.

B.2 SOILS

Soil characteristics in the area of the Projects were identified and assessed using the NRCS Soil Survey Geographic Database (Soil Survey Staff, 2019). Soils were evaluated for characteristics that could affect construction or increase the potential for soil related issues during and after construction. These characteristics include prime farmland, hydric soils, highly erodible soils, compaction-prone soils, potentially rocky soils, and low revegetation potential. The potential for soil contamination related issues was also identified and discussed. The soil characteristics descriptions, criteria used to identify the characteristics, summaries of the Projects' data, and impacts and mitigation measures are presented below.

The acreages for the soil characteristics of the 126 soil map units crossed by the Projects are provided in table B.2-1. The potential impacts for each soil characteristic and the mitigation measures for each are discussed below.

B.2.1 Prime Farmland Soils

Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pasture, woodland, or other lands). Urbanized land and open water cannot be designated as 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 or 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., by draining or irrigating).

The NRCS also recognizes farmland of statewide importance, defined as lands other than prime farmland used for production of specific high-value food and fiber crops (e.g., citrus, tree nuts, olives, fruits, and vegetables). Farmlands of statewide importance have the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods. Farmland of statewide importance is similar to prime farmland but with minor shortcomings, such as greater slopes or reduced ability to store soil moisture. The methods for defining and listing farmland of statewide importance are determined by the appropriate state agencies, typically in association with local soil conservation districts or other local agencies.

TABLE B.2-1

Acres of Soil Characteristics Affected by the FM100 Project and Leidy South Project [a]

	Farmlands		Compaction & Rutting Risks			Erosion Potential			Restoration Risks	
Facility	Prime [b]	Statewide Importance	Hydric Soils [c]	Compaction Potential [d]	Rutting [e]	Water [f]	Off-Road Use [g]	Wind [h]	Revegetation Potential [i]	Rock Introduction Potential [j]
FM100 PROJECT										
Pipeline Facilities (includes ATWS)	98.4	42.7	4.1	0.0	220.3	98.5	48.0	0.0	144.0	185.9
Aboveground Facilities (includes roads and ATWS)										
Tamarack Compressor Station	5.0	0.0	0.0	0.0	5.0	5.0	0.0	0.0	0.0	0.0
	(5.0)	(0.0)	(0.0)	(0.0)	(5.0)	(5.0)	(0.0)	(0.0)	(0.0)	(0.0)
Marvindale Compressor Station	11.1	0.0	0.1	0.0	11.6	3.6	0.0	0.0	4.2	3.7
	(5.1)	(0.0)	(0.0)	(0.0)	(5.6)	(1.5)	(0.0)	(0.0)	(2.0)	(1.5)
Marvindale Interconnect	7.9	0.0	0.0	0.0	7.9	0.0	0.0	0.0	0.0	0.0
	(1.6)	(0.0)	(0.0)	(0.0)	(1.6)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Carpenter Hollow OPP Station	0.0	0.9	0.0	0.0	1.0	0.1	0.0	0.0	0.1	1.0
	(0.0)	(0.9)	(0.0)	(0.0)	(1.0)	(0.1)	(0.0)	(0.0)	(0.1)	(1.0)
Mainline Valves	0.1	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.1	0.1
	(0.1)	(0.0)	(0.0)	(0.0)	(0.2)	(0.1)	(0.0)	(0.0)	(0.1)	(0.1)
Aboveground Facilities Subtotal	**24.2**	**0.9**	**0.1**	**0.0**	**25.7**	**8.8**	**0.0**	**0.0**	**4.3**	**4.8**
	(11.8)	**(0.9)**	**(0.0)**	**(0.0)**	**(13.4)**	**(6.6)**	**(0.0)**	**(0.0)**	**(2.1)**	**(2.6)**
Pipeline Facility Access Roads	25.0	8.0	0.7	0.0	88.3	60.7	43.4	0.0	92.4	73.4
	(11.3)	(5.2)	(0.0)	(0.0)	(51.1)	(35.7)	(25.5)	(0.0)	(55.7)	(39.7)
Staging Areas	26.6	12.3	5.0	0.0	43.1	1.7	0.0	0.0	5.2	14.0
Abandonment of Facilities	5.1	0.7	0.5	0.7	9.6	3.6	1.9	0.0	5.2	3.1
FM100 Project Subtotal	**179.3**	**64.6**	**10.5**	**0.7**	**387.0**	**173.2**	**93.3**	0.0	**251.1**	**281.1**
	(23.1)	**(6.1)**	**(0.0)**	**(0.0)**	**(64.5)**	**(42.3)**	**(25.5)**	(0.0)	**(57.8)**	**(42.3)**
LEIDY SOUTH PROJECT										
Pipeline Facilities (includes ATWS and Associated Abandonment)	34.6	29.8	4.8	3.0	108.9	109.1	49.4	0.0	133.1	115.4
Aboveground Facilities (includes access roads and TWS)										
Compressor Station 605	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Compressor Station 607	15.4	2.2	0.0	0.0	18.0	0.0	0.0	0.0	0.4	17.7
	(10.4)	(1.6)	(0.0)	(0.0)	(12.3)	(0.0)	(0.0)	(0.0)	(0.2)	(12.1)
Compressor Station 610	2.2	30.6	0.0	0.0	33.7	2.2	0.0	0.0	1.0	31.5
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)

TABLE B.2-1 (cont'd)

Acres of Soil Characteristics Affected by the FM100 Project and Leidy South Project [a]

	Farmlands		Compaction & Rutting Risks			Erosion Potential			Restoration Risks	
Facility	Prime[b]	Statewide Importance	Hydric Soils[c]	Compaction Potential[d]	Rutting[e]	Water[f]	Off-Road Use[g]	Wind[h]	Revegetation Potential[i]	Rock Introduction Potential[j]
Compressor Station 620	23.6	17.7	0.0	0.0	19.1	3.7	3.7	0.0	4.0	44.3
	(15.4)	(8.8)	(0.0)	(0.0)	(8.8)	(0.0)	(0.0)	(0.0)	(0.0)	(24.2)
Mainline Valves	0.3	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.7	1.1
	(0.3)	(0.0)	(0.0)	(0.0)	(0.0)	(0.7)	(0.0)	(0.0)	(0.7)	(1.1)
Aboveground Facilities Subtotal	**41.5**	**50.5**	**0.0**	**0.0**	**70.8**	**6.6**	**3.7**	**0.0**	**6.0**	**94.6**
	(26.1)	**(10.4)**	**(0.0)**	**(0.0)**	**(21.2)**	**(0.7)**	**(0.0)**	**(0.0)**	**(0.9)**	**(37.4)**
Pipeline Facilities Access Roads [k]	0.4	1.0	0.5	0.0	18.0	10.2	3.3	0.0	22.6	7.7
	(0.2)	(0.0)	(0.0)	(0.0)	(15.6)	(6.6)	(1.9)	(0.0)	(18.5)	(3.8)
Staging Areas	54.5	12.8	0.0	0.0	76.4	15.2	0.2	0.0	47.1	60.4
Leidy South Subtotal	**131.0**	**94.1**	**5.3**	**3.0**	**274.1**	**141.0**	**56.7**	**0.0**	**208.8**	**278.1**
	(26.3)	**(10.4)**	**(0.0)**	**(0.0)**	**(36.8)**	**(7.3)**	**(1.9)**	**(0.0)**	**(19.4)**	**(41.2)**
Projects Total	**310.3**	**158.7**	**15.8**	**3.7**	**661.1**	**314.2**	**150.0**	**0.0**	**459.9**	**559.2**
	(49.4)	**(16.5)**	**(0.0)**	**(0.0)**	**(101.2)**	**(49.6)**	**(27.4)**	**(0.0)**	**(77.2)**	**(83.5)**

Notes:

[a] Values not in parentheses reflect temporary impacts due to construction; values in parentheses reflect permanently impacts due to operations.

[b] Includes prime farmland if a limiting factor is mitigated.

[c] Includes soil map units where greater than 66 percent of the components area composed of hydric soils.

[d] Includes somewhat poorly, poorly, or very poorly drainage class and a soil surface texture with greater than 18 percent clay.

[e] Includes soils with a severe rating for soil rutting.

[f] Includes soils with slopes greater than 15 percent or soils with slopes greater than 5 percent and K factors of greater than 0.35.

[g] Includes soils with severe or very severe hazard of off-road erosion.

[h] Includes soils with a wind erodibility group of 1 or 2.

[i] Includes soils with a land capability class of 4 or greater.

[j] Includes soils with more 35 percent gravel, or more than 15 percent rock fragments larger than gravel or soils with bedrock within 5 feet.

[k] Access roads for aboveground facilities included in the aboveground facilities acreage.

B.2.1.1 Construction Impacts and Mitigation Measures

The Projects would temporarily impact approximately 310.3 acres of prime farmland. Construction of the FM100 Project would impact approximately 179.3 acres of prime farmland, including 103.5 acres for construction or activities associated with abandonment of pipeline facilities, 24.2 acres for aboveground facilities, 25.0 acres for access roads, and 26.6 acres for staging areas. Construction of the Leidy South Project would impact approximately 131.0 acres of prime farmland, including 34.6 acres for construction or activities associated with abandonment of pipeline facilities, 41.5 acres for aboveground facilities, 0.4 acre for access roads, and 54.5 acres for staging areas.

The Projects would temporarily impact approximately 158.7 acres of farmland of statewide importance. The FM100 Project would impact approximately 64.6 acres of farmlands of statewide importance, including 43.4 acres for construction or abandonment of pipeline facilities, 0.9 acre for aboveground facilities, 8.0 acres for access roads, and 12.3 acres for staging areas. The Leidy South Project would impact approximately 94.1 acres of farmlands of statewide importance, including 29.8 acres for construction or abandonment of pipeline facilities, 50.5 acres for aboveground facilities, 1.0 acre for access roads, and 12.8 acres for staging areas.

Pipeline operations not associated with permanent aboveground facilities are not anticipated to result in any long-term impacts on agricultural soils. Potential construction impacts on agricultural soils would be minimized and mitigated in accordance with National Fuel's ESCAMP and Transco's ECP. These include measures to conserve and segregate the topsoil, alleviate soil compaction, protect and maintain existing drainage tile and irrigation systems, prevent the introduction of weeds, and retain existing soil productivity (see section A.8.1.1), thereby minimizing the potential for long-term impacts on agricultural lands.

B.2.1.2 Operation Impacts and Mitigation Measures

The Projects would permanently impact 49.4 acres of prime farmland. This impact represents approximately 0.01 percent of the available prime farmland in the affected counties. National Fuel would maintain 11.8 acres for aboveground facilities and 11.3 acres for access roads on prime farmland, and Transco would maintain 26.3 acres for aboveground facilities and 0.2 acre for access roads on prime farmland.

Of the 23.1 acres of prime farmland that would be permanently impacted by the FM100 Project, only the areas that would be impacted by MLV-2 (0.04 acre) and PAR-37 (0.04 acre) appear to be currently used for agricultural purposes. Current or adjacent land uses, such as forestry, make it unlikely that the remaining prime farmland not currently used for agriculture would be used for agriculture in the foreseeable future.

The majority of the 26.3 acres of prime farmland that would be permanently impacted by the operation of the Leidy South Project are associated with Compressor Station 607 (10.4 acres) and Compressor Station 620 (15.4 acres). The remaining 0.5 acre of prime farmland that would be permanently impacted is associated with permanent access roads (0.2 acre) and MLVs (0.3 acre). Of the 10.4 acres that would be permanently impacted by Compressor Station 607, 3.9 acres do not appear to be used for agriculture due to existing forestry and residential land uses. Therefore, it is unlikely that this area would be used for agriculture in the foreseeable future.

The Projects would permanently impact 25.5 acres of farmland of statewide importance. National Fuel would maintain 0.9 acre for aboveground facilities and 5.2 acres for access roads on

farmlands of statewide importance, and Transco would maintain 19.3 acres for aboveground facilities on farmlands of statewide importance.

The majority of the 6.1 acres of farmland of statewide importance permanently impacted by the FM100 Project includes 5.2 acres associated with permanent access roads that do not appear to be used for agriculture due to existing road, forestry, and residential land uses. Therefore, it is unlikely that these areas would be used for agriculture in the foreseeable future. The Carpenter Hollow OPP Station would impact 0.9 acre of farmland of statewide importance; however, this area also does not appear to be currently used for agriculture and it is unlikely to be used for agriculture in the foreseeable future due to surrounding forested land use.

The 10.4 acres of farmland of statewide importance that would be permanently impacted by the operation of the Leidy South Project are associated with Compressor Station 607 (1.6 acres) and Compressor Station 620 (8.8 acres). Of the 1.6 acres that would be permanently impacted by Compressor Station 607, 1.3 acres do not appear to be used for agriculture due to existing forestry and residential land uses. Therefore, it is unlikely that this area would be used for agriculture in the foreseeable future.

We received comments relating to the impact of Compressor Station 620 on prime farmland and farmland of statewide importance. As noted above, the areas where aboveground facilities are installed would remove the soils from future agricultural use during the life of the Leidy South Project. We also received comments regarding Compressor Station 620 being within an Agricultural Security Area (ASA). We confirmed that Compressor Station 620 is not in an ASA (PDA, 2019a). Additionally, the Town of Hegins identified the parcel as being part of the Clean & Green Program,[14] which is a preferential tax assessment program that encourages protection of farmland, forestland, and open spaces by giving tax savings to landowners (PDA, 2019b). As mentioned above, Transco would implement its ECP for soils that would not be permanently encumbered with aboveground facilities or graveled. These measures would ensure that soils that are not permanently disturbed would be restored to pre-construction conditions.

B.2.2 Hydric Soils, Compaction, and Rutting

Construction and operation on certain wet soils can lead to adverse soil effects such as compaction and rutting. Soil compaction and rutting 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, and cause rutting. The degree of compaction and rutting depends on moisture content, soil mineralogy, soil texture, depth to restrictive layers, and slope. For cohesive soils (i.e., soils with greater than about 12-18 percent clay), it has been shown that high soil moisture content is the most important factor leading to soil compaction when external stresses are applied (e.g. construction activities). Therefore, fine-textured soils with poor internal drainage that are moist or saturated during construction are the most susceptible to compaction and rutting. Soil compaction and rutting could reduce soil productivity and plant growth, increase the susceptibility to erosion, and alter local hydrology.

B.2.2.1 Construction Impacts and Mitigation Measures

The Projects would temporarily impact approximately 15.8 acres of hydric soils, of which the FM100 Project would impact approximately 10.5 acres and the Leidy South Project would impact approximately 5.3 acres.

[14] Available on eLibrary at http://www.ferc.gov under accession no. 20191213-0008.

The Projects would temporarily impact approximately 3.7 acres of soils with a high compaction potential, of which the FM100 Project would impact approximately 0.7 acre and the Leidy South Project would impact approximately 3.0 acres.

The Projects would temporarily impact approximately 661.1 acres of soils with a high susceptibility to rutting, of which the FM100 Project would impact approximately 387.0 acres and the Leidy South Project would impact approximately 274.1 acres.

Construction would generally occur when soils are firm enough to avoid rutting, thereby limiting compaction and erosion issues. Topsoil would be segregated in agricultural and residential areas, preventing topsoil mixing and rutting. Soils would be tested (e.g., using a penetrometer) for compaction and compared to adjacent, similar soils to determine preconstruction conditions in accordance with National Fuel's ESCAMP and Transco's ECP. Deep tillage (i.e., disking) would be used to de-compact agricultural areas prior to the replacement of segregated topsoil. Additional tillage would be conducted on areas that are further compacted during cleanup and restoration activities. Hydric soils are often associated with wetland areas. National Fuel's ESCAMP and Transco's ECP outline mitigation measures for wetland soil impacts that are in accordance with our Procedures and would reduce the potential for compaction and rutting, such as limiting equipment traffic, use of low-ground-weight equipment and equipment mats, and topsoil segregation.

B.2.2.2 Operation Impacts and Mitigation Measures

No hydric soils or compaction prone soils would be permanently impacted by the Projects. Soil compaction and rutting that could occur during construction of the aboveground facilities or pipelines would be mitigated using procedures in National Fuel's ESCAMP and Transco's ECP. The areas likely to be permanently compacted beneath the aboveground facilities and access roads are localized and of minor extent, and thereby unlikely to cause significant hydrologic impacts to the area.

Wind, Water, and Off-Road Erosion

Erosion is a natural process where surface soils are worn away, generally resulting from water and wind forces that can be accelerated by human disturbance. Factors that influence the magnitude of erosion include soil texture, soil structure, length and percent of slope, existing vegetation cover, and rainfall. The most erosion-prone soils are generally bare or sparsely vegetated, non-cohesive, fine textured, and situated on moderate to steep slopes. Soils on steep, long slopes are more susceptible to water erosion than those on short slopes because the steeper slopes accelerate the flow of surface runoff. Susceptibility to wind erosion is less affected by slope angles and is more directly influenced by physical soil factors, including moisture, texture, calcium carbonate content, and organic matter, as well as landform and landscape conditions, including soil roughness factors, unsheltered distance, and vegetation cover. Off-road equipment can accelerate erosion by sheet or rill flow following exposure of the soil surface. Steep-sloped soils and soil textures prone to detachment (e.g. silty soils with low organic matter) and soils with low permeability would increase the susceptibility of erosion due to off-road use.

B.2.2.3 Construction Impacts and Mitigation Measures

None of the soils impacted by the Projects are classified as highly erodible by wind. The Projects would temporarily impact approximately 314.2 acres of soils classified as highly erodible by water, of which the FM100 Project would impact approximately 173.2 acres and the Leidy South Project would impact approximately 141.0 acres.

The Projects would temporarily impact approximately 150.0 acres of soils classified as prone to erosion by off-road use, of which the FM100 Project would impact approximately 93.3 acres and the Leidy South Project would impact approximately 56.7 acres.

National Fuel's ESCAMP and Transco's ECP outline mitigation measures that minimize or avoid potential construction impacts that could result in soil erosion. Temporary erosion controls, including interceptor diversions and sediment filter devices (e.g., silt fences), would be installed immediately following land disturbing activities. National Fuel and Transco would inspect these devices on a regular basis and after each rainfall event of 0.5 inch or greater to ensure proper function. Temporary erosion control devices would be maintained until the workspace for the Projects is successfully revegetated, at which time they would be removed and disposed of at an appropriate facility.

B.2.2.4 Operation Impacts and Mitigation Measures

No soils classified as having a high potential for wind or off-road use erosion would be permanently impacted during the construction and operation of aboveground facilities or pipelines. Of the 314.3 acres of soil classified as highly erodible by water that would be temporarily impacted by the Projects, 49.6 acres would be permanently impacted by operation of aboveground facilities: the FM100 Project would permanently impact approximately 42.3 acres and the Leidy South Project would permanently impact approximately 7.3 acres. Of the 42.3 acres classified as highly erodible by water for the FM100 Project, 35.6 acres would be associated with permanent access roads on slopes greater than 15 percent.

Soil erosion that would occur during the operation of aboveground facilities or the pipelines would be mitigated using procedures in National Fuel's ESCAMP and Transco's ECP. Permanent erosion control devices such as trench breakers and permanent slope breakers would be monitored by National Fuel and Transco during the long-term operation and maintenance of the Projects.

B.2.3 Rocky Soils and Revegetation

Rock fragments at the surface and within 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. 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.

The vegetation potential of soils is based on several characteristics, including topsoil thickness, soil texture, available water capacity, susceptibility to flooding, and slope. Other considerations include whether the soils are natural, human transported, or disturbed. Some soils have characteristics that cause a high seed mortality and these areas may need additional management and may be difficult to revegetate. The clearing and grading of soils with poor revegetation potential could result in a lack of adequate vegetation following construction and restoration of the right-of-way, which could lead to increased erosion, a reduction in wildlife habitat, and adverse visual impacts. Revegetation would be required on all lands except active cropland and lands permanently converted to aboveground facilities.

B.2.3.1 Construction Impacts and Mitigation Measures

The Projects would temporarily impact approximately 559.2 acres of soil with a high potential for rock introduction, of which the FM100 Project would impact approximately 281.1 acres and the Leidy South Project would impact approximately 278.1 acres.

The Projects would temporarily impact approximately 459.9 acres of soils with a low revegetation potential, of which the FM100 Project would impact approximately 251.1 acres and the Leidy South Project would impact approximately 208.8 acres.

National Fuel's ESCAMP and Transco's ECP require that the size, density, and distribution of rock in the construction work area in agricultural lands be similar to adjacent areas undisturbed by construction and require that excess rock be removed from at least the top 12 inches of soil in agricultural areas or in compliance with landowner agreements. However, we note that Transco's ECP qualifies that excess rock be rock that is "in excess of 4 inches". We do not believe that this provides the same level of protection as section V.A.4 of the FERC Plan, as excess rock could be smaller than four inches, nor has this modification been adequately justified. **Therefore, we recommend that**:

- **Prior to construction, Transco should file with the Secretary, for review and written approval by the Director of OEP, a revised ECP that does not include that phrase "in excess of 4 inches" in section V.A.4 of Attachment 2 of the ECP.**

Disturbed areas would be restored to preconstruction contours by applying fertilizer in uplands as specified in National Fuel's ESCAMP and Transco's ECP. Approved seedbed preparation and seed mixes would be used in accordance with National Fuel's ESCAMP and Transco's ECP.

B.2.3.2 Operation Impacts and Mitigation Measures

Of the 559.2 acres of soil with a high potential for rock introduction that would be temporarily impacted by the Projects, 83.5 acres of soil with a high potential for rock introduction would be permanently impacted by operation of aboveground facilities: the FM100 Project would permanently impact approximately 42.3 acres and the Leidy South Project would permanently impact approximately 41.2 acres.

Areas disturbed by operations of the aboveground facilities or pipelines would be revegetated areas and monitored for corrective actions as specified in National Fuel's ESCAMP and Transco's ECP.

B.2.4 Soil Contamination

Construction of the Projects has the potential to disturb soils that were previously contaminated and could also result in contamination of soils through spills of liquids such as fuels and lubricants. Contamination from spills or leaks of oils and hazardous materials during construction could adversely affect soils. The effects of such spills or leaks typically are small because of their low frequencies and volumes.

National Fuel has developed a SPRP included with its ESCAMP. Transco has developed a Spill Prevention and Response Procedures for Oil and Hazardous Materials (Spill Plan) included in its ECP. National Fuel's SPRP Plan and Transco's Spill Plan specify cleanup procedures to minimize the potential for soil contamination from spills or leaks of fluid, lubricant, coolant, or solvents.

The FM100 Project would not cross areas known to have contaminated soils. In the event that contamination is encountered during construction, National Fuel would implement its Unanticipated Discovery of Contaminated Materials Plan[15] that specifies cleanup procedures in the event contaminated soils are discovered.

[15] Available on eLibrary at http://www.ferc.gov under accession no. 20191018-5167.

Transco identified four documented sites of potentially contaminated soils within 0.25 mile of the Hensel Replacement pipeline (EDR; 2019a-h). Three of these sites have no record of spills or violations. Spills that occurred on the one other site have been fully remediated and cleared by PADEP (PADEP, 2020). Transco would implement its Unanticipated Discovery of Contamination Plan that specifies cleanup procedures in the event contaminated soils are discovered during construction.

In the event that contamination is encountered during construction of the Projects, work in the area would stop, the appropriate environmental manager or inspector and/or public officials would be notified, the type and extent of the contamination would be determined and documented, and the appropriate remedial actions would be taken in accordance with National Fuel's Unanticipated Discovery of Contaminated Materials Plan and Transco's Unanticipated Discovery of Contamination Plan.

B.2.5 Conclusions

We have reviewed the mitigation measures identified in National Fuel's ESCAMP and Transco's ECP, and with our recommendation for Transco to update and file a revised ECP, we conclude both plans would be consistent with our Plan and Procedures. Additionally, we have reviewed National Fuel's Unanticipated Discovery of Contaminated Materials Plan and Transco's Unanticipated Discovery of Contamination Plan and National Fuel's SPRP and Transco's Spill Plan and we conclude these plans are acceptable.

Given the impact minimization and mitigation measures described in National Fuel's ESCAMP, Unanticipated Discovery of Contaminated Materials Plan, and SPRP; as well as in Transco's ECP, Unanticipated Discovery of Contamination Plan, and Spill Plan, which have incorporated FERC's Plan, we conclude that soils would not be significantly affected by construction and operation of the Projects.

B.3 WATER RESOURCES

B.3.1 Groundwater Resources

B.3.1.1 Existing Groundwater Resources

Groundwater occurs in most porous geologic units below the water table, and geologic units that are capable of providing a sufficient volume of water with adequate quality for use are referred to as aquifers. Groundwater is an important resource in Pennsylvania, where more than 1 billion gallons of water is pumped from aquifers each day. About 56 percent of this volume supplies public and private domestic water needs, 39 percent supports industry and mining, and the remainder is utilized in agriculture (PSU, 2016). Groundwater use varies in the counties crossed by the Projects, ranging from 4 million gallons per day in Clinton County to 98 million gallons per day in Lycoming County (PADCNR, 1999).

Groundwater Occurrence and Quality

Groundwater aquifers in the general area of the Projects are found in unconsolidated surficial deposits and in consolidated bedrock formations. Aquifers may occur a few feet beneath the surface but are more commonly found at depths greater than 100 feet (PSU, 2016). The major aquifers underlying the Projects occur in Paleozoic sandstone and shale formations, some of which are fractured. The depths to these aquifers typically range from 80 to 200 feet, and wells typically yield 5 to 60 gallons per minute. Groundwater from sandstone is generally soft, containing less than 200 milligrams per liter (mg/l) dissolved solids, whereas groundwater from fractured shale is typically hard, with 200 to 250 mg/l dissolved solids (PSU, 2016).

National Fuel's proposed Line KL Extension, Line YM58, and Line YM224 would cross surficial silt, sand, and gravel deposits in stream valley floors (see section B.1.1.2). Groundwater from these deposits is considered a locally important source, commonly occurring at depths of 20 to 200 feet with wells typically yielding 100 to 1,000 gallons per minute and containing less than 200 mg/l dissolved solids (PSU, 2016). Shallow groundwater could also be encountered in construction trenches near streams and wetlands.

Sole Source Aquifers

The EPA defines a Sole Source Aquifer as an aquifer that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer, and for which no alternative drinking water source is reasonably available to all who depend on the aquifer should it become contaminated. The Projects do not overlie a designated Sole Source Aquifer (EPA, 2019a) or state-designated protected aquifers.

Public and Private Water Supply Wells and Springs

Table B.3.1-1 lists public and private water supply wells and springs within 150 feet of the Projects as identified by National Fuel and Transco from publicly available records (PADCNR, 2019c; PADEP, 2019c; 2019d). Each company also communicated with affected landowners to identify wells and springs on their property.

TABLE B.3.1-1

Water Supply Wells and Springs within 150 Feet of Construction Workspaces

Project/Facility	Milepost	Supply Type	Use	Distance from Workspace (feet)
FM100 PROJECT				
Line YM58	19.1	Spring	Non-potable	91
	23.8	Spring	Non-potable	115
	23.2	Spring	Non-potable	75
Line KL Extension	0.0	Well	Irrigation	0
	0.0	Well	Domestic	0
Line FM100 Abandonment	8.0	Spring	Non-potable	28
	44.0	Well	Domestic	53
LEIDY SOUTH PROJECT				
Hensel Replacement	193.8	Well	Domestic	0
Hilltop Loop	185.0	Well	Domestic	98
	185.8	Well	Domestic	11
Benton Loop	117.3	Well	Domestic	114
	118.0	Spring	Private Spring Excavated Near Pavilion	44
	188.1	Well	Domestic	92
	120.2	Spring	Private Spring Feeding Pond	80
Compressor Station 607	NA	Well	Domestic	0

Sources: PADCNR, 2019c; PADEP, 2019c; PADEP, 2019d; landowner communications; civil surveys

The State of Pennsylvania protects public drinking water sources through establishment of Wellhead Protection Areas (WHPAs), which are surface and subsurface areas surrounding a public water system through which contaminants are more likely to move, potentially reaching the water source. According to PADEP WHPA data, the Projects would not cross any WHPAs (PADEP, 2000; PADEP,

2019d). National Fuel identified a public water supply well for the Town of Crosby in McKean County approximately 0.6 mile south from Line YM58, and Transco noted that the nearest public water supply system or WHPA to the Leidy South Project is the Hegins Township Authority facility approximately 1.0 mile southwest from proposed Compressor Station 620.

Existing Groundwater Contamination

National Fuel and Transco accessed state and federal listings of sites with known or suspected soil and groundwater contamination (see section B.2.5). Some sites with documented contamination were identified within 0.25 mile of the Projects; however, it is unlikely that groundwater contamination that may be associated with these facilities would be encountered by the Projects. Also as noted in section B.2.5, each company provided plans to address the unanticipated discovery of pre-existing contamination during construction; we find these plans acceptable.

B.3.1.2 Groundwater Impacts and Mitigation

Groundwater could be impacted if encountered in pipeline trenches or excavations at aboveground facilities. Potential impacts could include increased turbidity, reduced recharge due to compaction, fluctuation of the water level in conjunction with dewatering, and alteration of the flow regime. We expect that these impacts would be localized, temporary, and minor due to the limited vertical extent of excavations and other ground disturbances, localized use of dewatering, and relatively short duration of construction. In areas with permanent aboveground facilities, recharge into aquifers could be reduced if infiltration is reduced; however, based on the limited size of the area that would be impacted with non-permeable surfaces, the impacts are expected to be very minor. These physical effects would be further reduced by implementing measures in National Fuel's ESCAMP and Transco's ECP that would minimize erosion and sedimentation, reduce compaction, and restore pre-existing grades and vegetation.

As discussed in section B.1.3.3, National Fuel and Transco may need to conduct blasting during construction of the Projects, although each company expects that most excavation would be accomplished by mechanical means and that any blasting would be limited in extent. Blasting would not impact important, deep bedrock aquifers, but could have localized, temporary, and minor effects on the quality and hydrologic characteristics of shallow groundwater resources due to the excavation activity described above.

Groundwater resources could also be affected by spills of fuel or other hazardous substances during construction. The risk that a spill poses to groundwater depends largely on the volume and content of the spill, the nature of surficial geologic materials, the depth to groundwater, and whether actions are taken to remove affected soil. A small spill would pose little risk to a deep bedrock aquifer whereas a large spill would likely affect a shallow water table that occurs within surficial, unconsolidated deposits. As noted in section B.2.5, National Fuel's SPRP and Transco's Spill Plan describe measures that each company would implement to prevent and respond to spills.

Construction could physically damage wells and springs within 150 feet of construction workspaces or diminish the yield and water quality of the wells and springs. Wells within workspaces would be marked and protected to prevent construction-related damage, and each company would conduct pre- and post-construction testing of well yield and water quality with landowner permission. Each company would also implement the measures summarized above to avoid and minimize sedimentation and other localized, temporary effects on groundwater quality and to prevent the storage and use of fuel and other hazardous materials in proximity to wells and springs. We conclude that these measures would adequately protect wells and springs from the Projects' impacts. In the unlikely event

that a water supply well or spring is affected, each company would arrange for a temporary water supply until the water supply and quality are restored or the affected well owner would otherwise be compensated.

National Fuel would utilize the HDD method at three locations along Line YM58 to avoid impacts on Potato Creek, Allegheny Portage Creek, and the Allegheny River. Transco does not propose any HDDs. As described in section A.8.1.4, the HDD process includes the use of drilling fluid, comprised primarily of a non-hazardous solution of water, inert solids, and bentonite (a naturally occurring clay mineral). During a successful HDD, the drilling fluid is generally confined to the area around the borehole, resulting in minimal impact on groundwater quality. National Fuel would minimize the potential for a greater loss of drilling fluid by implementing the measures outlined in its HDD Plan, which we find acceptable. In the event of a loss of drilling fluid, the primary impact on groundwater resources would be increased turbidity, which would diminish with distance and time from the point of release.

During operation of the Projects, each company would continue to implement the measures in its respective spill plan to avoid and reduce the potential for a hazardous materials spill to impact groundwater resources, including at aboveground facilities. We also expect that each company would comply with applicable regulations regarding the safe storage and handling of hazardous materials at aboveground facilities, which would prevent significant spills at the facilities. Transco also proposes to install water supply wells at new Compressor Stations 607 and 620 but would only withdraw approximately 80 gallons per day at each site, which would not have a significant impact on the source aquifer.

We received comments relating to the impact of Compressor Station 620 on groundwater resources. We believe that Transco's ECP, its Spill Plan, and other measures discussed above would prevent or minimize any impacts on groundwater from construction and operation of Compressor Station 620. Based on the above information and analysis, we conclude that construction and operation of the Projects would not result in a significant impact on groundwater resources and that implementation of each company's construction, restoration, and mitigation plans would further avoid or minimize impacts on groundwater resources.

B.3.2 Surface Water Resources

B.3.2.1 Existing Surface Water Resources

Watersheds

The USGS defines watersheds by regions, sub-regions, accounting units, and cataloging units. Each watershed is identified by a unique hydrologic unit code (HUC) consisting of 2 to 14 digits (USGS, 2017). The FM100 Project would cross several major basins (HUC-8) including the Upper Allegheny, Sinnemahoning, and the Middle West Branch Susquehanna. The Leidy South Project would cross the Upper Susquehanna-Lackawanna, Middle West Branch Susquehanna, and Lower West Branch Susquehanna basins.

Perennial and Intermittent Waterbodies

Based on field assessments and a review of USGS topographic maps, USGS National Hydrography and Watershed Boundary datasets, USDA NRCS soil survey data, and USFWS National Wetlands Inventory data, the Projects would cross a total of 40 perennial waterbodies, 60 intermittent waterbodies, 35 ephemeral waterbodies, and 3 jurisdictional ditches. Appendix D lists the waterbodies

affected by each project, including the associated pipeline, facility, or workspace; waterbody name; milepost; crossing width; flow type; FERC classification; fishery type; timing restriction; and proposed crossing method, as applicable.

FM100 Project

National Fuel's Line YM58 would cross 23 perennial waterbodies, 20 intermittent waterbodies, and 13 ephemeral waterbodies. In addition, access roads associated with Line YM58 would cross 54 additional waterbodies and 3 jurisdictional ditches; however, all are existing roads and no improvements to the roads would be required at 53 of the 54 of the waterbody crossings. A temporary bridge would be installed at the remaining waterbody (no in-stream work would occur). No waterbodies would be crossed by the Line YM224 Loop or the Line KL Extension.

Two existing access roads proposed for use at the Marvindale Compressor Station would cross waterbodies; however, no improvements to these roads are proposed and no impacts would be expected at these crossings. No surface waterbodies would be affected by the modifications to the remaining project-related aboveground facilities, including compressor stations and interconnects.

As discussed in section A.6.1.1, activities associated with the Line FM100 Abandonment would require ground-disturbing activities at 34 locations for various activities such as removing aboveground valve/rectifier facilities and cutting, capping, grouting, and/or removal of the pipe. Some of the workspaces required for these activities would impact waterbodies. Activities associated with the Line FM100 Abandonment include six waterbody crossings, including two perennial, three intermittent, and one ephemeral.

National Fuel identified numerous additional non-jurisdictional ditches during its field assessment that are not included in appendix D and are not specifically addressed further in this section; however, if dry at the time of construction, these features would be crossed using the standard upland crossing method. In the event the feature has flowing water at the time of construction, National Fuel would be prepared to implement an alternative wet crossing method (see "waterbody crossing methods" below).

Leidy South Project

Transco's pipeline facilities would cross 11 perennial waterbodies, 4 intermittent waterbodies, and 4 ephemeral waterbodies. Four proposed access roads would cross waterbodies: one along the Hensel Replacement and three along the Hilltop Loop (one of which crosses the waterbody twice); all crossings would utilize existing culverts.

No surface waterbodies would be affected by construction of Compressor Stations 607 and 620, or modifications to existing Compressor Station 610.

Sensitive Waterbodies

Waterbodies may be considered sensitive for several reasons, including but not limited to:

- waters that do not meet the water quality standards associated with the water's designated beneficial uses or has a presence of contaminated sediments, or have been designated for intensified water quality management and improvement (e.g., impaired waterbodies);

- rivers on or designated to be added to the Nationwide Rivers Inventory or a state river inventory;

- waters that have outstanding or exceptional quality, ecological and recreational importance, or are in sensitive and protected watershed areas;
- waterbodies that are crossed less than 3 miles upstream of potable water intake structures; and/or
- waterbodies that contain sensitive fisheries, threatened or endangered species, or critical habitat.

Waterbodies may also be considered sensitive if they are of special interest to a land management agency. No waterbodies crossed by the Projects contain federally designated Essential Fish Habitat (EFH).

FM100 Project

Impaired Waterbodies – Five waterbodies crossed by the FM100 Project are listed as impaired on the Pennsylvania 303 (d) lists: Allegheny Portage Creek (milepost 14.1 of Line YM58), Fishing Creek (milepost 23.0 of Line YM58), an unnamed tributary to Fishing Creek (milepost 23.5 of Line YM58), an unnamed tributary to Bennet Branch Sinnemahoning Creek (milepost 0.0 of Line FM100 Abandonment), and Bennet Branch Sinnemahoning Creek (milepost 0.1 of Line FM100 Abandonment). However, direct impacts would be avoided at four of these five waterbody crossings: one via use of the HDD construction method, and three that are within the workspace but no in-stream work is proposed (see appendix D). The remaining impaired waterbody, Fishing Creek, is listed as impaired due to the presence of microbial pathogens from an unknown source. Based on correspondence with PADEP, Fishing Creek is not used for recreation. On September 24, 2019, PADEP confirmed that National Fuel's proposed crossing method for Fishing Creek is acceptable and no additional mitigation requirements are required (PADEP, 2019e).

Nationwide or State Rivers Inventory – The FM100 Project would not cross any rivers on or designated to be added to the nationwide or state rivers inventory.

Outstanding or Exceptional Quality Waters – Waterbodies or watersheds can also be classified as high quality or exceptional value based on a variety of criteria, including chemistry, biology, and outstanding resources. The FM100 Project would cross 40 waterbodies classified as high quality and 3 waterbodies classified as exceptional value waters, as designated by the Commonwealth of Pennsylvania.

Potable Surface Water Intakes – According to PADEP (PADEP, 2019c; 2019d), one potable surface water intake occurs within 3 miles of National Fuel's proposed waterbody crossings. The Driftwood Borough surface water intake is located approximately 2.2 miles upstream of the Line FM100 Abandonment (PADEP, 2019c). Thus, no impacts are anticipated.

Waterbodies that contain sensitive fisheries, threatened or endangered species, or critical habitat – Waterbodies containing sensitive fisheries and/or threatened or endangered species are further discussed in sections B.4.1 and B.4.4 and outlined in appendix D.

Leidy South Project

Impaired Waterbodies – No waterbodies listed as impaired on the Pennsylvania 303 (d) lists would be crossed by the Leidy South Project.

Nationwide or State Rivers Inventory – The Leidy South Project would not cross any rivers on or designated to be added to the nationwide or state rivers inventory.

Outstanding or Exceptional Quality Waters – The Leidy South Project would cross 7 waterbodies classified as high quality and 15 waterbodies classified as exceptional value waters, as designated by the Commonwealth of Pennsylvania.

Potable Surface Water Intakes – Based on Transco's consultation with PADCNR (2018), the Paddy Run surface water intake is located approximately 3.8 river-miles downstream from the Hensel Replacement crossing of an unnamed tributary to Paddy Run. Paddy Run is the drinking water source for approximately 1,500 homes within Renovo Borough, South Renovo Borough, and portions of Chapman Township (Uhler, 2019). Based on a recommendation from the Renovo Town Engineer, Transco would provide the Renovo Water Authority with advance notice of the schedule for activities at the unnamed tributary to Paddy Run to allow the water authority the opportunity to temporarily suspend use of the intake while construction activities are occurring.

Waterbodies that contain sensitive fisheries, threatened or endangered species, or critical habitat – Waterbodies containing sensitive fisheries and/or threatened or endangered species are further discussed in sections B.4.1 and B.4.4 and outlined in appendix D.

Hydrostatic Testing Impacts and Mitigation

As discussed in section A.8.1.1, National Fuel and Transco would verify the integrity of the pipelines before placing them into service by conducting hydrostatic testing as required by DOT regulations. National Fuel's and Transco's estimated hydrostatic test water requirements, potential sources, and discharge locations are listed in table B.3.2-1. The companies would follow federal, state, and local permit requirements with regard to water withdrawal and discharge.

TABLE B.3.2-1

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

Project/Facility	Potential Source/Milepost	Quantity of Water Required (gallons)	Discharge Location/Milepost
FM100 PROJECT			
Line YM58	To be determined	2,355,557	To be determined
Line KL Extension	To be determined	12,208	To be determined
Line YM224 Loop	To be determined	165,088	To be determined
	FM100 Project Total	**2,532,853**	
LEIDY SOUTH PROJECT			
Hensel Replacement	Municipal	1,600,000	MP188.6
Hilltop Loop	West Branch Susquehanna River	650,000	MP 183.6
Benton Loop	Municipal	1,300,000	MP 120.1
Compressor Station 607	Municipal	61,167	To be determined
Compressor Station 610	Municipal	31,146	To be determined
Compressor Station 620	Municipal	77,932	To be determined
	Leidy South Project Total	**3,720,245**	
	Pipeline Facilities Total	**6,253,098**	

National Fuel proposes to obtain water for hydrostatic testing from private water impoundments, municipal water sources, or surface waterbodies, but would not use groundwater. Transco would obtain water for hydrostatic testing from both municipal sources and surface waterbodies.

Water withdrawals from surface waterbodies would be conducted by both companies in a manner that would not reduce water flow to a point that would impair flow or impact fish, recreational activities, or public usage. Pump intakes would be equipped with screening to minimize entrainment of aquatic species during withdrawal. Hydrostatic test water would not be obtained from or discharged to any high-quality surface waters unless approved by the applicable state agency.

Upon completion of testing, the test water would be discharged to a well-vegetated upland area or to the surface waterbodies identified in table B.3.2-1 through an energy dissipation device and filtration device, and as approved by state regulatory authorities. The new pipelines would consist of new steel pipe that would be free of chemicals or lubricants, and no additives would be used in the hydrostatic test water. When discharging to upland areas, National Fuel and Transco would use dewatering structures, in compliance with National Fuel's ESCAMP, Transco's ECP, and applicable federal and state permits.

In accordance with National Fuel's ESCAMP and Transco's ECP, the companies would be required to:

- apply for any required state-issued water withdrawal permits and National Pollution Discharge Elimination System or other state-issued discharge permits;
- file a list of all waterbodies proposed for use as a hydrostatic test water source or discharge location; and
- obtain federal, state, and/or local permits to use state-designated exceptional value waters, waterbodies which provide habitat for federally listed species, or waterbodies designated as public water supplies.

Withdrawal and discharge of water for hydrostatic testing could result in erosion, increased turbidity in surface waters, changes in water temperature and oxygen levels, or entrainment of aquatic species. These impacts could in turn result in injury or death to aquatic species located in proximity at the time of active withdrawal or discharge. The withdrawal of large volumes of water from surface water sources could also temporarily affect the downstream designated recreational and biological uses of the resource if the diversions constitute a large percentage of the source's total flow or volume.

By implementing the hydrostatic testing procedures summarized above and in National Fuel's ESCAMP and Transco's ECP, by obtaining and complying with required permits, we conclude that impacts on water quality and aquatic species associated with hydrostatic test water withdrawal and discharge would be minor and temporary.

If additional water allocation is needed for dust control, the companies would allocate additional water for these purposes from municipal water supplies. Dust suppression efforts would be conducted in compliance with the applicable permits.

Waterbody Crossing Methods, General Impacts, and Mitigation

Waterbodies would be crossed in accordance with National Fuel's ESCAMP, Transco's ECP, and state and federal permit requirements. The companies would use one of the methods described below to cross waterbodies affected by the Projects. Appendix D lists the proposed crossing method for each waterbody affected by the Projects.

Dry Crossing Methods

Standard Upland Construction Method – National Fuel and Transco would evaluate the use of standard upland construction techniques to cross dry intermittent waterbodies and any stream without flow at the time of construction. When implementing this method, the companies would:

- limit the use of equipment in the waterbody to that needed to complete the crossing; and
- stockpile material excavated from the trench within the construction right-of-way and at least 10 feet from the water's edge or within ATWS, which would be located at least 50 feet from the water's edge unless otherwise approved (see appendix E).

The companies would implement one of the following dry-ditch crossing methods for waterbodies that have the potential to carry flow during construction based on precipitation forecasts or for any other waterbody with flow at the time of construction.

Dam and Pump Method – The dam and pump crossing method (also known as "pump around") consists of installing diversion structures that dam the waterbody and temporarily divert stream flow around construction area activities. Damming structures typically consist of one or more of the following: imported riprap, concrete jersey barriers, water bladders, port-a-dams, steel plates, and/or sandbags. The selection of the dam type or material would depend on the stream or waterbody depth, flow velocity, channel width, and flow type.

The dam and pump method is initiated by installing a damming structure upstream and downstream of the trench area. Pumps and hoses are then used to convey water flow around the in-stream work area and discharge it downstream of the construction site through an energy dissipating (or similar) device to prevent erosion and scouring and to minimize turbidity, creating a relatively dry work area. Additional pumps are typically on standby for use in the event that a high-water flow event occurs during construction. The trench is then excavated, the pipeline is installed in the dry ditch, the trench is backfilled to pre-construction contours, and the stream banks restored prior to removing the damming structures and restoring water flow.

Flume Method – The flume crossing method consists of installing flume pipe(s) over the workspace prior to trenching (or during trenching should an unforeseen event create flow) and maintaining downstream flow of the waterbody through the flume pipe(s). Equipment located on the stream banks work around the flume pipe during excavation. The project pipe segment is then threaded under the flume pipe and the ditch backfilled. If topographic conditions do not permit the pipe to be threaded under the flume, then the flow may be temporarily pumped while the flume is pulled to lower the pipe into the ditch. Flume pipes remain in place and would be maintained until restoration of the waterbody is complete and would be permanently removed as part of restoration.

The flume method may be applied to intermittent waterbodies that are dry during the initial installation but may flow should an unforeseen storm event cause stormwater runoff.

Horizontal Directional Drill Method

The HDD method is described in section A.8.1.2. National Fuel proposes three HDDs at mileposts 6.8, 14.1, and 14.8 of Line YM58 to avoid impacts on Potato Creek, Allegheny Portage Creek, and the Allegheny River, respectively. Transco does not propose any HDDs.

Conventional Bore Method

The bore method is described in section A.8.1.2. National Fuel does not propose any bore waterbody crossings for the FM100 Project. Transco would use the bore method to cross the West Branch Little Muncy Creek (milepost 120.2) and associated wetland on the Benton Loop. This waterbody is directly adjacent to a road (Mordan Hollow Road/SR2079) that would be crossed using the bore method; therefore, this waterbody would also be included in the bore crossing of the road.

General Impacts and Mitigation

Project construction could affect surface waters in several ways; the degree of impact would depend on a number of factors, including the size of the waterbody, flow at the time of crossing, and crossing method and duration. Clearing and grading of streambanks, in-stream trenching, trench dewatering, and backfilling could affect waterbodies through increased sediment loading and turbidity levels, reduced dissolved oxygen concentrations, stream warming, and introduction of chemical discharges from spills of fuels/lubricants. The Projects could also impact aquatic resources, including fisheries, as discussed in section B.4.1.

Where the flume or dam and pump methods are used, temporary construction-related impacts would be limited primarily to short periods of increased turbidity before installation of the pipeline, during the installation of the upstream and downstream dams, and following installation of the pipeline when the dams are pulled and flow is re-established across the restored work area. Following installation of pipelines using dry-ditch crossing methods, stream banks and riparian areas would be re-contoured and stabilized with approved seed mixes.

Transco proposes to cross Young Womans Creek, a major waterbody (i.e., over 100 feet wide), utilizing a cofferdam or dam and pump method. In accordance with the Commission's Procedures, Transco is required to provide a site-specific crossing plan for all major waterbody crossings. We reviewed Transco's site-specific crossing plan provided in appendix F, and find it acceptable. The plan includes scaled drawings of the waterbody crossing and associated workspace requirements, as well as detailed measures that would be implemented during construction, including but not limited to:

- agency notification requirements;
- review of weather conditions prior to initiating construction;
- installation of erosion control best management practices; and
- restoration requirements.

The companies identified areas where they would locate ATWS within 50 feet of a waterbody and provided justification for each workspace (see appendix E). The measures in National Fuel's ESCAMP and Transco's ECP would be implemented to control erosion and avoid or minimize other impacts that could result from the use of the ATWS. We have determined that the companies' proposed locations of ATWS within 50 feet of a waterbody listed in appendix E are justified.

During construction, clearing and grading of vegetation cover could increase erosion along stream banks. Alteration of the natural drainage or compaction of soils by heavy equipment near stream banks during construction may accelerate erosion of the banks and the transportation of sediment carried by overland flow into the waterbodies. The extent of the impact would depend on sediment loads, stream velocity, turbulence, stream bank composition, and sediment particle size. To minimize these impacts,

equipment bridges and equipment pads would be used. ATWS for spoil storage and pipe staging would typically be set back from the bank and temporary sediment barriers would be installed around disturbed areas in accordance with National Fuel's ESCAMP and Transco's ECP. Upon completion of construction, the companies would restore and properly stabilize the stream banks to prevent erosion and washouts.

Riparian cover on affected stream banks would be expected to recover over several months to several years. Once construction is complete, streambeds and banks would be quickly restored to preconstruction conditions to the fullest extent practicable. For open-cut crossings, waterbody banks would be stabilized, and temporary sediment barriers would be installed within 24 hours of completing instream construction activities. Adherence to National Fuel's ESCAMP and Transco's ECP would also maximize the potential for regrowth of riparian vegetation, thereby minimizing the potential for any long-term impacts associated with lack of shade and cover. In addition, restoration of forested riparian buffers along waterbodies would be completed in accordance with all applicable state and federal permit authorizations. A strip of riparian vegetation at least 25 feet wide adjacent to waterbodies would typically be allowed to revegetate to preconstruction condition over the entire width of the right-of-way, except for a 10-foot-wide strip centered over the pipeline that may be maintained in an herbaceous state. In accordance with the ESCAMP and ECP, trees would not be allowed to grow within 15 feet of the pipeline.

National Fuel's SPRP Plan and Transco's Spill Plan describe measures to prevent and, if necessary, control any inadvertent spill of hazardous materials that could impact soil or water quality. These plans include protective measures for the storage and handling of chemicals and fueling activities during construction within 100 feet from wetlands and waterbodies.

As previously mentioned, no direct surface waterbodies would be affected by construction of Compressor Station 620; however, we received comments on the potential impact on Deep Creek, located approximately 260 feet down gradient of the Compressor Station 620 site. During construction, Transco would implement its ECP and Spill Plan, which includes such measures as installing temporary erosion control devices that would be monitored by an EI on a daily basis during active construction. Transco would also install permanent erosion control devices at this location to minimize impacts from stormwater. These measures are all designed to prevent sediment flow and possible contaminates from spills from entering Deep Creek.

Because the waterbody crossings would be completed in accordance with the construction and restoration methods described above, National Fuel's ESCAMP, Transco's ECP, and any site-specific measures that may be required by the USACE, we conclude that impacts on waterbodies would be minor and temporary.

B.3.3 Wetlands Resources

B.3.3.1 Existing Wetland Resources

Wetlands in the area of the Projects are regulated at the federal and state levels. The USACE retains full section 404 and section 10 permitting authority in Pennsylvania. Section 401 of the Clean Water Act (CWA) requires that proposed dredge and fill activities under section 404 be reviewed and certified by the designated state agency so that the Projects would meet state water quality standards. The designated state agency in Pennsylvania is the PADEP.

No wetlands enrolled in the USDA Wetland Reserve Program or Conservation Reserve Program would be crossed by the Projects (see also section B.5.5.)

National Fuel and Transco conducted field delineations of wetlands that would be crossed using the USACE's Wetlands Delineation Manual (USACE, 1987) and the 2012 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0) Regional Supplement. Wetlands were classified as described in Cowardin et al. (1979). The basic wetland types that were delineated in the area of the Projects are discussed below.

Palustrine Forested Wetlands

Palustrine forested wetlands are characterized by woody vegetation that is 6 meters (approximately 18 feet) tall or taller and normally include an overstory of trees, an understory of young trees or shrubs, and an herbaceous layer.

Palustrine Scrub-Shrub Wetlands

Palustrine scrub-shrub wetlands are generally dominated by woody vegetation less than 6 meters (approximately 18 feet) tall. Scrub-shrub land types may represent a successional stage leading to a forested wetland and include shrubs, young trees, and trees or shrubs that are small and/or stunted due to environmental conditions.

Palustrine Emergent Wetlands

Palustrine emergent wetlands are characterized by erect, rooted, herbaceous hydrophytes, not including mosses and lichens. Emergent wetlands typically are found to be dominated by low-growing sedges, rushes, and other herbaceous vegetation.

Palustrine Unconsolidated Bottom Wetlands

Palustrine unconsolidated bottom wetlands crossed by the FM100 Project are characterized by the lack of large stable surfaces for plant and animal attachment. They include wetlands with at least 25 percent cover of particles smaller than stones, and vegetation cover of less than 30 percent.

B.3.3.2 Wetland Crossing Methods, General Impacts, and Mitigation

Crossing Methods

Wetlands would be crossed in accordance with National Fuel's ESCAMP, Transco's ECP, and state and federal permit requirements. National Fuel and Transco would use various methods to cross wetlands depending on site-specific conditions present during construction, as described below.

Unsaturated Wetlands – In unsaturated wetlands where the soils are non-saturated and able to support construction equipment at the time of crossing, the companies would use standard upland construction techniques as described in section A.8.1.1. In general, the existing vegetation would first be cut to the ground level. Tree stumps would not be removed from the wetland with the exception of those directly over the trench line. Debris would be removed from the wetland and stockpiled within an upland area of the right-of-way for disposal. Next, topsoil would be segregated in the wetland. Pipe stringing and fabrication may be conducted within the wetland adjacent to the trench or adjacent to the wetland in a designated ATWS. Following trenching and lowering the pipeline into the trench, the companies would conduct backfilling, grading, and final cleanup.

Saturated or Unstable Wetlands – In wetlands where the soils are saturated or otherwise unable to support mainline construction equipment and the right-of-way, equipment would need to be stabilized

with timber mats or similar materials. Clearing activities would be similar to those described for unsaturated wetlands and limited to only that necessary to install the pipeline. The companies would conduct construction similar to that in unsaturated wetlands; however, topsoil segregation would not be possible because of saturation. Prior to crossing and movement of construction equipment through these wetlands, the companies propose to stabilize the right-of-way using timber mats to allow for safe working conditions.

Standing Water Wetlands – The push/pull method (see section A.8.1.2) would be used as an alternative wetland crossing method, or if specifically required through agency consultations, to cross large wetland areas where sufficient water is present for floating the pipeline in the trench, and grade elevation over the length of the push-pull area would not require damming to maintain adequate water levels for pipe floatation. Crossing of a wetland using the push/pull method involves stringing and welding the pipeline in designated areas outside the boundary of the wetland. The companies would excavate the wetland using backhoes supported by equipment mats. The prefabricated pipeline segment would be installed within the wetland by attaching floats or buoys to the pipe segment and pulling or pushing the pipeline segment across the water-filled trench. This process is known as "floating" the pipeline segment into place. After the pipeline segment is correctly positioned, the companies would remove the floats allowing the pipeline to eventually sink to the bottom of the excavated trench with the aid of concrete coating or concrete set-on weights to achieve negative buoyancy. The companies would then backfill the excavated trench with backhoes working off of equipment mats.

As previously discussed in section B.3.1.2, Transco would also use the bore method to cross a wetland associated with the West Branch Little Muncy Creek (milepost 120.2) on the Benton Loop. This wetland is directly adjacent to a road (Mordan Hollow Road/SR2079) that would be crossed using the bore method; therefore, this wetland would also be included in the bore crossing of the road. The bore method is described in section A.8.1.2.

General Impacts and Mitigation

Table B.3.3-1 summarizes the Projects' acreage impacts on each wetland types. More detailed information is included in appendix G.

Construction of the Projects would impact a total of approximately 20.9 acres of wetlands, consisting of 16.9 acres of emergent wetland, 2.3 acres of scrub-shrub wetland, and 1.5 acres of forested wetlands. Of the 1.5 acres of forested wetland impacts, approximately 0.2 acre would be permanently converted to emergent or scrub-shrub wetland types for vegetation maintenance requirements along the pipeline facilities.

The primary impact of the Projects on wetlands would be the alteration of wetland function and value due to vegetation clearing. Construction could also impact water quality within the wetland due to sediment loading or inadvertent spills of fuel or chemicals. The use of heavy equipment within wetlands could also result in the compaction of wetland soils. Impacts on wetlands would be greatest during and immediately following construction. The majority of these effects would be short term in nature and would cease shortly after the wetlands are restored and vegetated. Following revegetation, the wetland would eventually transition back into a community with functionality similar to that of the preconstruction state. In emergent wetlands, the herbaceous vegetation would regenerate quickly (typically within 1 to 3 years).

TABLE B.3.3-1

Summary of Wetland Impacts Associated with the FM100 Project and Leidy South Project (acres)

	Emergent Wetland		Scrub-shrub Wetland		Forested Wetland		Unconsolidated Bottom (Pond)	
Project/Facility	Con [a]	Op [b]	Con	Op	Con	Op	Con	Op
FM100 PROJECT								
Line YM58	10.4	1.6 [c]	1.7	0.2	1.1	<0.1	0.1	0.0
Access Roads	0.8	0.0	<0.1	0.0	0.0	0.0	<0.1	0.0
Line KL Extension	0.6	<0.1 [c]	0.0	0.0	0.0	0.0	0.0	0.0
Access Roads	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Line YM224 Loop	<0.1	<0.1 [c]	0.0	0.0	0.0	0.0	0.0	0.0
Access Roads	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Line FM100 Abandonment [d]	0.3	0.0	<0.1	0.0	0.0	0.0	0.0	0.0
Access Roads	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marvindale Compressor Station	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.0
Access Roads	<0.1	0.0	0.0	0.0	<0.1	0.0	0.0	0.0
Tamarack Compressor Station	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access Roads	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FM100 Project Subtotal	**12.1**	**1.6**	**1.8**	**0.2**	**1.1**	**<0.1**	**0.2**	**0.0**
LEIDY SOUTH PROJECT								
Hensel Replacement [e]	1.4	0.0	0.4	<0.1	<0.1	<0.1	0.0	0.0
Access Roads	0.2	<0.1	0.0	0.0	<0.1	0.0	0.0	0.0
Hilltop Loop	0.8	0.0	0.0	0.0	0.1	<0.1	0.0	0.0
Access Roads	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benton Loop	2.4	0.0	<0.1	<0.1	0.2	<0.1	0.0	0.0
Access Roads	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Compressor Station 607	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access Roads	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Leidy South Project Subtotal	**4.8**	**<0.1**	**0.5**	**<0.1**	**0.4**	**<0.1**	**0.0**	**0.0**
Projects Total	**16.9**	**1.7**	**2.3**	**0.3**	**1.5**	**0.2**	**0.2**	**0.0**

[a] Con = Construction Impacts. Includes impacts associated with all areas within the construction workspace limits. This includes the total of the existing pipeline right-of-way, new permanent right-of-way, ATWS areas, and contractor/ staging areas.

[b] Op = Operational Impacts. Includes impacts associated with the new permanent right-of-way located outside of the existing and currently maintained pipeline right-of-way.

[c] Emergent wetlands within permanently maintained right-of-way; would be allowed to revert to preconstruction conditions.

[d] Does not include wetlands between workspaces where no impacts would occur (foot traffic only).

[e] No wetland or waterbody impacts for Leidy Line A abandonment where not collocated with Leidy Line D.

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

Following revegetation, no permanent impact would occur on emergent wetland vegetation in the maintained pipeline right-of-way because these areas naturally consist of, and would remain as, open land and herbaceous communities. In addition, all scrub-shrub wetlands would be allowed to revert to scrub-shrub wetlands after construction. Revegetation would be considered successful if the cover of herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent wetland areas that were not disturbed by construction.

The duration of the impact on scrub-shrub and forested wetlands would be longer than that of emergent wetlands. Forested wetlands located outside of the permanent right-of-way would be allowed to revert to forested wetlands after construction. In these areas, woody vegetation may take several years to regenerate, resulting in long-term impacts. Permanent impacts on forested wetlands within the new permanent right-of-way would be based on its width, where the wetland would be converted to scrub-shrub or emergent. For the permanent right-of-way, the re-establishment of mature woody vegetation would be precluded by the annual maintenance of a 10-foot-wide herbaceous strip centered over the pipeline and the cutting of woody vegetation within 15 feet of the pipeline centerline. This would result in a permanent conversion of previously forested wetland areas to non-forested wetland areas. The conversion from one vegetation cover type to another could result in changes in wetland functions and values by altering the amount of sunlight or other environmental conditions in the wetland, affecting wildlife habitat. In general, however, it is expected that the affected wetlands would continue to provide important ecological functions such as sediment/toxicant retention, nutrient removal, flood attenuation, groundwater recharge/discharge, and wildlife habitat.

In general, the companies would minimize wetland impacts by collocating the Projects with existing utility rights-of-way (72.7 percent of National Fuels proposed pipelines; 95 percent of Transco's Hensel Replacement and 100 percent of the Hilltop and Benton Loops). In addition to the measures identified in crossing methods discussion above, the companies would implement the following measures outlined in National Fuel's ESCAMP and Transco's ECP:

- Sediment barriers would be installed across the entire construction right-of-way at all waterbody/wetland crossings, where necessary, to prevent the flow of sediments into the waterbody or wetland. Where waterbodies or wetlands are adjacent to the construction right-of-way, sediment barriers would be installed along the edge of the construction right-of-way as necessary to contain spoil and sediment within the construction right-of-way.

- Trench plugs/breakers would be installed at the banks of all waterbodies and at the boundaries of all wetland crossings immediately after trench excavation to prevent diversion of water into upland portions of the pipeline trench and to keep any accumulated trench water out of the waterbody or wetland.

- The top 12 inches of topsoil would be segregated from the area disturbed by trenching in wetlands, except in areas where standing water is present or soils are saturated or frozen.

- The trench would be dewatered (either on or off the construction right-of-way) in a manner that would not cause erosion and would not result in heavily silt-laden water flowing into any waterbody or wetland.

- Vegetation maintenance during operations would be limited in wetlands to a 10-foot-wide herbaceous corridor and the removal of trees and shrubs within 15 feet of the pipeline centerline.

In addition to the above measures, the companies would limit the width of the construction right-of-way in wetlands to 75 feet, as specified in Section V.A.3 of our Procedures, except in those areas identified in table B.3.3-2, which includes the companies' justification for more than 75 feet of construction right-of-way width. We reviewed the companies' alignment sheets and other mapping and have determined that these requested construction rights-of-way in wetlands are justified.

TABLE B.3.3-2

Areas Proposed to Exceed 75 Feet of Workspace Width within Wetlands

Project/Facility	Wetland Identification	Milepost	Justification [a]	Width of Workspace within Wetland (feet)
FM100 PROJECT				
Line YM58	Wetland 039	6.7	A	150
	Wetland 037c	6.8	B	100
	Wetland 051	7.8	C	100
	Wetland 076	14.0	B	100
	Wetland 077	14.0	B	100
	Wetland 080	14.1	B	100
Line KL Extension	Wetland 004b	0.2	C	125
LEIDY SOUTH PROJECT				
Hensel Replacement	W3-T1-R	193.6	D	90
Hilltop Loop	W3-T7a-HL	183.5	E	315
	W1-T4-HL	184.9	F	175
	W3-T2-HL	185.1	G	145

[a] a = HDD pad and drill operations; timber mats would be used to minimize impacts
b = although standard ROW configuration is shown, wetland is along HDD path and right-of-way would not be cleared at this location
c = topsoil segregation and spoil storage in support of stream crossing
d = wetland crossing between two active pipelines
e = wetland adjacent to existing valve site proposed for removal, matting would be used to minimize wetland disturbance
f = steep slope and adjacent to large waterbody crossing and foreign pipelines
g = steep slope and adjacent to road

National Fuel and Transco would also locate ATWS at least 50 feet away from wetland boundaries, in accordance with their ESCAMP or ECP, except where site-specific conditions justify the need for ATWS to be sited closer than 50 feet. National Fuel and Transco identified areas where it would be necessary to locate ATWS within 50 feet of wetlands and provided justification for each workspace (see appendix E). These justifications include the need for additional workspace for waterbody and road crossings, steep slope construction, and other activities. We have determined that the companies' proposed locations of ATWS within 50 feet of a wetland are justified.

Wetland restoration would be conducted in accordance with National Fuel's ESCAMP, Transco's ECP, and other permit conditions as may be required. The companies would conduct annual post-construction monitoring of all wetlands affected by construction to assess the condition of vegetation and the success of restoration for a period of at least 3 years. If after the third year any wetland is not revegetated, the companies would be required to develop and implement a remedial wetland revegetation plan in consultation with a professional wetland ecologist to actively revegetate wetlands. They would be required to provide continual annual revegetation reports until revegetation is successful. An annual monitoring report addressing the status of wetland restoration and revegetation would be submitted to the appropriate agencies. Other elements for inclusion in the annual monitoring report would be determined through consultations with USACE and PADEP in conjunction with permit conditions and authorization.

Wetland Mitigation

The USACE and designated state agencies require mitigation for unavoidable wetland impacts to preserve no net loss of wetland function.

FM100 Project

National Fuel's consultation with PADEP and USACE regarding wetland mitigation requirements is ongoing. Wetland mitigation would be determined as part of National Fuel's joint permit application to the PADEP for a Pennsylvania Water Obstruction and Encroachment Permit and to the USACE for a permit under section 404 of the CWA and section 10 of the Rivers and Harbors Act.

Leidy South Project

In coordination with the USACE and PADEP, an offsite wetland mitigation site is proposed to maintain no net loss of wetlands and to adequately replace lost functions for the Leidy South Project. The proposed mitigation plan includes approximately 0.3 acre wetland creation and 0.2 acre wetland enhancement within the Lower West Branch Susquehanna River Sub-basin. The proposed wetland mitigation site is located within an existing property currently in use for other offsite permittee-responsible mitigation. The current land use for the portion of the property proposed to be used by Transco is agriculture. Transco continues to consult with the USACE and PADEP regarding the final wetland mitigation plan for the Leidy South Project. As part of the federal and state permitting processes, written approval of the mitigation plan must be obtained from the appropriate agencies prior to construction. Information concerning federal threatened and endangered species and cultural resources at the proposed wetland mitigation site is included in sections B.4.4.3 and B.6.1, below. A map of the offsite wetland mitigation site is provided in appendix H.

B.4 FISHERIES, VEGETATION, AND WILDLIFE

B.4.1 Fisheries

The PADEP classifies freshwater 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. Select waterbodies are further classified as high quality or exceptional value and given special protection. High quality waterbodies exceed levels necessary to support fish, shellfish, wildlife, and recreation. Waterbodies classified as exceptional value are in significant natural areas, provide exceptional ecological significance, or are designated as a "wilderness trout stream." The Projects would cross 49 waterbodies classified as high quality and 20 waterbodies classified as exceptional value.

The PAFBC further classifies waterbodies supporting trout populations or providing habitat as Approved Trout Waters, Class A Trout Waters, Special Regulation Areas, Stream Sections that Support Natural Reproduction of Trout, and Wilderness Trout Streams. The Projects would cross 128 waterbodies with trout classifications. As discussed in section B.3.2.1, 60 of the waterbody crossings are at existing access roads that would be utilized for the Projects, and no in-stream work would occur. Appendix D identifies the fishery classifications that apply to each waterbody crossed by the Projects. There are no waters designated as EFH within the vicinity of the Projects. Therefore, we conclude that the Projects would have no impact on EFH.

FM100 Project

The FM100 Project would cross 111 waterbodies supporting coldwater fisheries. Pennsylvania also affords special protections to high quality or exceptional value waterbodies and may designate waters

to be managed for trout. The FM100 Project would cross 41 high quality-designated waterbodies, 3 exceptional value waterbodies, 106 Wild Trout-designated waterbodies, and 3 trout stocked waterbodies. No Class A Wild Trout streams would be crossed by the FM100 Project.

Leidy South Project

The Leidy South Project would cross 13 waterbodies supporting coldwater fisheries, 8 high quality-designated waterbodies, 17 exceptional value waterbodies, and 22 Wild Trout-designated waterbodies. No Class A Wild Trout streams would be crossed by the Leidy South Project.

B.4.1.1 General Impacts and Mitigation

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

The greatest potential for construction impacts on fishery resources would result from an increase in sediment loading and turbidity within and immediately downstream of the construction work areas, including an inadvertent drilling mud release, downstream scour associated with diverting water around waterbody crossings, or discharge of hydrostatic test water. Increased levels of sedimentation could adversely affect fish eggs and juvenile fish survival, benthic community diversity and health, and spawning habitat. However, as discussed in section B.3.2.1, the companies would complete all in-stream work during state-specified construction windows, and would also implement other measures outlined in National Fuel's ESCAMP and Transco's ECP to reduce sedimentation and enhance restoration. In addition, Transco proposes to cross Young Womans Creek, a major waterbody, utilizing the cofferdam or dam and pump method. In accordance with the FERC Procedures, Transco provided a site-specific crossing plan (see appendix F) that is discussed further in section B.3.2.1.

As previously discussed in section B.3.2.1, no direct surface waterbodies would be affected by construction of Compressor Station 620; however, we received comments on the potential for construction of the compressor station to impact Deep Creek (a stocked trout water), which is approximately 260 feet down gradient of the Compressor Station 620 site. During construction, Transco would implement its ECP and Spill Plan, which include such measures as installing temporary erosion control devices that would be monitored by an environmental inspector on a daily basis during active construction. Transco would also install permanent erosion control devices at this facility to minimize impacts from stormwater. These measures are all designed to prevent sediment flow and possible contaminates from spills from entering Deep Creek.

Long-term impacts on fishery resources could occur if the stream contours are permanently modified in the area of crossing or if the adjacent riparian vegetation does not recover. The companies propose to reduce effects on fishery resources through the use of the various waterbody crossing methods and restoration procedures described in sections A.8.1.2 and B.3.2.1 and by minimizing the duration of in-stream work in accordance with National Fuel's ESCAMP and Transco's ECP. Section B.3.2.1 also describes the procedures the companies would implement during hydrostatic test water withdrawal and discharge to minimize sedimentation and turbidity. Specifically, the companies would screen the intake hoses to avoid the uptake of organic debris and entrapment of aquatic species during water withdrawal. National Fuel and Transco would comply with appropriate agency requirements that consider the

protection of fisheries resources on a case-by-case basis. Discharges would comply with regulatory permit conditions and would be controlled to prevent scour and excessive sedimentation.

If conditions are encountered that warrant the use of controlled blasting, the companies would implement plans (i.e., National Fuel's Procedures for Blasting guidance document in its ESCAMP and Transco's Blasting Plan in its ECP) that outline proper precautions to be implemented to minimize potential impacts such as prior notification to landowners, vibration monitoring, water quality testing, and the use of mats to control flyrock. In addition, the companies would acquire the appropriate federal, state, and local permits prior to blasting. We believe these measures would minimize the potential for fishery impacts due to blasting.

Impacts on fisheries would be reduced further by limiting in-stream work to the time periods required by federal and state agencies (see appendix E). For waterbodies that do not have a specific timing restriction or are otherwise authorized by the state of Pennsylvania, the companies would adhere to the in-stream construction timing restrictions included in National Fuel's ESCAMP and Transco's ECP, which are in accordance with measure V.B.1 of our Procedures. We find that implementing these timing restrictions would minimize impacts on fish species in the area of the Projects.

We expect streambeds and banks to quickly revert to preconstruction conditions. Each applicant's commitment to conduct restoration, bank stabilization, and revegetation efforts in accordance with National Fuel's ESCAMP and Transco's ECP, and all applicable state and federal permits would minimize the potential for erosion from the surrounding landscape. Adherence to National Fuel's ESCAMP and Transco's ECP would also maximize the potential for regrowth of riparian vegetation, thereby minimizing the potential for any long-term impacts associated with lack of shade and cover. All temporary work areas would be restored and allowed to revegetate to original conditions. No long-term impacts are anticipated after restoration of stream bottoms and regrowth of stream bank and aquatic vegetation. If vegetation maintenance during operation would be required along specific streambanks, impacts on fisheries would be minor. By implementing the above measures, we conclude that impacts on fisheries related to the Projects would be sufficiently minimized.

B.4.2 Vegetation

Plant communities were classified using the National Land Cover Dataset (USGS, 2012), interpretation of aerial photography, and/or field surveys. Major upland cover types affected by the Projects include upland forest and open upland, as summarized in table B.4.2-1. Table B.4.2-2 describes the approximate acreage of upland vegetation communities that would be affected by the Projects. Wetland vegetation communities that would be affected by the Projects are discussed in section B.3.3.

TABLE B.4.2-1

Upland Vegetation Cover Types Associated with the FM100 Project and Leidy South Project

Vegetation Community	General Description	Common Species
Upland forest	Mixed Deciduous/Evergreen, Deciduous Hardwood Forest.	Dominant trees observed in this forest type include red maple, sugar maple, eastern hemlock, black cherry, black walnut, American beech, birch species, oak species, and white pine.
Open upland	This vegetation community consists of all non-forested, non-wetland habitats, including agricultural lands (which includes pastureland), grassland, shrubland, residential, and existing pipeline right-of-way.	Agriculture lands predominantly used for crop production (corn, soybean, alfalfa, sunflower) or pasture/grazing land (fallow fields). In residential areas the existing rights-of-way consist primarily of maintained lawns and a limited amount of scrub-shrub communities. Existing pipeline rights-of-way are mowed on a regular basis to suppress woody plant growth. Plant species commonly observed included various perennial cool grass species.

TABLE B.4.2-2

Upland Vegetation Affected by the FM100 Project and Leidy South Project (acres)

	Pipeline Facilities [a]		Aboveground Facilities [b]		Contractor Yards/Staging Areas		Access Roads		**Total**	
Project/Vegetation Cover Type	Con [c]	Op [d]	Con	Op	Con	Op [e]	Con [f]	Op [g]	Con	Op
FM100 PROJECT										
Upland Forest	122.1	63.7	17.5	8.0	1.8	0.0	4.1	3.2	**145.5**	**74.9**
Open Upland	179.5	123.7	2.7	0.2	20.3	0.0	32.9	20.9	**235.4**	**144.8**
FM100 Project Subtotal	**301.6**	**187.4**	**20.2**	**8.2**	**22.1**	**0.0**	**37.0**	**24.1**	**380.9**	**219.7**
LEIDY SOUTH PROJECT										
Upland Forest	45.6	7.4	4.4	2.8	6.5	0.0	4.6	4.3	**61.1**	**14.5**
Open Upland	118.9	12.1	59.3	34.2	96.8	0.0	1.7	0.4	**276.7**	**46.7**
Leidy South Project Subtotal	**164.5**	**19.5**	**63.7**	**37.0**	**103.3**	**0.0**	**6.3**	**4.7**	**337.8**	**61.2**
Projects Total	**466.1**	**206.9**	**83.9**	**45.2**	**145.3**	**0.0**	**43.3**	**28.8**	**718.7**	**280.9**

[a] Includes pipeline replacements, loops, extensions, and abandonment.

[b] Acreage of vegetation impacts for aboveground facilities reflects the workspace both within and outside of the fence line for existing facilities. Operational impacts associated with the footprint of MLVs are included here; construction impacts for MLVs are included in totals for pipeline facilities. Modifications at existing Compressor Station 605 would not result in ground disturbance; therefore, no upland vegetation would be affected.

[c] Construction acreages include impacts associated with all areas within the construction workspace limits. This includes the total of the existing pipeline right-of-way, new permanent pipeline rights-of-way, temporary workspace areas, and ATWS.

[d] Operational acreages include impacts associated with the portion of the new permanent right-of-way outside of the existing and currently maintained pipeline right-of-way.

[e] Following construction, areas used for contractor/pipe storage yards/staging areas would be allowed to return to preconstruction conditions; no operational impacts are anticipated.

[f] Acreage of vegetation impacts for temporary access roads associated with the pipeline loops. Construction impacts for temporary access roads associated with aboveground facilities are included in the construction impacts for those facilities.

Con = construction

Op = operation

FM100 Project

Construction of the FM100 Project would impact 380.9 acres of upland vegetation, of which 235.4 acres (62 percent) consists of open upland vegetation communities, with the remaining 145.5 acres (38 percent) comprised of upland forest (see table B.4.2-2). Of the 380.9 acres of vegetation affected by construction, the majority, 179.5 acres (47 percent), is associated with pipeline facilities in open upland and 122.1 acres (32 percent) are associated with pipeline facilities in upland forest.

Operation of the FM100 Project would impact 219.7 acres of upland vegetation, comprised of 144.8 acres of open upland and 74.9 acres of upland forest. Operation of the new Marvindale and Tamarack Compressor Stations would permanently impact 8.0 acres of open upland and 0.2 acre of upland forest, or 5 percent of the operational impacts on upland vegetation.

National Fuel would minimize impacts on upland forest by utilizing existing rights-of-way or previously disturbed, non-forested areas to the extent practicable. Specifically, about 77 percent of National Fuel's proposed pipelines would be collocated with existing utility rights-of-way. National Fuel would conduct vegetation maintenance within the full width of the new permanent rights-of-way and would allow the temporary workspaces to revert to woody vegetation in accordance with the ESCAMP.

Vegetation Communities of Special Concern

Based on consultation with the PADCNR, the pipeline abandonment portion of the FM100 Project would occur within three natural and/or wild areas: the Bucktail Natural Area, Johnson Run Natural Area, and Square Timber Wild Area. None of these areas or other areas with vegetation communities of special concern would be affected by new pipeline and aboveground facilities. National Fuel would obtain authorization from the PADCNR regarding its abandonment efforts and impacts on state-managed lands. These areas are also discussed in section B.5.5.3.

The Bucktail Natural Area can be observed via a 75-mile scenic drive from Emporium, Pennsylvania to Lock Haven, Pennsylvania and contains views of approximately 16,433 acres of forest that is part of the Elk and Sproul State Forests (PADCNR, 2019d). This natural area is comprised of mainly forested land along the walls of the West Branch of the Susquehanna River and Sinnemahoning Creek (PADCNR, 2019e). Project activities associated with the FM100 Abandonment within the Bucktail Natural Area would be limited to the existing pipeline and road rights-of-way; therefore, impacts to sensitive habitats within this natural area are not anticipated.

The Johnson Run Natural Area is a state-managed, 216-acre natural area on the steep slopes above Sinnemahoning Creek and features an old growth hemlock-hardwood mix. Project activities associated with the FM100 Abandonment within the Johnson Run Natural Area would be limited to the existing pipeline and road rights-of-way; therefore, impacts to sensitive habitats (i.e. old growth forest) within this natural area are not anticipated.

The Square Timber Wild Area is approximately 8,461 acres (a portion of which is in the Bucktail State Park Natural Area) and features deep narrow valleys and steep ridges (PADCNR, 2019d). Project activities associated with the FM100 Abandonment within the Square Timber Wild Area would be limited to the existing pipeline right-of-way; therefore, impacts on sensitive habitats are not anticipated.

Noxious Weeds and Other Invasive Plants

National Fuel obtained lists of noxious and invasive weeds that could be present from the USDA's Introduced, Invasive, and Noxious Plants database (USDA, 2019) and the PDA (2019), and conducted field surveys for noxious and invasive weeds.

National Fuel did not identify significant populations of noxious weeds during surveys conducted between September and October 2017, and April and August 2018. National Fuel has prepared a NIWCP that outlines methods to prevent, mitigate, and control the spread of noxious and invasive weeds during ground-disturbing activities associated with construction of the FM100 Project, and includes a monitoring program to be implemented following construction and restoration. Relevant measures in the plan include:

- flagging areas of concern (by the EI during preconstruction review) prior to construction to alert construction personnel and prevent access into areas until noxious weed control measures have been properly implemented;
- treating known weed populations prior to construction with appropriate methods in coordination with the PDA and following applicable agency requirements to prevent their spread;
- removing soil and plant material from vehicles and machinery to prevent the transport of noxious weeds to other areas; and
- checking for invasive species growth as part of revegetation monitoring following completion of construction after the first and second growing seasons, as applicable, and in accordance with National Fuel's NIWCP and ESCAMP.

We reviewed National Fuel's NIWCP and find it acceptable.

Pollinators

On June 20, 2014, President Barack Obama signed a Presidential Memorandum titled "Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators." According to the memorandum, "there has been a significant loss of pollinators, including honey bees, native bees, birds, bats, and butterflies, from the environment." The memorandum also states that, "given the breadth, severity, and persistence of pollinator losses, it is critical to expand federal efforts and take new steps to reverse pollinator losses and help restore populations to healthy levels." In response to the Presidential Memorandum, the federal Pollinator Health Task Force published a National Strategy to Promote the Health of Honey Bees and Other Pollinators in May 2015. This strategy established a process to increase and improve pollinator habitat.

Pollinator habitat in and adjacent to the FM100 Project area can be found in a variety of vegetation types. Common insect pollinators in the FM100 Project area include various species of bees, butterflies, and moths. The temporary loss of this habitat could increase the rates of stress, injury, and mortality experienced by honey bees and other pollinators.

Construction of the FM100 Project would temporarily impact about 250 acres of pollinator habitat. The Pennsylvania Field Office of the USFWS recommended that National Fuel revegetate disturbed areas in accordance with best management practices included in the Forage and Habitat section of the Pennsylvania Pollinator Protection Plan (USFWS, 2019a), and the EPA requested the applicants

explore the feasibility of incorporating pollinator-friendly species into revegetation efforts. National Fuel would incorporate the following measures, included in the Pennsylvania Pollinator Protection Plan, to support foraging habitat for pollinators along the proposed rights-of-way:

- limit herbicide applications and utilize spot treatments to avoid overspray;
- develop a revegetation/restoration plan in coordination with landowners and agencies that includes native and pollinator species; and
- implement a low-impact mowing plan.

Leidy South Project

Construction of the Leidy South Project would impact 337.8 acres of upland vegetation, of which 276.7 acres (82 percent) consists of open upland vegetation communities, with the remaining 61.1 acres (18 percent) comprised of upland forest (see table B.4.2-2). Of the 337.8 acres of upland vegetation affected by construction, 153.7 acres (45 percent) are associated with construction of the new pipeline facilities, while 10.8 acres (3 percent) are associated with the portion of the Leidy Line A abandonment that is not collocated with Leidy Line D. Construction of new Compressor Stations 607 and 620 would impact 58.9 acres of open upland vegetation and 4.0 acres of upland forest, representing 18 percent of vegetation affected. Construction at the existing Compressor Station 610 would impact 0.3 acre of upland forest within the fence line of the existing facility, representing less than 0.1 percent of vegetation affected. The temporary use of contractor yards would impact 96.8 acres of open upland vegetation and 6.5 acres of upland forest, totaling 31 percent of vegetation affected. The construction of access roads would impact 1.7 acres of open upland vegetation and 4.6 acres of upland forest, accounting for 0.5 percent of open upland vegetation and 1.4 percent of upland forest affected by construction.

Operation of the Leidy South Project would impact 61.2 acres of upland vegetation, comprised of 46.7 acres of open upland and 14.5 acres of upland forest. Operation of the proposed Compressor Stations 607 and 620 would permanently impact 33.8 acres of open upland and 2.5 acre of upland forest, or 60 percent of the operational impact of the Leidy South Project on upland vegetation.

Transco would minimize impacts on upland forest by utilizing existing rights-of-way or previously disturbed, non-forested areas to the extent possible. Specifically, 95 percent of Transco's proposed Hensel Replacement and 100 percent of Transco's Hilltop and Benton Loops would be collocated with existing utility rights-of-way. Transco would typically limit the width of new permanent right-of-way to 25 feet and would allow the ATWS to revert to woody vegetation. In addition, the proposed construction rights-of-way would overlap the existing, maintained permanent right-of-way. Where the Leidy Line A is removed on Sproul State Forest land, between approximate mileposts 191.1 to 192.6, Transco would regrade the existing Leidy Line A and B rights-of-way to eliminate an existing two-tone grade and restore approximate original contours. The new pipeline (Leidy Line D) would be offset 25 feet where it is adjacent to Leidy Line B, which is closer than the existing 47-foot-wide Leidy Line A offset. Transco's current permanent right-of-way within the Sproul State Forest crosses approximately 69.2 acres; however, the resulting permanent right-of-way would cross 57.3 acres, resulting in a reduction in permanent right-of way and an increase in available habitat for wildlife. In addition, Transco proposes to plant trees in approximately 46 acres of the temporary construction workspace within the Sproul State Forest.

Vegetation Communities of Special Concern

Based on consultation with the PADCNR, Transco's Leidy Line D and Leidy Line A abandonment components of the Hensel Replacement and a small portion (less than 0.1 mile) of the Hilltop Loop would cross the Sproul State Forest and the Tamarack Swamp Natural Area.

The Sproul State Forest is managed by the PADCNR's Bureau of Forestry and is the largest in the state forest system. Sproul State Forest encompasses approximately 305,450 acres primarily in western Clinton and northern Centre Counties with small portions in Cameron, Clearfield, Lycoming, and Potter Counties, and it features steep and rugged hillsides cut by the West Branch of the Susquehanna River and its tributaries (PADCNR, 2019f). The Hensel Replacement would cross a total of 60.3 acres of open upland and 13.9 acres of upland forest within the Sproul State Forest; of the 74.2 acres of upland vegetation impacted, 4.6 acres would be permanently impacted (i.e., converted to herbaceous cover) by operation of the Leidy South Project. The remaining 69.6 acres would be allowed to recover within the construction right-of-way and ATWS; and, as noted above, Transco proposes to plant trees in approximately 46 acres of the temporary construction workspace within the Sproul State Forest. The Hilltop Loop would cross a total of 0.7 acre of open upland and 0.5 acre of upland forest within the Sproul State Forest, none of which would be permanently impacted by operation of the Leidy South Project.

The Tamarack Swamp Natural Area is northeast of the town of Tamarack in Clinton County. This 267-acre area supports eight wetland types, including the tamarack and black spruce swamp for which it is named (PADCNR, 2019d). We received comments requesting that the Hensel Replacement avoid impacts on the Tamarack Swamp Natural Area. Based on input received during the pre-filing process, Transco's proposed route addressed concerns with routing the Hensel Replacement to avoid direct impacts on the Tamarack Swamp Natural Area. Additionally, as a result of consultation with the PADCNR, Transco proposes to abandon the portion of Leidy Line A within the Tamarack Swamp Natural Area by abandoning in place and grouting the abandoned pipeline and does not plan to maintain the right-of-way.

Noxious Weeds and Other Invasive Plants

Transco obtained lists of noxious and invasive weeds that could be present from the USDA's Introduced, Invasive, and Noxious Plants database (USDA, 2019), the PDA (2019), and the PADCNR (2019g), and conducted field surveys for noxious and invasive weeds.

Transco documented noxious and invasive weeds during field surveys in 2018 and 2019. The following four noxious and six invasive plant species were found at various locations along the pipeline routes and aboveground facilities sites: bull thistle (*Cirsium vulgare*), multiflora rose (*Rosa multiflora*), shattercane (*Sorgum bicolor*), purple loosestrife (*Lythrum salicaria*), spotted knapweed (*Centaurea maculosa*), Japanese stiltgrass (*Microstegium vimineum*), Japanese barberry (*Berberis thunbergii*), autumn olive (*Elaeagnus umbellata*), garlic mustard (*Alliaria petiolata*), and crown-vetch (*Securigera varia*).

Transco has prepared a Draft ISMP that outlines measures to prevent, mitigate, and control the spread of noxious and invasive weeds during ground-disturbing activities associated with construction, and includes a monitoring program that would be implemented following construction and restoration. Some of the measures in the plan include:

- providing noxious weed management training to construction and inspection personnel;

- removing soil and propagules from vehicles and machinery to prevent the transport of noxious weeds to other areas;

- monitoring for invasive species following completion of construction after the first and second growing seasons, as applicable, and in accordance with Transco's Draft ISMP; and

- treating weed populations with appropriate methods (e.g., mechanical removal, herbicide application) to prevent their spread.

We reviewed Transco's Draft ISMP and find it acceptable.

Pollinators

Like National Fuel and in response to federal agency comments, Transco would also address the recent federal efforts to increase and improve pollinator habitat. Pollinator habitat in and adjacent to the Leidy South Project area can be found in a variety of vegetation types. Common insect pollinators in the Leidy South Project area include various species of bees, butterflies, and moths. The temporary loss of this habitat would increase the rates of stress, injury, and mortality experienced by honey bees and other pollinators.

Construction of the Leidy South Project would temporarily impact about 277 acres of pollinator habitat. The temporary loss of habitat could increase the rates of stress, injury, and mortality experienced by honeybees and other pollinators. Transco would incorporate the following measures, included in the Pennsylvania Pollinator Protection Plan, to support foraging habitat for pollinators along the proposed rights-of-way:

- develop a revegetation/restoration plan that includes native and pollinator species;

- implement a low-impact mowing plan; and

- implement an invasive species management plan to prevent the spread of invasive and noxious species.

B.4.2.1 General Impacts and Mitigation

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 a project. Permanent impacts are those that modify vegetation resources to the extent that they would not return to preconstruction conditions during the life of a project.

Pipeline and Ancillary Facilities

The greatest impact on vegetation would be on forested areas because of the length of time required for woody vegetation to revert to its preconstruction condition. Construction in forested lands would remove mature trees in the construction right-of-way. In addition, the canopy overhanging the right-of-way may be trimmed as needed. Trees would be cut into lengths, chipped, and/or removed. The removal of mature trees could also result in secondary impacts such as increased erosion. Incremental fragmentation of upland forest habitat could occur due to the expansion of the companies' existing rights-

of-way where the pipelines are not adjacent to existing utilities in forested areas. The loss of forest habitat and the expansion of existing corridors could also decrease the quality of habitat for forest wildlife species, including alteration of habitat resulting from increased light levels into interior forest and a subsequent loss of soil moisture as a result of an expanded right-of-way, as discussed in section B.4.3.2. Expansion of the existing corridor could also result in an increased opportunity for invasive plants to displace native species. After construction, forested vegetation would be allowed to recover within the construction right-of-way and ATWS; however, the impact in these areas would be long term.

Impacts on cultivated land would include the loss of crop production, likely for an entire growing season. Construction could also impact long-term productivity of agricultural lands by causing soil compaction and increased soil erosion, and could introduce or spread invasive plant species. During operation, agricultural production could continue over the areas crossed by the new pipelines except where aboveground facilities have been modified or constructed. Open lands currently dominated by herbaceous growth would revegetate quickly, often within one growing season after seeding, and otherwise typically within 3 years, depending on several factors. Cleared scrub-shrub vegetation communities would likely require 3 to 5 years to regain their woody composition.

In general, impacts on vegetation resources would be minimized by collocating the pipeline facilities with existing rights-of-way, reducing the area affected by construction to include portions of the existing, maintained rights-of-way. The companies would further minimize impacts on upland vegetation by implementing the measures outlined in National Fuel's ESCAMP and Transco's ECP, including topsoil segregation and replacement, mitigation of compacted soils, and use of erosion controls. After construction, the companies would seed the affected areas using seed mixes recommended by the NRCS, local agencies or organizations, or relevant landowner agreements. During operation and excluding agricultural land, the companies would be allowed to mow the permanent right-of-way no more than once every 3 years to clearly delineate the right-of-way for pipeline integrity purposes; however, a 10-foot-wide swath centered over the pipelines may be mowed more frequently to facilitate routine patrols and emergency access. In accordance with National Fuel's ESCAMP and Transco's ECP, maintenance clearing would not be conducted between April 1 and August 31, to avoid impacts on nesting migratory birds (see section B.4.4.1).

Impacts in agricultural areas would be further minimized by implementing measures described in National Fuel's ESCAMP and Transco's ECP. These measures include segregation of topsoil, soil stabilization, soil compaction avoidance, protection of existing drainage tile and irrigation systems, preventing the introduction of weeds, and retaining existing soil productivity. By implementing these measures, 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 and use shortly following construction, cleanup, and restoration.

To minimize the spread of invasive species, the companies would implement noxious weed control plans (i.e., National Fuel's NIWCP and Transco's Draft ISMP). These plans outline methods to prevent, mitigate, and control the spread of noxious and invasive weeds during ground-disturbing activities and are discussed further in section B.4.2 above. We reviewed National Fuel's NIWCP and Transco's Draft ISMP and found them to be acceptable.

Aboveground Facilities

Impacts on vegetation at existing and new compressor station sites would be similar to those described for the pipeline facilities and would include the removal of existing vegetation, the potential for soil compaction and erosion, and the potential to introduce or spread invasive plant species. In general, impacts on open upland vegetation communities in temporary workspaces would be temporary or short-

term, whereas impacts on upland forest in temporary workspaces would be long-term. Within the operational footprint of aboveground facilities, vegetation would be removed and replaced by buildings, other infrastructure, pavement, gravel, or mowed lawn, permanently impacting vegetation resources in these areas. The companies would implement similar measures to minimize impacts on vegetation resources at aboveground facilities as would be implemented for the pipeline loops, as discussed above.

Access Roads

Impacts on vegetation associated with the construction of access roads would be comparable to those described for the pipelines, including the removal of vegetation, potential for soil compaction and erosion, establishment of invasive species, and fragmentation of interior forested tracts. Impacts on open land vegetation communities in temporary workspaces would generally be temporary or short term, whereas impacts on upland forest in temporary workspaces would be long-term. Vegetation would be permanently impacted within the operating rights-of-way of new or modified access roads. The companies would implement similar measures to minimize impacts on vegetation resources from access roads as those implemented for the pipeline facilities.

Contractor Yards

Impacts on vegetation at contractor yards would be similar to those described for the pipeline facilities and would include the removal of existing vegetation, the potential for soil compaction and erosion, and the potential to introduce or spread invasive plant species. Transco would not utilize or maintain the contractor yards after completion of construction. Therefore, most vegetation impacts would be temporary or short-term, although the removal of upland forest would be a long-term impact as the previously forested area would take decades to return to preconstruction conditions. The companies would implement similar measures to minimize impacts on vegetation resources at contractor yards as would be implemented for the pipeline facilities.

In summary, construction and operation of the proposed facilities would result in temporary, short-term, long-term, and permanent impacts on open land (including agricultural land) and upland forest vegetation resources. However, we conclude that collocation of the pipeline facilities with existing maintained rights-of-way and implementation of the measures outlined in National Fuel's ESCAMP and NIWCP and Transco's ECP and Draft ISMP would adequately minimize impacts on upland vegetation resources.

B.4.3 Wildlife

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

B.4.3.1 Existing Wildlife Resources

As described in the sections below, the proposed facilities would cross several distinct upland and wetland vegetation cover types. These include upland forest, open upland (i.e., grasslands, pasture, agricultural land, shrublands, residential areas, and maintained utility rights-of-way), forested wetlands, scrub-shrub wetlands, and open wetlands (emergent). Each of these cover types provide nesting, cover, and foraging habitat for a variety of wildlife species. Table B.4.3-1 identifies the terrestrial wildlife species common to these habitats. Other cover types, including open water and developed areas, also provide habitat for wildlife species. Impacts on aquatic resources are described in section B.4.1.3.

TABLE B.4.3-1

Common Wildlife Species Occurring in Major Habitat Types Traversed by the FM100 Project and Leidy South Project

	Uplands			Wetlands			
Common Name	Upland Forest	Open Upland	Developed	Palustrine Forested	Palustrine Emergent	Palustrine Scrub-shrub	Open Water
MAMMALS							
Black bear	X	--	--	--	--	X	--
Raccoon	X	X	X	X	--	--	--
Striped skunk	X	--	--	X	--	--	--
Gray squirrel	X	X	X	--	--	--	--
Eastern chipmunk	X	--	X	--	--	--	--
Opossum	X	X	X	--	--	X	--
White-tailed deer	X	X	--	X	--	X	--
Eastern cottontail	--	X	X	--	--	X	--
Meadow jumping mouse	--	X	--	--	--	X	--
Meadow vole	--	X	--	--	--	--	--
Woodland vole	X	--	--	--	--	--	--
Masked shrew	--	--	--	--	--	X	
Coyotes	--	X	--	--	--	--	--
Red fox	X	X	--	--	--	X	--
Beaver	--	--	--	X	X	X	X
Muskrat	--	--	--	X	X	X	X
Mink	--	--	--	X	X	X	X
BIRDS							
Song sparrow	X	--	--	X	--	--	--
Swamp sparrow	--	--	--	--	--	X	--
Black-capped chickadee	--	--	--	X	--	--	--
Common yellowthroat	--	--	--	X	X	X	--
Red-winged blackbird	--	--	--	X	X	X	--
Wild turkey	X	X	--	--	--	--	--
Ring-necked pheasant	X	--	--	--	X	X	--
Mourning dove	--	X	X	--	--	--	--
Cooper's hawk	X	--	--	--	--	--	--
Red-tailed hawk	X	--	--	--	--	--	--
Ruffed grouse	X	--	--	--	--	--	--
American woodcock	--	--	--	X	X	X	--
Wood duck	--	--	--	X	X	--	--
AMPHIBIANS							
Green frog	--	--	--	X	X	--	X
Gray tree frog	--	--	--	--	--	X	--
Wood frog	--	--	--	X	--	X	--
Eastern American toad	X	--	--	--	--	X	--
Northern dusky salamander	--	--	--	X	X	--	X
Redback salamander	--	--	--	X	X	X	X
Spotted salamander	--	--	--	X	X	--	--
Eastern hellbender	--	--	--	--	X	--	--
Leopard frog	--	--	--	X	X	--	X
Spring peeper	--	--	--	X	X	--	X
Red spotted newt	--	--	--	--	--	X	--
Eastern newt	X	--	--	--	--	--	X

TABLE B.4.3-1 (cont'd)

Common Wildlife Species Occurring in Major Habitat Types Traversed by the FM100 Project and Leidy South Project

	Uplands			Wetlands			
Common Name	Upland Forest	Open Upland	Developed	Palustrine Forested	Palustrine Emergent	Palustrine Scrub-shrub	Open Water
REPTILES							
Northern water snake	--	--	--	X	X	X	X
Painted turtle	--	--	--	X	X	--	X
Spotted turtle	--	--	--	X	--	--	--
Snapping turtle	--	--	--	X	X	--	X
Timber rattlesnake	X	--	--	--	--	--	--
Northern ring neck snake	X	--	--	--	--	--	--
Ribbon snake	--	--	--	--	--	X	--
Eastern garter snake	--	X	--	X	--	X	--
Common garter snake	X	X	X	X	X	X	X

Source: Pennsylvania Game Commission, 2019; Pennsylvania Herp Identification Online Guide to Reptiles and Amphibians, 2008-2016; USDA, 2006.

Upland Forest

The upland forests in the area of the Projects provide moderate to high-quality habitat for a variety of mammals, birds, amphibians, reptiles, and invertebrates. As a forest matures, cavity trees become more abundant; overstory trees produce more nuts, acorns, and fruit; and dead wood and leaf litter collect on the ground. Woodpeckers, black-capped chickadees, squirrels, and other small animals nest in cavity trees, and gray squirrels and wild turkey eat the acorns and hickory nuts produced by mature trees. Species as large as black bear and as small as the masked shrew forage for insects in dead wood on the ground, and amphibians such as newts and salamanders thrive in the moist environment created by the closed canopy overhead and the deep leaf litter underfoot. The successional stage of a tract of forest often determines the type of wildlife community found there (PennState Extension, 1997).

Open Upland

This cover type category covers all non-forested vegetation, including grasslands, pasture, agricultural land, shrublands, residential areas, and maintained utility rights-of-way. Although row crops generally provide poor to moderate cover habitat, they often provide forage for several species. Pastures also provide grazing habitat for species such as white-tailed deer. Hayfields, small grains, fallow and old fields, pastures, and idled croplands provide nesting habitats for grassland-nesting birds (USDA, 1999). On landscapes where intensive row crop agriculture is the dominant land use, these strip habitats are extremely important for grassland birds and other wildlife. Grassland birds rely on open fields for nesting and foraging. Rights-of-way for utility lines maintained in early successional communities provide valuable nesting and foraging habitats for grassland bird species (USDA, 1999). Grasslands and old fields can be utilized as foraging and denning habitat by mammals and provide nesting and breeding habitat to upland game birds such as pheasants. Shrublands provide sources of food and nesting sites for various birds, as well as cover for invertebrates, reptiles, and amphibians. Open fields and shrub cover provide habitat for small mammal species such as mice, rabbits, and voles, which make them prime hunting grounds for predator species such as foxes, coyotes, and raptors.

Developed Areas

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

Wetlands

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

Palustrine emergent wetlands provide important habitat for waterfowl, muskrats, herons, frogs, and salamanders. Bird species such as red wing blackbird and grey catbird also utilize emergent wetland habitat.

Palustrine scrub-shrub wetlands provide cover for invertebrates, reptiles, and amphibians. Scrub-shrub cover provides habitat for small mammal species such as mice and rabbits, which also makes it prime hunting grounds for predator species.

Open Water

The open water cover type includes the creeks, streams, and rivers crossed by the Projects. In addition to the aquatic resources discussed in section B.4.1, the open water cover type provides important foraging and breeding habitat for various terrestrial species including waterfowl, reptiles, amphibians, and some mammals.

B.4.3.2 General Impacts and Mitigation

Pipeline and Ancillary Facilities

As fully described in section A.6, the abandonment activities for the Projects would generally be limited to grading and shallow excavation in small, isolated, and previously disturbed areas that would be restored in accordance with National Fuel's ESCAMP and Transco's ECP. These areas would only be disturbed temporarily and would be available or return to wildlife habitat after abandonment activities are complete. As a result, the abandonment activities would not result in significant impact on wildlife habitats. Therefore, the remainder of this section focuses on impacts associated with the new pipeline facilities proposed by National Fuel and Transco.

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

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

We received comments about forest fragmentation, which occurs when interior forest is broken up and changes through removal of canopy species. Fragmentation generally affects birds through dispersal barriers, absence of suitable microhabitats, small population size, and edge effects (Degraaf and Healy, 1990). Effects on wildlife from fragmentation have been studied most via migratory birds. Edge effects can result in interactions between birds that nest in the interior of forests and species that inhabit surrounding landscape, typically lowering the reproductive success of the interior species. Other evidence suggests that certain mammals, amphibians, reptiles, and plants are also adversely affected by forest fragmentation. Species that require large tracts of unbroken forested land may be forced to seek suitable habitat elsewhere. The loss of forest habitat, expansion of existing corridors, and the creation of open early successional and induced edge habitats could decrease the quality of habitat for forest interior wildlife species in a corridor much wider than the actual cleared right-of-way. The distance an edge effect extends into a woodland is variable, but many studies point to at least 300 feet (Rodewald, 2001; Jones et al., 2000; Ontario Ministry of Natural Resources, 2000; Robbins, 1988; Rosenberg et al., 1999). Edge impacts within this distance could include a change in available habitat for some species due to an increase in light and temperature levels on the forest floor and the subsequent reduction in soil moisture; thereby resulting in habitat that would no longer be suitable for species that require these specific habitat conditions, such as salamanders and amphibians. An alteration of habitat could affect the fitness of some species and increase competition both within and between species, possibly resulting in an overall change to the structure of the forest community.

Most of the proposed pipeline facilities are collocated with existing, maintained rights-of-way, which would reduce fragmentation effects. During operation, previously forested habitat (including forested wetlands) would not reestablish within the permanent right-of-way for the pipelines. The principal impact would be a shift from the species favoring forest habitat to those using either edge habitat or areas that are more open. It is not likely that the relatively small widening (approximately 25 feet) of existing permanently cleared rights-of-way would impede the movement of most forest interior species. The impact of the permanent conversion of forested habitat to non-forested habitat would be minimized by installing most of the proposed loops adjacent to existing rights-of-way, which is maintained in an herbaceous state.

The degree of construction-related impacts on wildlife that inhabit wetlands would depend on the species and the time of year of construction. Highly mobile wetland species, such as beavers, mink, muskrat, and birds, would likely vacate the area during construction. Amphibians and reptiles have lower mobility and hibernate in soft wetland soil. Some limited mortality to these species is likely unavoidable; however, the silt-fence barrier erosion control device, erected and maintained to reduce erosion, would also assist in keeping these species along with small mammals out of the active work area in wetland areas.

Aboveground Facilities

Like the impacts discussed above for the pipeline and abandonment activities, construction of new and modifications to existing compressor stations or abandonment of aboveground facilities could result in the mortality of less mobile animals such as small rodents, reptiles, amphibians, and

invertebrates unable to escape the immediate construction area. In addition, some wildlife would likely be permanently displaced as a result of habitat conversion to non-vegetated and/or impervious cover (i.e., slab, gravel, aboveground structures) or maintained vegetation (i.e., ornamentals and maintained lawn), and the erection of security fences around the site.

We received comments regarding noise impacts on wildlife near Transco's Compressor Station 607 and 620. The effects of noise on wildlife during construction of Compressor Station 607 and 620 would be similar to that described for pipeline construction. During operation, Compressor Station 607 and 620 would generate noise on a nearly continuous basis, which could impact nearby wildlife as discussed below.

Effects on wildlife from chronic noise vary by species (Barber et al., 2009; Francis et al., 2011a, 2011b; Francis et al., 2012; Blickley et al., 2012). The number of individual birds present near oil and gas infrastructure has been shown to decline with proximity to the facility, but reproductive success was higher than expected, seemingly due to a proportionate decline in the presence of nest predators (Francis et al., 2011a). In another instance, increased noise levels from oil and gas infrastructure appeared to reduce reproductive success, potentially due to an inability of the females of the species to adequately hear male courtship songs (Habib et al., 2006). Another study concluded that species may be able to adjust to chronic noise by changing their vocalizations in ways that would allow them to be better heard (Francis et al., 2011b).

Transco would implement various noise mitigation measures at Compressor Station 607 and 620, such as using high-density insultation for walls/roof, turbine exhaust silencer system, blowdown silencers, and acoustical pipe insulation for outdoor piping. The noise levels to which wildlife would be exposed beyond the compressor station property boundaries would vary based on the distance from the facility. A full description of the noise impacts associated with operation of Compressor Station 620 is provided in section B.9.3. Based on Transco's proposed noise mitigation measures and the representative wildlife species near Compressor Station 607 and 620, in the years following initial construction, birds and other wildlife would either become habituated to the operational noise associated with the compressor station or move into similar available habitat farther from the noise source. As such, the effects on wildlife due to noise emissions would be minimal and highly localized.

In May 2018, the PDA issued an Order of Quarantine and Treatment for the spotted lanternfly (a non-native insect) for select counties in Pennsylvania. Transco's Compressor Station 620 in Schuylkill County would be within the Quarantine Area. As discussed further in Transco's Draft ISMP, Transco would adhere to the requirements of the Order of Quarantine and Treatment; specifically, Transco would clean equipment prior to departing the Compressor Station 620 site and would provide training to construction and inspection personnel on the signs of invasive insects.

Contractor Yards and Access Roads

Areas used for contractor yards and temporary access roads would be affected during construction only; no operational impacts would occur. As such, impacts on wildlife species at or near contractor yards and temporary access roads would be like those described above for pipeline construction.

As discussed above, some access roads would be retained in their modified condition for future access during operation of the pipelines, which would permanently convert open upland and upland forest to developed lands. As a result, some wildlife could be permanently displaced in these areas as a result of habitat conversion to non-vegetated and/or impervious cover.

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

B.4.4 Protected Species

B.4.4.1 Migratory Birds

Migratory birds are species that nest in the United States and Canada during the summer and then migrate to and from the tropical regions of Mexico, Central and South America, and the Caribbean for the non-breeding season. Migratory birds are protected under the Migratory Bird Treaty Act ([MBTA]; 16 U.S. Code [USC] 703-711). The MBTA, as amended, prohibits the intentional taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, or nests unless authorized under a USFWS permit. Bald and Golden Eagles are additionally protected under the Bald and Golden Eagle Protection Act (BGEPA) (16 USC 668-668d). Executive Order 13186 (66 CFR 3853) directs federal agencies to identify where unintentional take is likely to have a measurable negative effect on migratory bird populations and to avoid or minimize adverse impacts on migratory birds through enhanced collaboration with the USFWS. The Executive Order states that emphasis should be placed on species of concern, priority habitats, and key risk factors, and that focus should be given to addressing population-level impacts.

On March 30, 2011, the USFWS and the Commission entered into a *Memorandum of Understanding Between the Federal Energy Regulatory Commission and the U.S. Department of the Interior United States Fish and Wildlife Service Regarding Implementation of Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds"* (MOU) that focuses on avoiding or minimizing adverse impacts on migratory birds and strengthening migratory bird conservation through enhanced collaboration between the two agencies. This voluntary agreement does not waive legal requirements under the MBTA, BGEPA, ESA, Federal Power Act, NGA, or any other statutes, and does not authorize the take of migratory birds.

A variety of migratory bird species, including songbirds, raptors, and waterfowl utilize the habitat found within the area of the Projects. The USFWS established Birds of Conservation Concern (BCC) lists for various regions in the country in response to the 1988 amendment to the Fish and Wildlife Conservation Act, which mandated the USFWS to identify migratory nongame birds that, without additional conservation actions, were likely to become candidates for listing under the ESA. The BCC lists, last updated in 2008, are divided by regions. The Projects cross Bird Conservation Region 28, which has 25 species included on the BCC list for that region (see table B.4.4-1).

TABLE B.4.4-1

Birds of Conservation Concern Potentially Occurring within the FM100 Project and Leidy South Project Areas

Species	Primary Breeding Habitat, (Secondary Breeding Habitat)
Bald eagle	Forest (Riparian)
Bewick's wren	Open Woodlands (Riparian)
Black-capped chickadee	Forests (Open Woodlands)
Blue-winged warbler	Abandoned Fields, Swamp/Wetlands
Canada warbler	Mixed Deciduous-Coniferous Woodlands

TABLE B.4.4-1 (cont'd)

Birds of Conservation Concern Potentially Occurring within the FM100 Project and Leidy South Project Areas

Species	Primary Breeding Habitat, (Secondary Breeding Habitat)
Cerulean warbler	Mature Upland Oak Woods (Wooded Hillsides along Streams and Rivers)
Golden-winged warbler	Abandoned Fields with Small Saplings (Forest Edge)
Henslow's sparrow	Ephemeral Grasslands
Kentucky warbler	Deciduous Woods of Floodplains, Swamps, and Ravines
Loggerhead shrike	Pasture and Cropland with Scattered Trees and Hedgerows
Louisiana waterthrush	Wooded Ravines and Mountain Brooks
Northern saw-whet owl	Woodlands with Dense Undergrowth of Conifers or Shrubs
Olive-sided flycatcher	Conifer Forest
Peregrine falcon	Cliffs or man-made structures (Riparian)
Prairie warbler	Old Fields/Pastures with Young Trees
Red crossbill	Mature Coniferous Forests
Red-headed woodpecker	Open Woodlands with Scattered Trees
Rusty blackbird [a]	Wet Forest
Sedge wren [a]	Moist Upland Sedge Meadow
Swainson's warbler	Bottomland Forests (Cove Hardwoods with Dense Deciduous Understory)
Upland sandpiper	Agricultural Lands (Dry Grasslands)
Whip-poor-will	Open Woodlands
Wood thrush	Moist, Lowland Deciduous Forest
Worm-eating warbler	Woodlands with Dense Understory
Yellow-bellied sapsucker	Northern Hardwood Forests

[a] This species is non-breeding in Bird Conservation Region 28.

The potential impacts of the Projects on migratory birds, including BCC-listed birds, would include the temporary and permanent loss of habitat associated with the removal of existing vegetation. As previously noted, the abandonment activities for the Projects would generally be limited to grading and shallow excavation in small, isolated, and previously disturbed areas that would be restored in accordance with National Fuel's ESCAMP and Transco's ECP. These areas would only be disturbed temporarily and would be available to wildlife habitat after abandonment activities are complete. As a result, the proposed abandonment activities would not result in significant impact on migratory bird habitat. The greatest potential to impact migratory birds would occur if construction activities such as grading, tree clearing, and construction noise take place during the nesting season. This could result in the destruction of nests and mortality of eggs and young birds that have not yet fledged. Construction would also reduce the amount of habitat available for resources such as foraging and predator protection for migratory birds and would temporarily displace birds into adjacent habitats, which could increase the competition for food and other resources. This in turn could increase stress, susceptibility to predation, and negatively impact reproductive success. The temporary loss of upland forest and forested wetlands associated with the pipeline facilities (see tables B.3.3-1 and B.4.2-2) would present a long-term impact for migratory birds that depend on forested land. Noise and other construction activities could affect courtship and breeding activities, including nesting and the rearing of young. Clearing and grading would also temporarily remove nesting and foraging habitat and could destroy occupied nests resulting in the mortality of eggs and young, unfledged birds, if these activities are done during the nesting season.

Migratory birds, including BCC-listed birds, could also be affected during operations that permanently convert upland forested land and forested wetland to an herbaceous state. The reduction in available forest habitat could result in increased competition, a potential increase in parasitic bird species, edge effects (as previously discussed in section B.4.3.2), and ongoing disturbances associated with periodic mowing and other right-of-way maintenance activities.

Important Bird Areas

Important Bird Areas (IBAs) are sites that provide essential habitat for one or more species of bird. IBAs include sites for breeding, wintering, and/or migrating birds. IBAs may cover a few acres or thousands of acres, but usually they are discrete sites that stand out from the surrounding landscape. IBAs may include public or private lands, or both, and they may be protected or unprotected (National Audubon Society [Audubon], n.d.-a). The FERC and USFWS MOU requires that agencies and companies identify measures to protect, restore, and manage, as practicable, IBAs and other significant bird sites that occur on lands impacted by projects.

FM100 Project

National Fuel's project components would cross a total of 435.5 acres of habitat within the Susquehanna Headwaters Forest Block IBA, of which 52.7 acres would be permanently impacted (i.e., forest converted to herbaceous cover). This large forested landscape was identified through the analysis conducted by the Atlantic Flyway's Eastern Forest Project (Audubon, n.d.-b). This IBA overlaps several previously nominated IBAs.

National's Fuel's Tamarack Compressor Station would also be located approximately 250 feet from the Tamarack Swamp IBA. The Tamarack Swamp IBA is a 383-acre area that is situated at the head of Drury Run in Clinton County and was once comprised of dense growth of hemlock, spruces, and balsams; however, logging, residential development, and commercial encroachment have destroyed much of the undisturbed qualities that were reported in the beginning of the 20th century (Audubon, n.d.-c). The Tamarack Swamp Natural Area still holds value and unique habitat for various bird species, including the turkey vulture, sharp-shinned hawk, broad-winged hawk, ruffed grouse, killdeer, American woodcock, spotted sandpiper, black-billed cuckoo, whip-poor-will, northern flicker, hairy woodpecker, downy woodpecker, eastern kingbird, crested flycatcher, eastern phoebe, alder flycatcher, barn swallow, and cliff swallow.

Leidy South Project

Transco's Leidy Line D component of the Hensel Replacement would cross the Tamarack Swamp IBA, discussed above. The Hensel Replacement would cross a total of 5.2 acres within the Tamarack Swamp IBA, of which 0.4 acre would be permanently impacted (i.e., forest converted to herbaceous cover) by the operation of the Leidy South Project (i.e., permanent right-of-way). The remaining 4.8 acres of vegetation would recover within the construction right-of-way and ATWS; however, the impact on forest habitat in these areas would be long term.

General Impacts and Mitigation

To avoid or reduce construction-related impacts on migratory birds, the companies consulted with the Pennsylvania Field Office of the USFWS to identify mitigation measures, including identifying the times of year when construction should be avoided. The USFWS recommended that both companies conduct vegetation clearing between September 1 and March 31. The companies have agreed to adopt the USFWS-recommended vegetation clearing windows during construction. Further, in accordance with National Fuel's ESCAMP and Transco's ECP, maintenance clearing and mowing would not be conducted between April 1 and August 31, to avoid impacts on nesting migratory birds (see section B.4.4.1).

Transco would install two new communication towers: one at the MLV facility at approximate MP 117.0 on the Benton Loop and the other at existing Compressor Station 607. Migratory birds are known to collide with towers during migration and could become confused or disoriented by lighting or

fly directly into the tower or guy wires during nighttime migrations. Birds may also use the tower to build nests or as perches, which could be impacted by maintenance activities occurring during operation (USFWS, 2018a). Transco would adopt the following measures, based on the USFWS' Recommended Best Practices for Communication Tower Design, Siting, Construction, Operation, Maintenance, and Decommissioning (USFWS, 2018b):

- limit the height of the tower to 90 feet at the MLV facility and 190 feet at Compressor Station 607 (which is below USFWS' recommended maximum height of 199 feet);
- utilize free-standing towers, free of guy wires; and
- construct the towers without tower lighting.

During operation of the Projects, vegetative maintenance clearing would occur outside of the migratory bird nesting season in accordance with the ESCAMP and ECP. Additionally, the potential loss of nests and adult birds relocating to avoid construction is an impact of limited duration that would not result in a substantial or long-term change in migration patterns through the area nor constitute a population-level impact, as areas not maintained for operation would be allowed to return to preconstruction conditions. Where the Projects facilities are abandoned and allowed to revert to forest/unmaintained right-of-way, additional migratory bird habitat would be created. Based on this, the additional mitigation measures that Transco would adopt for the communication towers on the Benton Loop and at Compressor Station 607, and that the new pipeline facilities are largely collocated with existing rights-of-way, we conclude that the Projects would not have a significant impact on migratory birds.

B.4.4.2 Bald and Golden Eagle Protection Act

The bald eagle is a large bird of prey whose range covers virtually all of North America. Although no longer federally listed under the ESA, the bald eagle is protected under the BGEPA and the MBTA. The BGEPA and MBTA prohibit killing, selling, or harming eagles or their nests, and the BGEPA also protects eagles from disturbances that may injure them, decrease productivity, or cause nest abandonment.

Optimal roosting, foraging, and breeding habitats for the bald eagle include areas near waterbodies, such as lakes, rivers, and forested wetlands. Bald eagles typically prefer large trees for roosting and nesting. Bald eagles can be sensitive to human activity and disturbance, and may abandon otherwise suitable habitat if disturbance is persistent (Fraser et al., 1985). Both Projects were reviewed using the USFWS' bald eagle mapping tool to identify known bald eagle nests within 1 mile.

FM100 Project

No nests were identified within 1 mile of National Fuel's FM100 Project activities (USFWS, 2019b). In addition, National Fuel conducted ground-based searches for raptor nests during biological surveys conducted in 2017 and 2018. No raptor nests were observed in the FM100 Project study area during these surveys. National Fuel would adhere to the recommendations included in the USFWS National Bald Eagle Management Guidelines if any bald eagle nests are identified near the FM100 Project.

Leidy South Project

We received comments regarding impacts on nesting bald eagles near Transco's Compressor Station 620. One known bald eagle nest is within 1 mile (approximately 2,975 feet southwest) of the proposed Compressor Station 620 site (USFWS, 2018b). The activities associated with Compressor Station 620 would not take place within the minimum disturbance buffer (660 feet) recommended in the USFWS' National Bald Eagle Management Guidelines (USFWS, 2007a). Transco would adhere to the recommendations included in the USFWS National Bald Eagle Management Guidelines if any bald eagle nests are identified near the Leidy South Project.

B.4.4.3 Federal Threatened and Endangered Species

Federal agencies are required under section 7 of the ESA, as amended, to ensure that any actions authorized, funded, or carried out by the agency would not jeopardize the continued existence of a federally listed endangered or threatened species, or result in the destruction or adverse modification of the designated critical habitat of a federally listed species. As the lead federal agency authorizing the Projects, FERC is required to consult with the USFWS to determine whether federally listed endangered or threatened species or designated critical habitat are found in the vicinity of the Projects, and to evaluate the proposed action's potential effects on those species and/or critical habitats.

For actions involving major construction activities with the potential to affect listed species or designated critical habitat, the lead federal agency must report its findings to the USFWS in a Biological Assessment for those species that may be affected. If it is determined that the action is likely to adversely affect a listed species, the federal agency must submit a request for formal consultation to comply with section 7 of the ESA. In response, the USFWS would issue a Biological Opinion (BO) as to whether the federal action would jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat.

Based on consultation with the USFWS, the Projects would have *no effect* on one federally listed species and *may affect, but would not adversely affect* three federally listed species. As discussed below, we have received concurrence from the USFWS for the species under its jurisdiction. Thus, section 7 consultation is complete for the Projects.

As our non-federal designee and for the purpose of complying with section 7(a)(2) of the ESA, National Fuel and Transco initiated informal consultation with the Pennsylvania Field Office of the USFWS on August 14, 2017 and October 31, 2018, respectively, regarding federally listed threatened or endangered species potentially occurring in or near the general area of the Projects.

The USFWS identified four federally listed threatened species (northern long-eared bat, Indiana bat, rayed bean mussel, and northeastern bulrush) under its jurisdiction that are known to occur in the FM100 Project area. These species, their protection status, and their potential location in the FM100 Project area are summarized in table B.4.4-2 and discussed further below.

The USFWS identified three federally listed threatened or endangered species (northern long-eared bat, Indiana bat, and northeastern bulrush) under its jurisdiction that are known to occur in the Leidy South Project area. These species, their protection status, and their potential location in the Leidy South Project area are summarized in table B.4.4-3 and discussed below.

In addition, as mentioned in section B.3.3.2, Transco proposes to utilize an offsite wetland mitigation site to offset wetland impacts associated with the Leidy South Project. The proposed mitigation plan includes wetland creation and enhancement at the Cunningham Farm Mitigation Site in

the Lower West Branch Susquehanna River Sub-basin. Transco submitted a Pennsylvania Natural Diversity Inventory (PNDI) Environmental Review for the proposed mitigation site on July 30, 2019. The PNDI receipt indicated that impacts on federally listed or proposed species would not be anticipated.

TABLE B.4.4-2

Federally Listed Species Known or Potentially Occurring within the FM100 Project Area

Common Name *Scientific Name*	Federal Status [a]	Pipeline Facilities: Line YM58	Pipeline Facilities: LineYM224 Loop	Pipeline Facilities: Line KL Extension	Pipeline Facilities: Line FM100 Abandonment	Aboveground Facilities	Determination [b]
Northern long-eared bat *Myotis septentrionalis*	T	X	X	X	X	X	NLAA [c]
Indiana bat *Myotis sodalis*	E				X	X	NE [d]
Rayed bean mussel *Villosa fabalis*	E			X		X	NLAA
Northeastern bulrush *Scirpus ancistrochaetus*	E					X	NE

[a] T = Threatened
E = Endangered

[b] NLAA = Not Likely to Adversely Affect
NE = No Effect

[c] Per the Final 4(d) Rule (USFWS, 2019c)

[d] In a conference call on April 29, 2019 and a letter dated June 5, 2019, the USFWS indicated that the project components that would require tree clearing are outside of the range of the Indiana bat.

TABLE B.4.4-3

Federally Listed Species Known or Potentially Occurring within the Leidy South Project Area [a]

Common Name *Scientific Name*	Federal Status [b]	Pipeline Facilities: Hensel Replacement	Pipeline Facilities: Hilltop Loop	Pipeline Facilities: Benton Loop	Pipeline Facilities: Dorrance Loop	Aboveground Facilities	Determination [c]
Northern long-eared bat *Myotis septentrionalis*	T	X	X	X	X	X	NLAA [d]
Indiana bat *Myotis sodalis*	E	X	X	X	X	X	NLAA
Northeastern bulrush *Scirpus ancistrochaetus*	E		X	X	X	X	NE

[a] The November 14, 2019 USFWS verification letter generated for the northern long-eared bat also identified the federally listed bog turtle as potentially occurring in the Leidy South Project area. However, of the counties crossed by the Leidy South Project, Schuylkill County is the only county where the bog turtle is listed. The project components in Schuylkill County are limited to Compressor Station 620, which would not impact suitable habitat for the bog turtle (i.e., wetlands); therefore, the Leidy South Project would have *no effect* on the bog turtle and this species is not discussed further in this section.

[b] T = Threatened
E = Endangered

[c] NLAA = Not Likely to Adversely Affect
NE = No Effect

[d] Per the Final 4(d) Rule (USFWS, 2019d)

Northern Long-eared Bat

The northern long-eared bat was federally listed as threatened on May 4, 2015 and is state-listed as endangered in Pennsylvania. The northern long-eared bat is known to or believed to occur in all counties in Pennsylvania crossed by the Projects (USFWS, 2018c).

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 the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live trees and snags (dead trees). Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices (USFWS, 2016a).

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 and habitat destruction or disturbance (e.g., vandalism to hibernation sites [hibernacula], roost tree removal).

Fragmentation of forested habitat used for foraging or migration by the northern long-eared bat may impact the species. The northern long-eared bat is a forest interior species adapted to cluttered forest environments and the species roosts and forages in closed, intact forest stands (Lausen, 2009). Northern long-eared bats have also been known to forage along forest edges, paths, riparian areas, and ponds and streams (Wisconsin Department of Natural Resources, 2013; Henderson and Broders, 2008). A reduction in the amount of forested habitat available in the general vicinity of roost trees or foraging areas could alter use patterns in an area or preclude use of an area altogether. Even marginally suitable fragmented forest can become important habitat to listed bat species as undisturbed or less fragmented forests become less available (Medlin et al., 2010; Gorresen and Willig, 2004). A forest structure and fragmentation study conducted in Missouri's Ozark forests found that in areas dominated by forest cover, non-forested areas may provide landscape heterogeneity fulfilling some habitat requirement not provided in a fully forested landscape for northern long-eared bats (Yates and Muzika, 2006).

Noise and lights associated with nighttime construction activities (e.g., HDD, facility construction) when bats are foraging may affect protected bat species, particularly in areas of limited habitat where bat colonies are already stressed. This disruption may lead to reduced fitness for both adult female bats and their young. Studies have shown that bats can habituate to transient, low intensity, and ongoing airborne sound and human activities. However, significant changes in baseline noise levels in an area can result in temporary to permanent alteration of bat behavior. At low noise levels or farther distances, bats may initially startle, but then habituate to low background noise levels. At closer range and louder noise levels (particularly if accompanied by physical vibrations from heavy machinery and the crashing of falling trees), many bats would probably be startled to the point of flushing from their daytime roosts and in some cases may experience increased predation risk. For projects that continue for multiple days with noise levels greater than levels usually experienced by bats, bats roosting within or close to these areas are likely to shift their focal roosting areas farther away or may temporarily abandon these roosting areas completely. Overall, it is reasonable to assume that some bats may be temporarily disturbed by noise and vibration of construction activities within or directly adjacent to previous roosting habitat. Combined with the loss of forest habitat, a shift in roosting behavior away from newly

constructed corridors would be anticipated (Belwood, 2002; USFWS, 2007b, 2016b; Hendricks et al., 2004).

FM100 Project

The northern long-eared bat is known to or believed to occur in all counties crossed by the FM100 Project (USFWS, 2018c). No tree removal would occur within 0.25 mile of a known northern long-eared bat hibernaculum or within 150 feet of a known, occupied maternity roost tree (USFWS, 2019c).

Leidy South Project

The Leidy South Project is within 150 feet of three known northern long-eared bat maternity roost trees: one on the Benton Loop, one on the Hilltop Loop, and one on the Hensel Replacement (USFWS, 2019d). Based on consultation with the USFWS for the Indiana bat (discussed below), Transco proposes to conduct tree clearing for the Leidy South Project between November 15 and March 31, which would be outside of the active season for the northern long-eared bat.

Therefore, per the Final 4(d) Rule (USFWS, 2016c), the Projects would not result in prohibited incidental take, because of the following:

- the companies would not clear known maternity roost trees or trees within 150 feet of known maternity roost trees between June 1 and July 31;
- the companies would not remove trees within 0.25 mile of a known hibernacula at any time of the year; and
- activities associated with the Projects would not occur within known hibernacula.

As part of the northern long-eared bat's Final 4(d) rule, the USFWS completed a non-jeopardy BO and proposed an optional framework to streamline section 7 consultations for projects that may affect the species but would not cause prohibited take. Federal agencies can rely upon the finding of the BO and optional framework to fulfill their project-specific section 7 responsibilities if they notify the USFWS 30 days prior to implementing the action. National Fuel and Transco, as non-federal representatives of FERC, utilized this optional framework for the FM100 Project and Leidy South Project, respectively, via the online determination key for the northern long-eared bat available through the USFWS' Information Planning and Consultation website (USFWS, 2019e; USFWS, 2019f).

Based on the results of the northern long-eared bat online determination key for the Projects, prohibited take of the northern long-eared bat would be avoided. National Fuel and Transco submitted the online determination keys for the FM100 Project and Leidy South Project on November 6, 2019 and November 14, 2019, respectively; no response was received from the USFWS on either project. Therefore, consultation is complete for the northern long-eared bat.

Indiana Bat

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

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

Threats to the Indiana bat vary during its annual cycle. At 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.

The potential impacts on the Indiana bat would be like those described above for the northern long-eared bat.

As discussed above, in a conference call on April 29, 2019 and a letter dated June 5, 2019, the USFWS indicated that the FM100 Project is outside of the range of the Indiana bat; and therefore, we agree that the FM100 Project would have *no effect* on the Indiana bat.

In a letter dated June 24, 2019, the USFWS indicated the Leidy South Project is within the range of the Indiana bat and recommended that Transco conduct tree clearing activities between November 15 and March 31 to avoid killing or injuring Indiana bats, to which Transco has agreed. In an email dated November 4, 2019, the USFWS concluded that, based on Transco's implementation of the tree clearing timing restriction, the Leidy South Project is *not likely to adversely affect* the Indiana bat. We agree with this finding. Thus section 7 consultation is complete for this species.

Rayed Bean

The federally endangered rayed bean is a small freshwater mussel, usually less than 1.5 inches long. Its shell is smooth-textured and green, yellowish-green, or brown with numerous dark-green wavy lines. The male's shell shape is generally elongated, whereas the female's is smaller and elliptical (USFWS, 2012). The rayed bean historically was found across a wide expanse that included parts of the Midwest and eastern United States, north to Ontario, Canada (USFWS, 2012). Once found in at least 115 streams, canals, and lakes, the rayed bean now occurs in only 31 streams and 1 lake, which is a 73 percent reduction in the number of occupied streams and lakes (USFWS, 2012). The species has been extirpated from Illinois, Kentucky, and Virginia but is still found in Indiana, Michigan, New York, Ohio, and Pennsylvania, and Ontario, Canada (USFWS, 2012). The rayed bean generally lives in smaller, headwater creeks, but is sometimes found in large rivers and wave-washed areas of glacial lakes. It prefers gravel or sand substrates and is often found in and around roots of aquatic vegetation (USFWS, 2012). Adults spend their entire lives partially or completely buried in substrate, filtering water through their gills to remove algae, bacteria, detritus, microscopic animals, and dissolved organic material for food (USFWS, 2012).

Threats to the rayed bean include construction of dams, pollution, sedimentation, and non-native species. Dams affect both upstream and downstream mussel populations by disrupting natural river flow patterns, scouring river bottoms, changing water temperatures, and eliminating habitat (USFWS, 2012).

Adult mussels are easily harmed by toxins and degraded water quality from pollution because they are sedentary. Although sedimentation is a natural process, poor land use practices, dredging, impoundments, and other activities accelerate erosion and increase sedimentation (USFWS, 2012). Sediment that blankets a river bottom can suffocate mussels. Accelerated sedimentation may also reduce feeding and respiratory ability for the rayed bean, leading to decreased growth, reproduction, and survival. The invasion of the nonnative zebra mussel into the United States poses a serious threat as they proliferate in such high numbers that they use up the resources and attach to native mussel shells in such large numbers that the native mussel cannot eat or breathe (USFWS, 2012).

In coordination with the USFWS and the PAFBC, National Fuel conducted surveys for the federally listed rayed bean and other state-listed mussels at the Alleghany River, Portage River, and Potato Creek in July 2019. Suitable mussel habitat was identified at all three waterbodies; however, no rayed bean individuals were identified during surveys. National Fuel provided a copy of its Freshwater Mussel Survey Report to the USFWS on September 25, 2019. In a letter dated December 19, 2019, the USFWS concurred with the probable absence of the rayed bean mussel at the proposed crossing locations based on the current distribution of the rayed bean and the negative survey results for the rayed bean mussel. By email dated January 29, 2020 the USFWS indicated that this language is consistent with not likely to adversely affect the rayed bean mussel. We agree that the FM100 Project is *not likely to adversely affect* the rayed bean, and consider consultation complete.

Northeastern Bulrush

The federally endangered northeastern bulrush is an obligate wetland plant found in small wetlands, sinkhole ponds, beaver ponds, or wet depressions with seasonally fluctuating water levels. Northeastern bulrush appears to have adapted to regularly changing water levels, which may have given it an advantage over less tolerant plant species. But habitat alterations that make a site consistently drier or wetter could make life impossible for northeastern bulrush. Activities such as filling or ditching in a wetland can destroy or degrade this species' habitat and pose a threat (USFWS, 2006).

National Fuel's review of the USFWS' Environmental Conservation Online System – Information for Planning and Consultation identified the northeastern bulrush as a species known to occur in the vicinity of the Tamarack Compressor Station. Therefore, National Fuel conducted a habitat assessment during the appropriate survey window for the species. No suitable habitat or individuals were identified during the survey at the Tamarack Compressor Station site. In a letter dated December 19, 2019, the USFWS concurred with the probable absence of the northeastern bulrush at the Tamarack Compressor Station based on the lack of suitable habitat and negative survey results We conclude that the FM100 Project would have *no effect* on the northeastern bulrush.

Transco conducted surveys within suitable habitat areas for the northeastern bulrush between May and July 2019. A population of northeastern bulrush were recorded within the Hilltop Loop survey corridor. The population occurs approximately 215 feet outside of the proposed construction workspace, while the closest northeastern bulrush habitat is approximately 155 feet from the proposed construction workspace. In a letter dated October 1, 2019, the USFWS concluded that, because northeastern bulrush was not documented within wetlands in the construction workspace and any impacts on wetlands would be down gradient of the identified population, the Leidy South Project would have *no effect* on the northeastern bulrush. We agree with this finding.

Thus, consultation for the northeastern bulrush is complete.

B.4.4.4 State-Listed Threatened and Endangered Species

Pennsylvania has regulatory requirements for state-listed species, and three agencies are responsible for protecting threatened and endangered species and other sensitive resources: 1) the PGC has jurisdiction over state-listed birds and mammals; 2) the PAFBC monitors state-listed fish, reptiles, amphibians, and aquatic organisms; and 3) the PADCNR has jurisdiction over state-listed plants, natural communities, terrestrial invertebrates, and geological features.

A discussion of agency consultation, survey results, and proposed mitigation for state-listed species potentially occurring in the area of the Projects is provided below and summarized in table B.4.4-3 in appendix I.

FM100 Project

National Fuel's consultations with the PAFBC, PADCNR, and PGC regarding review of the FM100 Project facilities for potential impacts on species and resources of concern identified 13 state-listed threatened, endangered, or special concern species (1 mammal, 1 fish, 1 amphibian, 1 reptile, 3 mussels, and 6 plants) that may occur in the FM100 Project area. In addition, the PGC identified the state-listed endangered northern long-eared bat as a species of concern, and the PAFBC and USFWS identified the federally listed rayed bean mussel as a species of concern; both species are discussed in section B.4.4.3. A summary of surveys and/or proposed mitigation for the remaining species is presented below and summarized in table B.4.4-3.

Silver-haired bat – The silver-haired bat inhabits wooded areas bordering lakes and streams. It roosts in dense foliage, behind loose bark, or in hollow trees—rarely in a cave. It begins feeding earlier in the day than most bats, often before sunset. Silver-haired bats do not hibernate in Pennsylvania, migrating farther south. In summer, a few may breed in the cooler, mountainous sections of the state, but most go farther north (PGC, 2017). In a letter dated April 29, 2019, the PGC recommended that any trees or dead snags greater than 5 inches in diameter at breast height that require clearing within Clearfield and Elk Counties should be cut between November 1 and March 31 to minimize impact on the silver-haired bat. National Fuel has agreed to adopt the PGC-recommended tree clearing window during construction in Clearfield and Elk Counties for the FM100 Abandonment.

Burbot – The state-listed endangered burbot is known from the upper Allegheny River watershed at several of the proposed pipeline stream crossing locations. This fish species is especially vulnerable to physical (e.g., dredging, substrate modification) and chemical (e.g., turbidity, pH, dissolved oxygen, temperature, heavy metals and organic contaminants) changes to its aquatic environment. Although the mobile adults of this species may be capable of moving from a project area, their spawning grounds (including eggs, fry, and immature fish) are vulnerable to burial, crushing by equipment, and siltation from in-stream construction projects (PAFBC, 2018). In a letter dated October 8, 2019, the PAFBC recommended that no in-stream activity be conducted from December 1 to April 1 in the upper Allegheny River watershed to avoid adverse impacts during the spawning season. In addition, the PAFBC requested National Fuel conduct work during low flow periods and implement strict erosion and sedimentation control measures. National Fuel has agreed to implement the PAFBC's recommendations.

Blue-spotted salamander – Blue-spotted salamanders live most of their lives underground, except during the breeding season when they are observed moving to and from ephemeral/vernal pools. Blue-spotted salamanders are generally associated with lowland swamps and marshes and surrounding uplands with sandy or loamy soils (PAFBC, 2018). Based on consultation with the PAFBC, National Fuel contracted Ecological Associates, LLC (Ecological Associates), a PAFBC-approved blue-spotted salamander surveyor, to conduct a habitat assessment to determine if potentially suitable habitat exists in

the FM100 Project area. The habitat assessment identified two areas of potential breeding habitat and one area of confirmed breeding habitat in the FM100 Project area. Ecological Associates' report concluded that the potential and confirmed breeding habitat would not be impacted due to National Fuel's proposed use of the HDD crossing method at these waterbodies and commitment to implement its HDD Plan. Ecological Associates further recommended the following additional measures to minimize impacts on the blue-spotted salamander:

- contact the PAFBC immediately in the event of an inadvertent return, and
- install silt fence between workspace edges and within 300 feet of potentially suitable or confirmed breeding habitat as a physical barrier to prevent workers from entering the sensitive habitats and to prevent blue-spotted salamanders from entering the workspace.

In a letter dated October 8, 2019, the PAFBC agreed with the findings of the blue-spotted salamander habitat assessment and the report's recommendations, and further concluded that the FM100 Project would not result in adverse impacts to the blue-spotted salamander if the recommendations in the report are implemented. National Fuel has agreed to adopt the additional measures identified in Ecological Associates' report.

Timber rattlesnake – Timber rattlesnakes inhabit the forested, mountainous regions of Pennsylvania. Their active season is mid-April through mid-October. They prefer upland forested areas where they forage for small mammals (e.g., mice and chipmunks). Talus and/or scree slopes, rocky ledges, outcrops, and boulder fields generally with southerly exposures contain the entrances to over-wintering dens. Dens usually have rocky crevices or other features that provide access to ancestral underground chambers to which the snakes return yearly for hibernation. These sites generally have rocky habitat containing a semi-open canopy nearby that is used by gravid females for gestation (PAFBC, 2010). Prior to European settlement, the range of the timber rattlesnake is thought to have spanned most of Pennsylvania, while the current range is restricted to the more rugged, least accessible, and less populated regions of the Commonwealth. Today, timber rattlesnakes occur in forested, mountainous regions that encompass mainly the central and northeast region of Pennsylvania (e.g., Ridge and Valley Province, Laurel Highlands, Allegheny Plateau, and the Pocono Plateau) (PAFBC, 2010). In a letter dated November 19, 2018, the PAFBC made the following recommendations:

- train workers on identifying the species and implementing safety protocols;
- conduct a habitat assessment in accordance with the PAFBC's *Timber Rattlesnake Habitat Protocol*;
    - if potential denning habitat is identified, avoid direct impacts;
    - if potential or occupied gestation habitat is identified, replace with PAFBC's *Guidelines for Timber Rattlesnake Habitat Creation;*
- employ a PAFBC-permitted timber rattlesnake monitor on-site prior to and during construction between April 15 and October 15 to inspect/clear areas prior to construction and to capture and remove snakes that enter work areas during construction; and
- contact the PAFBC regarding concerns related to number of snake encounters or habitat alteration during construction.

National Fuel contracted Herpetological Associates, Inc (Herpetological Associates), a PAFBC-approved timber rattlesnake surveyor, to conduct a habitat assessment to determine if potentially suitable habitat exists in the FM100 Project area. The habitat assessment was conducted between July and August 2019. Potential habitat was identified at two locations along the FM100 Abandonment; however, since the time of the survey, National Fuel has determined that work at one of the areas is no longer needed and thus is not a part of the proposed action. Two timber rattlesnakes were observed in the remaining habitat area, which is potential habitat for gestation and offsite overwintering. Herpetological Associates' report included recommendations in accordance with the recommendations from the PAFBC above, such as training workers, employing a rattlesnake monitor, and dismantling and replacing rock habitat if avoidance is not possible.

In a letter dated October 8, 2019, the PAFBC agreed with the findings of the timber rattlesnake habitat assessment and the report's recommendations, and further concluded that the FM100 Project would not result in adverse impacts to the timber rattlesnake if the recommendations in the report are implemented. National Fuel has agreed to adopt the measures identified in Herpetological Associates' report.

Mussels – Rare or protected freshwater mussels are known to occur in waterbodies crossed by the FM100 Project. Based on consultation with the PAFBC, National Fuel conducted a freshwater mussel survey at Potato Creek, Portage Creek, and Allegheny River to determine the presence or absence of state-listed mussel species of concern and the federally listed rayed bean mussel. The federally listed rayed bean mussel is discussed in section B.4.4.3. No state-listed threatened or endangered mussels were identified during the survey effort; however, several state-designated rare or special concern species were identified. National Fuel proposes to cross Potato Creek, Portage Creek, and Allegheny River via HDD. In a letter dated October 8, 2019, the PAFBC concurred with the use of the HDD crossing method as an avoidance measure and concluded the FM100 Project would not result in adverse impacts to freshwater mussel species, provided the following additional recommendations are followed:

- EI(s) are on site for duration of HDD crossings;
- HDD activities are suspended in the event of an inadvertent return;
- a vac truck is on site or on call for efficient cleanup in the event of an inadvertent return;
- the PAFBC is notified within 24 hours prior to initiating HDD activities; and
- an approved erosion and sedimentation control plan and related best management practices are implemented.

National Fuel has agreed to adopt the above recommendations from the PAFBC.

Plants – National Fuel conducted targeted floristic surveys at select locations, based on correspondence with the PADCNR, along Line YM58, FM100 Abandonment, and the Tamarack Compressor Station during the 2017 and 2018 field seasons to determine the presence or absence of cranesbill, screwstem, creeping snowberry, yellow-fringed orchid, Bebb's sedge, and soft-leaved sedge. No individuals of these species were found during surveys. In a letter dated October 7, 2019, the PADCNR concluded that based on the results of the survey, no impact on these species would be likely. The PADCNR provided National Fuel with some additional recommendations to prevent the introduction or spread of noxious weeds, which National Fuel has agreed to implement.

Leidy South Project

Transco's consultations with the PAFBC, PADCNR, and PGC regarding review of the Leidy South Project facilities for potential impacts on state-listed species and resources of concern identified eight state-listed threatened, endangered, rare, or special concern species (one reptile, seven plants) that may occur along the Leidy South Project components. The PGC also identified the state-listed endangered northern long-eared bat as a species of concern in Pennsylvania, which is also federally listed and discussed earlier in this section. A summary of proposed mitigation for the remaining species is presented below and summarized in table B.4.4-3 in appendix I.

Timber rattlesnake – The habitat requirements, status, and distribution for the timber rattlesnake are discussed above for the FM100 Project. The PAFBC requested that Transco perform a habitat assessment along the Hensel Replacement, Hilltop Loop, and Compressor Station 620 site. Transco completed the habitat assessment between March and May 2019. Potential habitat was identified at 10 locations along the Hensel Replacement and 8 locations along the Hilltop Loop; no potential habitat was identified at the Compressor Station 620 site. Based on the results of the habitat assessment, Transco conducted presence/absence surveys at the areas of potential habitat along the Hensel Replacement and the Hilltop Loop. During the presence/absence surveys, timber rattlesnakes were observed in 6 of the 10 habitat areas along the Hensel Replacement and 3 of the 8 habitat areas along the Hilltop Loop. Three of the active habitat areas (all are gestation habitat) along the Hensel Replacement and one of the active habitat areas (denning and gestation habitat) along the Hilltop Loop are within the Leidy South Project workspace. In a letter dated August 21, 2019, the PAFBC recommended the following measures to avoid impacts to denning timber rattlesnakes and to mitigate impacts to potential and occupied gestation habitat:

- Denning habitat – no blasting would occur within 50 feet of confirmed denning habitat between October 1 and May 15.

- Gestation habitat – areas would be restored to preconstruction conditions in accordance with the PAFBC *Guidelines for Timber Rattlesnake Habitat Creation.*

Transco has agreed to adopt the above recommendations from the PAFBC.

Plants – Transco conducted targeted floristic surveys of the Hensel Replacement and Compressor Station 607 work areas between May and July 2019 to determine the presence or absence of white twisted-stalk, swamp currant, showy mountain-ash, Bebb's sedge, soft-leaved sedge, and purple bedstraw. A population of purple bedstraw was found in an upland area between 10 and 75 feet upslope of the construction workspace along the Hensel Replacement. In a letter dated October 3, 2019, the PADCNR concluded that because the purple bedstraw was found outside the limits of disturbance, no impact is likely.

B.4.4.5 General Impacts and Mitigation

In general, impacts on state-listed species would typically be like those described for other plant and animal species in sections B.4.3.2. We determined that, given the nature of the species present, the results of the surveys conducted and agency consultation, and the measures that would be implemented as part of the Projects, impacts on state-sensitive species would be avoided or appropriately minimized, and we do not anticipate any significant impacts.

B.5 LAND USE, RECREATION, AND VISUAL RESOURCES

B.5.1 Land Use

Land use categories in the FM100 Project area were identified based on field observations conducted in 2017 and 2018 in addition to interpretation of aerial imagery and other records. Based on that review, the land uses consist primarily of open land, industrial/commercial, forest/woodland, and agricultural, with smaller amounts categorized as wetlands, open water, and residential. The total acreage to be disturbed for construction of the FM100 Project facilities is 547.7 acres, including 326.2 acres for construction or abandonment of pipeline facilities, 26.0 acres for construction or abandonment of aboveground facilities, 149.8 acres for access roads, and 45.7 acres for staging areas. Upon completion, National Fuel would maintain 193.3 acres for the permanent pipeline right-of-way, including 9.9 acres for aboveground facilities, and 77.1 acres for access roads. The remaining 267.4 acres would be restored and allowed to revert to preconstruction uses, with the exception of about 74.9 acres of forest/woodland within the permanent right-of-way, which would be converted to open land. A summary of the land use categories affected by construction and operation of the FM100 Project is provided in table B.5.1-1. A detailed summary is provided in appendix J.

TABLE B.5.1-1

Summary of Land Use Types Affected by Construction and Operation of the FM100 Project and Leidy South Project [a]

Facility	Open Land		Industrial / Commercial		Forest / Woodland		Agricultural		Wetlands		Open Water		Residential		Total	
	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.
FM100 PROJECT																
Pipeline Facilities [b]																
Line YM58	116.2	93.2	4.9	2.6	109.5	57.7	49.9	24.3	13.3	1.8	2.1	1.1	1.0	0.6	**296.9**	**179.8**
Line YM224 Loop	5.6	4.0	0.2	0.1	6.4	3.7	2.1	1.1	<0.1	<0.1	0.0	0.0	0.0	0.0	**14.5**	**9.0**
Line KL Extension	1.2	1.4	0.8	0.7	2.6	2.3	0.0	0.0	0.6	<0.1	0.0	0.0	0.0	0.0	**5.2**	**4.5**
Pipeline Facilities Subtotal	**123.0**	**98.6**	**5.9**	**3.4**	**118.5**	**63.7**	**52.0**	**25.4**	**13.9**	**1.8**	**2.1**	**1.1**	**1.0**	**0.6**	**316.6**	**193.3**
Aboveground Facilities																
Tamarack Compressor Station	0.0	0.0	0.0	0.0	4.3	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**4.3**	**4.3**
Marvindale Compressor Station	0.0	0.0	0.5	0.0	11.3	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**11.8**	**3.7**
Marvindale Interconnect	1.8	<0.1	4.5	1.6	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**7.9**	**1.7**
Carpenter Hollow OPP Station	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.2**	**0.2**
Aboveground Facilities Subtotal	**1.9**	**0.2**	**5.1**	**1.7**	**17.2**	**8.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**24.2**	**9.9**
Abandonment Facilities																
Line FM100																
Pipeline ROW	4.8	0.0	0.7	0.0	3.6	0.0	0.0	0.0	0.3	0.0	0.2	0.0	0.0	0.0	**9.6**	**0.0**
ATWS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Costello Compressor Station	0.4	0.0	0.8	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.3**	**0.0**
WHP-MS-4317X Station	0.2	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.5**	**0.0**
Abandonment Facilities Subtotal	**5.4**	**0.0**	**1.6**	**0.0**	**3.9**	**0.0**	**0.0**	**0.0**	**0.3**	**0.0**	**0.2**	**0.0**	**0.0**	**0.0**	**11.4**	**0.0**
Access Roads	31.3	20.7	111.4	52.6	4.1	3.2	1.6	0.2	0.9	<0.1	0.4	0.3	<0.1	0.0	**149.8**	**77.1**
Staging Areas	17.2	0.0	23.5	0.0	1.8	0.0	3.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	**45.7**	**0.0**
FM100 Project Total	**178.8**	**119.5**	**147.5**	**57.7**	**145.5**	**74.9**	**56.7**	**25.6**	**15.2**	**0.6**	**2.8**	**1.4**	**1.1**	**0.6**	**547.7**	**280.3**

TABLE B.5.1-1 (cont'd)

Summary of Land Use Types Affected by Construction and Operation of the FM100 Project and Leidy South Project [a]

Facility	Open Land		Industrial / Commercial		Forest / Woodland		Agricultural		Wetlands		Open Water		Residential		Total	
	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.
LEIDY SOUTH PROJECT																
Pipeline Facilities																
Hensel Replacement [c]	59.1	2.7	21.6	2.9	10.1	1.3	0.0	0.0	2.1	<0.1	0.3	0.1	0.0	0.0	**93.2**	**7.0**
Hilltop Loop	15.3	1.0	3.6	2.0	21.2	4.0	0.0	0.0	0.7	<0.1	0.2	<0.1	0.4	0.1	**41.4**	**7.2**
Benton Loop	32.6	5.4	1.9	0.8	14.3	2.1	11.9	3.0	2.6	<0.1	0.1	<0.1	0.1	0.0	**63.5**	**11.6**
Pipeline Facilities Subtotal	**107.0**	**9.1**	**27.1**	**5.7**	**45.6**	**7.4**	**11.9**	**3.0**	**5.3**	**<0.1**	**0.6**	**0.1**	**0.5**	**0.1**	**198.1**	**25.8**
Aboveground Facilities																
Compressor Station 605	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Compressor Station 607	14.8	10.0	<0.1	0.0	3.2	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**18.0**	**12.8**
Compressor Station 610	0.0	0.0	33.7	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**34.0**	**0.0**
Compressor Station 620	0.0	0.0	0.1	0.1	0.8	0.0	44.4	24.1	0.0	0.0	0.0	0.0	0.0	0.0	**45.3**	**24.2**
Mainline Valves	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.5**	**0.5**
Aboveground Facilities Subtotal	**15.3**	**10.5**	**33.8**	**0.1**	**4.3**	**2.8**	**44.4**	**24.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**97.8**	**37.5**
Access Roads	1.6	0.4	16.9	7.9	4.7	4.3	<0.1	0.0	0.2	0.1	0.0	0.0	0.0	0.0	**23.5**	**12.7**
Staging Areas	72.8	0.0	8.4	0.0	6.5	0.0	24.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	**111.9**	**0.0**
Leidy South Project Total	**196.7**	**20.0**	**86.2**	**13.7**	**61.1**	**14.5**	**80.4**	**27.1**	**5.7**	**0.6**	**0.6**	**0.1**	**0.5**	**0.1**	**431.3**	**76.0**
Projects Total	**375.5**	**139.5**	**233.7**	**71.4**	**206.6**	**89.4**	**137.1**	**52.7**	**20.9**	**2.1**	**3.4**	**1.5**	**1.6**	**0.7**	**979.0**	**356.3**

[a] The totals shown in this table may not equal the sum of addends due to rounding.

[b] Pipeline facility totals include the impacts from MLVs.

[c] Hensel Replacement includes: Leidy Line D with Associated Abandonment and Removal of Leidy Line A, and Regrading of Existing Two-tone Contour

Note: Con. = construction; Op. = operation; ROW = right-of-way

Land use categories in the Leidy South Project area were identified using field observations conducted in 2018 and interpretations of 2018 aerial imagery and other records. Based on that review, the land uses consist primarily of open land, industrial/commercial, agricultural, and forest/woodland, with smaller amounts categorized as wetlands, open water, and residential. The total acreage to be disturbed for construction of the Leidy South Project facilities is 431.3 acres, including 198.1 acres for construction or abandonment of pipeline facilities, 97.8 acres for aboveground facilities, 23.5 acres for access roads, and 111.9 acres for staging areas. Upon completion, Transco would maintain 25.8 acres for the permanent pipeline right-of-way, 37.5 acres for aboveground facilities, and 12.7 acres for access roads. The remaining 355.3 acres would be restored and allowed to revert to pre-construction uses, with the exception of about 14.5 acres of forest/woodland within the permanent pipeline right-of-way, which would be converted to open land. A summary of the land use categories affected by construction and operation of the Leidy South Project is provided in table B.5.1-1 and appendix J.

B.5.2 General Impacts

B.5.2.1 Open Land

Open land includes existing right-of-way, vacant land, herbaceous and scrub-shrub upland, and non-forested lands. Open land does not include wetlands or open water.

Construction of the FM100 Project would impact approximately 178.8 acres of open land, including 127.8 acres for construction or abandonment of pipeline facilities, 2.5 acres for construction or abandonment aboveground facilities, 31.3 acres for access roads, and 17.2 acres for staging areas. Upon completion, National Fuel would maintain 98.6 acres for the permanent pipeline right-of-way, 0.2 acre for aboveground facilities, and 20.7 acres for access roads in open land.

Construction of the Leidy South Project would impact approximately 196.7 acres of open land, including 107.0 acres for construction or abandonment of pipeline facilities, 15.3 acres for new aboveground facilities, 1.6 acres for access roads, and 72.8 acres for staging areas. Upon completion, Transco would maintain 9.1 acres for the permanent pipeline right-of-way, 10.5 acres for aboveground facilities, and 0.4 acre for access roads in open land.

Construction of the Projects would impact a total of approximately 375.5 acres of open land. Of the 375.5 acres of open land, approximately 139.5 acres would be permanently impacted during operation. The majority of the open land that would be impacted by the Projects is associated with either National Fuel's or Transco's existing utility rights-of-way or other utility rights-of-way currently maintained as open land. Temporary impacts on open land are expected during grading, trenching, backfilling, and restoration; however, National Fuel's and Transco's use of their ESCAMP and ECP would minimize impacts. Routine vegetation maintenance would be conducted by mowing, cutting, or clearing. Within 1 to 5 years following construction, most open land uses would return to preconstruction conditions. In total, approximately 31.8 acres of open land would be permanently converted to industrial/commercial for the aboveground facilities and access roads.

B.5.2.2 Industrial/Commercial

Industrial/commercial land includes utility stations, roads, commercial, retail facilities, manufacturing or industrial plants, and transportation rights-of-way. National Fuel's and Transco's direct impacts on industrial/commercial/roads land types include impacts within the property lines of existing National Fuel and Transco facilities and existing roads/railroads crossed during construction of the Projects.

Construction of the FM100 Project would impact approximately 147.5 acres of industrial/ commercial land, including 6.6 acres for construction or abandonment of pipeline facilities, 6.0 acres for construction or abandonment aboveground facilities, 111.4 acres for access roads, and 23.5 acres for staging areas. Upon completion, National Fuel would maintain 3.4 acres for the permanent pipeline right-of-way, 1.7 acres for aboveground facilities, and 52.6 acres for access roads in industrial/ commercial land.

Construction of the Leidy South Project would impact approximately 86.2 acres of industrial/commercial land, including 27.1 acres for construction or abandonment of pipeline facilities, 33.8 acres for aboveground facilities, 16.9 acres for access roads, and 8.4 acres for staging areas. Upon completion, Transco would maintain 5.7 acres for the permanent pipeline right-of-way, 0.1 acre for aboveground facilities, and 7.9 acres for access roads in industrial/commercial land.

Construction of the Projects would impact a total of approximately 233.7 acres of industrial/ commercial land. Of the 233.7 acres of industrial/commercial land, approximately 71.4 acres would be permanently impacted during operation. Industrial/commercial lands affected by the Projects primarily consist of previously disturbed road rights-of-way. National Fuel and Transco would minimize impacts on industrial/commercial land uses by coordinating private driveway crossings with business owners to maintain vehicle access. Steel plates would be kept on site at all times to create a temporary platform for access, as necessary. Road surfaces would be restored as soon as practicable so that normal access can resume and industrial/commercial land uses would be restored to preconstruction conditions, or as specified in landowner agreements.

National Fuel would cross 20 roadways and 2 railways, and Transco would cross 17 roadways, all ranging from maintained local paved roads to state highways. These roadways would be crossed using conventional road bore, open-cut, or HDD crossing methods as described in section A.8.1.4. HDD and bore crossing methods allow the roadway to remain in service while the installation process takes place, resulting in little to no disruption to traffic. In the event of an open-cut crossing, impacts on roadways would include short-term traffic congestion and disruption. To minimize these impacts, National Fuel and Transco would consult with local law enforcement and safety officials to develop temporary traffic control plans. Following construction, roadways would be restored to preconstruction conditions. Overall, commercial/industrial land uses within the permanent right-of-way would return to preconstruction conditions. No commercial structures are within 50 feet of the Projects.

B.5.2.3 Forest/Woodland

Forest/woodland includes upland forest and woodland, except forested wetlands, which are discussed in section B.5.2.5.

Construction of the FM100 Project would impact approximately 145.5 acres of forest/woodland, including 122.1 acres for construction or abandonment of pipeline facilities, 17.5 acres for construction or abandonment aboveground facilities, 4.1 acres for access roads, and 1.8 acres for staging areas. Upon completion, National Fuel would maintain 63.7 acres of permanent pipeline right-of-way, 8.0 acres for aboveground facilities, and 3.2 acres for access roads in forest/woodland.

Construction of the Leidy South Project would impact approximately 61.1 acres of forest/woodland, including 45.6 acres for construction or abandonment of pipeline facilities, 4.3 acres for aboveground facilities, 4.7 acres for access roads, and 6.5 acres for staging areas. Upon completion, Transco would maintain 7.4 acres for the permanent pipeline right-of-way, 2.8 acres for aboveground facilities, and 4.3 acres for access roads in forest/woodland.

Construction of the Projects in forest/woodland areas would require the removal of trees to prepare the construction workspace. However, National Fuel and Transco would minimize forest/woodland impacts by siting the proposed facilities within existing rights-of-way, minimizing the construction workspace, and utilizing open, industrial/commercial, or agricultural land for aboveground facilities or contractor/pipe yards and contractor staging areas to the extent practicable.

Approximately 145.5 acres of forest/woodland would be temporarily impacted by the construction of the FM100 Project. Following construction, permanent impacts would occur over the maintained portion of the right-of-way and aboveground facilities where forest/woodland would be converted to open land or industrial/commercial. National Fuel would retain a 50-foot-wide permanent right-of-way following construction which would be maintained in accordance with National Fuel's ESCAMP. A total of 63.7 acres of forest/woodland would be maintained in an herbaceous state over the pipeline centerline during operation of the pipelines. The Elk State Forest, Moshannon State Forest, and Susquehannock State Forest would be affected by FM100 Project activities as discussed further in section B.5.4.

Approximately 61.1 acres of forest/woodland would be temporarily impacted by the construction of the Leidy South Project. Following construction, permanent impacts would occur over the maintained portion of the right-of-way and aboveground facilities where forest/woodland would be converted to open or industrial/commercial land. A total of 7.4 acres of forest/woodland would be maintained in an herbaceous state during operation. The Sproul State Forest would be affected by Leidy South Project activities as discussed further in section B.5.4.

Where trees would be cleared within the construction footprint to provide an adequate and safe work surface, the woody vegetation would be allowed to regrow outside the maintained right-of-way following completion of construction. Forest/woodland crossed by HDD would not be permanently impacted since National Fuel does not plan to conduct routine vegetation maintenance between the HDD entry and exit pits.

Transco indicated that it would fairly compensate landowners for timber cut on their property and may, in some cases, allow the landowners to keep timber for their consumption or sale. Based on these measures, we conclude that impacts on forest/woodland areas would be minimized to the extent practical and would not be significant.

B.5.2.4 Agricultural

Agricultural land includes land associated with active croplands, hayfields, and pasture.

Construction of the FM100 Project would impact approximately 56.7 acres of agricultural land, including 52.0 acres for construction or abandonment of pipeline facilities, 1.6 acres for access roads, and 3.1 acres for staging areas. Upon completion, National Fuel would maintain 25.4 acres for permanent pipeline right-of-way, and 0.2 acre for access roads in agricultural land.

Construction of the Leidy South Project would impact approximately 80.4 acres of agricultural land, including 11.9 acres for construction or abandonment of pipeline facilities, 44.4 acres for aboveground facilities, less than 0.1 acre for access roads, and 24.0 acres for staging areas. Upon completion, Transco would maintain 3.0 acres for the permanent right-of-way and 24.1 acres for aboveground facilities in agricultural land.

Construction of the Projects would impact a total of approximately 137.1 acres of agricultural land. Of the 137.4 acres of agricultural land, approximately 52.7 acres would be permanently impacted during operation.

We received comments stating that the parcel of land associated with Compressor Station 620 is zoned as agricultural and the compressor station should be placed on industrial/commercial land. Compressor station siting is based on a number of factors including engineering considerations, constructability, and avoidance of sensitive environmental resources. While we acknowledge that Compressor Station 620 may be inconsistent with current zoning, the NGA gives the Commission the exclusive siting authority for interstate natural gas facilities, consistent with any other relevant federal law.

No specialty crops, including nurseries, vineyards, orchards, citrus groves, dairies, and aquaculture, or tree farms, were identified near the Projects' facilities.

The construction methods in actively cultivated agricultural land are described in section A.8.1.4. The effects of construction on agricultural land would generally be minor and short term except where new aboveground facilities are installed. Short-term impacts on agricultural areas would include the temporary loss of standing and row crops within the construction work area and the disruption of farming operations for the growing season during the year of construction. To reduce construction impacts, National Fuel would follow its ESCAMP and Transco would follow its ECP, which include employing erosion and sediment control and restoration measures (e.g., soil stabilization, topsoil segregation, compaction avoidance) to minimize and mitigate impacts on agricultural lands. To preserve soil fertility on agricultural lands, both National Fuel and Transco would strip topsoil up to 12 inches in depth, keep it segregated from subsoil, and replace it as the surface layer during restoration to preserve soil productivity.

Section B.2.1 addresses mitigation measures for construction and operation of the Projects on agricultural land. Section B.2.1.2 discusses permanent impacts to farmland due to construction and operation of the Projects.

Landowners would be compensated for any temporary or permanent crop loss resulting from construction and operation of the Projects and, following restoration, agricultural activities would be allowed to continue over the permanent pipeline right-of-way. Based on these measures, we conclude impacts on agricultural land would be minimized to the extent practicable.

B.5.2.5 Wetlands

Wetlands include field-delineated wetlands as well as forested wetlands.

Construction of the FM100 Project would impact approximately 15.2 acres of wetlands, including 14.4 acres for construction or abandonment of pipeline facilities and 0.9 acre for access roads. Upon completion, National Fuel would maintain 1.8 acres for the permanent pipeline right-of-way and less than 0.1 acre for access roads in wetlands.

Construction of the Leidy South Project would impact approximately 5.7 acres of wetlands, including 5.4 acres for construction or abandonment of pipeline facilities, 0.2 acre for access roads, and 0.2 acre for staging areas. Upon completion, Transco would maintain less than 0.1 acre for the permanent pipeline right-of-way and 0.1 acre for access roads in wetlands.

Construction of the Projects would impact a total of approximately 20.9 acres of wetlands, consisting of 16.9 acres of emergent wetland, 2.3 acres of scrub-shrub wetland, 1.5 acres of forested

wetlands, and 0.2 acre of unconsolidated bottom wetlands. Of the 1.5 acres of forested wetland impacts, approximately 0.2 acre would be permanently impacted during operation and would be converted to emergent or scrub-shrub wetland types due to vegetation maintenance requirements along the pipeline facilities. The temporary impacts related to construction would be minimized by implementing the special wetland construction techniques described in sections A.8.1.4 and B.3.3.1, which include National Fuel's ESCAMP and Transco's ECP. Impacts on wetlands are described in detail in section B.3.3.1

B.5.2.6 Open Water

The open water classification includes waterbody crossings that are visible on aerial photography and field delineated waterbodies.

Construction of the FM100 Project would impact approximately 2.8 acres of open water, including 2.3 acres for construction or abandonment of pipeline facilities, 0.4 acre for access roads, and 0.1 acre for staging areas. Upon completion, National Fuel would maintain 1.1 acres for the permanent pipeline right-of-way and 0.3 acre for access roads across open water.

Construction of the Leidy South Project would impact approximately 0.6 acre of open water for construction or abandonment of pipeline facilities. Upon completion, Transco would have no permanent pipeline right-of-way across open water.

Construction of the Projects would impact a total of approximately 3.4 acres of open water. Of the 3.4 acres of open water, approximately 1.5 acres would be permanently maintained as right-of-way but would not result in operational impacts on the waterbodies. The temporary impacts related to construction would be minimized by reducing the nominal construction right-of-way to 75 feet in open water areas along the proposed routes and implementing the special waterbody construction techniques described in sections A.8.1.4 and B.3.3.1 in addition to National Fuel's ESCAMP and Transco's ECP. Operation of the pipeline facilities would not impact waterbodies and use would continue as before construction.

B.5.2.7 Residential

Residential land consists primarily of housing and other dwellings, including residentially zoned areas that have been developed. Residential lands may also overlap with other land use categories such as forest/woodland and open land. Construction methods proposed for residential areas are described in section A.8.1.4.

Construction of the FM100 Project would impact approximately 1.1 acres of residential land for construction or abandonment of pipeline facilities and less than 0.1 acre for access roads. Upon completion, National Fuel would maintain 0.6 acre for the permanent pipeline right-of-way on residential land.

Construction of the Leidy South Project would impact approximately 0.5 acre of residential land for the new pipeline facilities. Upon completion, Transco would maintain 0.1 acre for the permanent pipeline right-of-way on residential land.

Construction of the Projects would impact a total of approximately 1.6 acres of residential land, of which approximately 0.7 acre would be permanently impacted during operation. The structures within 50 feet of the construction work area would be most likely to experience the effects of construction and operation of the Projects. National Fuel's construction work area would be within 50 feet of 8 residences

(including multiple mobile homes) and 11 other structures. The construction workspace would be within 7 feet of one of the residences. **Therefore, we recommend that:**

- **Prior to construction of Line YM58, National Fuel should file with the Secretary, for review and written approval by the Director of OEP, evidence of landowner concurrence with the site-specific construction plan near milepost 15.0 or file a revised site-specific construction plan near milepost 15.0 that maintains a 10 foot buffer between the aboveground structure and the construction workspace.**

Transco's construction work would be within 50 feet of four residences and four other structures. The residences and structures near the Projects are summarized in table B.5.2-1, below. Transco proposes to permanently remove one garage; however, we are not aware if Transco has obtained landowner permission to remove this structure. **Therefore, we recommend that:**

- **Prior to construction of the Hilltop Loop, Transco should file with the Secretary, for review and written approval by the Director of OEP, evidence of landowner concurrence with removal of the garage at milepost 185.0. If Transco is unable to obtain concurrence, Transco should file revised alignment sheets for construction in this area that avoids removal of the structure.**

In general, as the distance to the construction work area increases, the impacts on residences decrease. In residential areas, typically the greatest impacts associated with construction and operation of a pipeline are temporary disturbances during construction and the burden of the permanent easement, which would prevent the construction of permanent structures within the permanent right-of-way. Temporary construction impacts on residential areas could include inconvenience caused by noise and dust generated by construction equipment, personnel, trenching of roads or driveways, traffic congestion, removal of aboveground structures such as fences, ground disturbance of lawns, removal of trees, landscaped shrubs, or other vegetation screening between residences and/or adjacent rights-of-way. In addition, there is potential for damage to existing septic systems or wells and other utilities.

Before mobilizing any equipment, National Fuel and Transco would stake the limits of disturbance and the centerline of the pipeline. National Fuel and Transco would utilize special construction methods designed for working in residential areas. These special construction methods are shown on National Fuel's and Transco's respective RCPs (see appendix C), which we have reviewed and found acceptable. However, **we encourage the owners of each of these residences to review the RCP for their property and provide us any comments or concerns during the EA comment period**. The companies would negotiate with landowners during the right-of-way acquisition process concerning impacts on their property. In addition, National Fuel and Transco would implement the following general measures to minimize construction-related impacts on all residences and other structures within 50 feet of the construction right-of-way:

- leave mature trees and landscaping intact within the construction work area, unless the trees or landscaping interfere with the installation techniques or present unsafe working conditions;

- regularly water the construction workspace to control fugitive dust emissions;

- segregate topsoil from subsoil in residential areas;

- secure the trench within residential areas with safety fencing at the end of each day of construction;

- restrict vehicle speeds on the right-of-way in the vicinity of the residences;
- fence the edge of the construction workspace with safety fencing; and
- restore lawn and landscape areas in the construction workspace immediately after cleanup operations, or as specified in landowner agreements, consistent with the requirements of National Fuel's ESCAMP and Transco's ECP.

National Fuel and Transco developed Environmental/Landowner Complaint Resolution Procedures for all landowners potentially impacted by the Projects that outline the procedures to follow if there are any environmental or landowner concerns or problems during construction and/or restoration of the right-of-way. We reviewed these procedures and find them acceptable.

TABLE B.5.2-1

Residences and Structures within 50 Feet of the FM100 Project and Leidy South Project Construction Work Areas [a]

Project/Facility/ Approximate Milepost	Type of Structure	Distance from Proposed Pipeline (feet)	Distance from Structure to Edge of Construction Workspace (feet)	Proposed Mitigation
FM100 PROJECT				
Line YM58				
7.1	Shed	90	50	Fencing
15.0	Residence	73	7	Fencing
15.3	Residence	88	48	Fencing
23.0	Residence	86	21	Fencing
Line FM100 Abandonment				
27.0	Mobile Homes (Multiple)	18	0 [b]	Fencing
LEIDY SOUTH PROJECT				
Hilltop Loop				
185.0	Garage	120	5	Install safety fence along the limits of disturbance
185.0	Residence	128	33	Install safety fence along the limits of disturbance
185.0	Garage	86	2	Install safety fence along the limits of disturbance
185.0	Garage	38	0	Garage to be removed
185.9	Residence	105	45	Install safety fence along the limits of disturbance
Benton Loop				
117.1	Shed/Garage	184	10	Install safety fence along the limits of disturbance
117.2	Residence	119	35	Install safety fence along the limits of disturbance
118.1	Residence	130	45	Install safety fence along the limits of disturbance

[a] No structures are within 50 feet of the following facilities: Line YM224 Loop, Line KL Extension, Tamarack Compressor Station, Marvindale Compressor Station, Marvindale Interconnect, Carpenter Hollow OPP Station, Hensel Replacement – Leidy Line D, Hensel Abandonment – Leidy Line A, Compressor Station 607, Compressor Station 610, and Compressor Station 620.

[b] Although the mobile homes are within the workspace, National Fuel does not propose any ground disturbing activity or pipeline removal to take place within 50 feet of these structures.

B.5.3 Abandonment and Removal of Line FM100

National Fuel indicates that there are five areas where landowners have requested removal of the existing Line FM100 pipeline on their property. Of these five, three comments were submitted to FERC requesting removal of the pipeline on their property. Two of these comments were submitted by different commentors about the same property. Between mileposts 0.1 and 0.3, the landowner has indicated plans for a future gravel mine. National Fuel has committed to remove the pipeline for this landowner. We agree with National Fuel's removal of the pipeline at this location.

Between mileposts 22.9 and 23, National Fuel indicates that a portion of the pipeline was installed via HDD, which means that the depth to the pipeline can be much greater than that of a pipeline installed by traditional construction methods. National Fuel proposes that it would remove the pipeline in areas where the top of the pipe is less than 5 feet from the ground surface, but only if the landowner determines it conflicts with future property improvements and there are no identified safety or environmental concerns. While we agree that removal of the pipeline in areas of greater than 5 feet of cover would result in excessive impacts on soils and require large amounts of workspace, and in some instances, may not be feasible to remove, we disagree with National Fuel's commitment to only remove the pipeline if the landowner identifies a conflict with future property improvements. **Therefore, we recommend that:**

- **National Fuel should abandon by removal the Line FM100 pipeline as requested by the landowner from mileposts 22.9 to 23.0 in areas where there is less than 5 feet of cover over the pipeline. If National Fuel reaches an agreement with the landowner to abandon the pipeline in place, National Fuel should file documentation with the Secretary prior to abandonment indicating the landowner's change in preference for the abandonment method, and then implement the landowner preference at these locations. If National Fuel believes that there are safety or environmental concerns that have yet to be identified that would preclude the removal, National Fuel should file supplemental information and justification with the Secretary, and request specific approval from the Director of OEP to abandon the pipeline in place.**

Between mileposts 24.9 and 25 and mileposts 25 and 25.1, National Fuel proposes to abandon the pipeline in place because of steep slopes and other environmentally sensitive resources. National Fuel states that it would remove the pipeline in the future if the landowner determines it conflicts with future property improvements. In this case, we agree with National Fuel's assessment that impacts from the removal of the pipeline on steep slopes and in areas with sensitive environmental features would outweigh the removal of the pipeline. National Fuel's commitment to continue to work with the landowners in this case is satisfactory.

We received comments from Big Run Lodge, Inc. and Big Run Acres, Inc. requesting removal of the pipeline and relinquishment of the easement between mileposts 30.7 and 31. National Fuel indicates that the tract is accessible, does not have slope or gradient issues that would cause safety concerns during the removal, and stream and wetland impacts could be avoided. National Fuel indicates that the landowner preference is to have the pipeline removed and the easement relinquished; however, it is not clear to Commission staff whether National Fuel is committing to removing the pipeline at this location. Because the landowner filed comments into the record, we believe the landowner clearly desires to have the pipeline removed. We do not find any apparent environmental reasons why the pipeline should not be removed on these properties. **Therefore, we recommend that**:

- **National Fuel should abandon by removal the Line FM100 pipeline as requested by the landowner from mileposts 30.7 to 31.0. If National Fuel reaches an agreement**

with the landowner to abandon the pipeline in place, National Fuel should file documentation with the Secretary prior to abandonment indicating the landowners' change in preference for the abandonment method, and then implement the landowner preference at these locations. If National Fuel believes that there are safety or environmental concerns that have yet to be identified that would preclude the removal, National Fuel should file supplemental information and justification with the Secretary, and request specific approval from the Director of OEP to abandon the pipeline in place.

Additionally, we received comments that the Commission should require the relinquishment of the easements held by National Fuel where its pipelines are abandoned. National Fuel has stated that after Line FM100 has been abandoned they would retain the easement but would no longer regularly mow the easement. Easements between National Fuel and landowners are legal instruments and as such, any requests for National Fuel to relinquish easements or rights-of-way are not within the scope of this EA.

B.5.4 Planned Developments

National Fuel and Transco contacted local planning officials in the affected municipalities to identify planned residential or commercial developments within 0.25 mile of the Projects. National Fuel and Transco received correspondence from the agencies that no commercial or residential developments were identified within 0.25 mile of FM100 or Leidy South Projects in Cameron, Clearfield, Clinton, Elk, Lycoming, McKean, and Potter Counties. Correspondence was not received from Columbia County.

B.5.5 Public Land, Recreation, and Special Interest Areas

National Fuel and Transco would affect the recreation and special land use areas listed in table B.5.4-1. Collectively, the Projects would impact a total of about 195.6 acres of recreational and special interest areas during construction, including 92.6 for National Fuel and 103.0 for Transco. No permanent impacts from aboveground facilities would occur on recreational or special interest areas. National Fuel and Transco would not impact any wilderness areas or national wildlife refuges, Native American reservations, nature preserves, national parks, national trails, national historic landmarks, Conservation Reserve Program or Enhancement Program, Wetland Reserve Program, Farm and Ranch Lands Protection Program, Clean and Green Program, Agricultural Security Areas or agricultural conservation easements, flood control levees, or national landmarks.

TABLE B.5.4-1

Recreation and Special Use Areas Affected by the FM100 Project and Leidy South Project

Project/Facility/ Being Milepost	End Milepost	Resource Name	Areas Affected by Construction (acres) [a]
FM100 PROJECT			
Line YM58			
N/A [b]	N/A [b]	Elk State Forest	0.8
N/A [b]	N/A [b]	Elk State Forest	0.5
10.3	11.2	State Game Land 61	0.9
15.3	15.3	PA Bicycle Route Y	<0.1
20.0	21.9	State Game Land 59	17.9
N/A [b]	N/A [b]	State Game Land 59	13.1
22.3	22.5	State Game Land 59	1.3

TABLE B.5.4-1 (cont'd)

Recreation and Special Use Areas Affected by the FM100 Project and Leidy South Project

Project/Facility/ Being Milepost	End Milepost	Resource Name	Areas Affected by Construction (acres) [a]
Line FM100 Abandonment			
0.6	12.2	Moshannon State Forest	0.1
N/A [b]	N/A [b]	Moshannon State Forest	0.9
12.3	12.5	State Game Land 034	--
12.5	14.8	Moshannon State Forest	0.1
15.2	15.8	Moshannon State Forest	2.8
15.2	16.1	Moshannon State Forest	0.1
16.5	21.6	Moshannon State Forest	--
24.9	25.7	Bucktail State Park Natural Area	--
27.1	27.3	Bucktail State Park Natural Area	0.3
27.1	27.3	Bucktail State Park Natural Area	--
27.3	27.3	Johnson Run Natural Area	--
27.3	27.3	Johnson Run Natural Area	<0.1
27.8	28.3	Elk State Forest	--
28.5	29.1	Elk State Forest	--
N/A [b]	N/A [b]	Elk State Forest	0.4
29.6	30.2	Elk State Forest	0.2
30.2	30.6	Square Timber Wild Area	<0.1
31.0	31.5	Square Timber Wild Area	<0.1
31.5	40.1	Elk State Forest	<0.1
33.4	33.4	Elk State Forest	0.6
40.1	44.0	Susquehannock State Forest	0.5
40.1	40.4	Susquehannock State Forest	1.8
LEIDY SOUTH PROJECT			
Hensel Replacement			
188.5	193.5	Sproul State Forest	101.6
194.0	194.0	Sproul State Forest	Combined with above
190.0	190	Two Mile Run Snowmobile Trail	<0.1
192.7	192.7	Donut Hole Trail	<0.1
Hilltop Loop			
183.5	183.5	Sproul State Forest	1.4
Mainline Valve Facility at MP 188.15 (Hensel Replacement)			
188.2	188.2	Sproul State Forest	<0.1

[a] Acres less than 0.001 are considered de minimis and are reflected as "--" in this table.

[b] Off-centerline resource.

B.5.5.1 State Forest

Elk State Forest

Elk State Forest consists of approximately 217,000 acres of northern hardwood and mixed oak forest. The state forest is named for the vast number of elk that formerly inhabited the area (PADCNR, 2019f). The FM100 Project would cross 19.4 miles of Elk State Forest and would affect 2.5 acres during construction on the state forest in McKean and Cameron Counties. Two access roads, one temporary and one permanent, for Line YM58 would cross Elk State Forest. No improvements would be required for PAR-3 or TAR-4, but the road would be maintained in accordance with measures imposed by the PADCNR. Several workspaces for the Line FM100 abandonment would be within Elk State Forest; however, these workspaces would be entirely within National Fuel's existing right-of-way. Two access roads would be used for the Line FM100 abandonment (Rectifier 873 - 872 Access and MLV LUC0 - 5039 Access) in the state forest. National Fuel is continuing coordination with the PADCNR to obtain approval for use of the existing roads and other workspaces to abandon portions of Line FM100 and install Line YM58.

Moshannon State Forest

Moshannon State Forest consists of approximately 190,031 acres on the Allegheny Plateau. Various recreational activities within the forest include 244 miles of hiking trails, camping, mountain biking, horseback riding, hunting, and fishing (PADCNR, 2019i). The FM100 Project would cross 21 miles of Moshannon State Forest, and would affect 4.0 acres during construction on the state forest in Clearfield and Elk Counties. Several workspaces for the Line FM100 abandonment would be within Moshannon State Forest; however, the workspaces would be entirely within National Fuel's existing right-of-way. Two access roads would be used for the Line FM100 abandonment (Rectifier 167 - 168 Access and MLV BZE0 - 5810 Access) in the state forest. National Fuel is continuing coordination with the PADCNR to obtain approval for use of the existing roads and other workspaces to abandon portions of Line FM100.

Susquehannock State Forest

Susquehannock State Forest consists of approximately 265,000 acres known for some of the most productive stands of black cherry trees in the world (PADCNR, 2019j). The FM100 Project would cross 4.4 miles of Susquehannock State Forest and would affect 2.3 acres of the state forest in Potter County during construction. One workspace would be entirely within National Fuel's existing right-of-way for the Line FM100 abandonment and one access road would be used for the Line FM100 abandonment (POP0 4317 Access). Cherry Springs State Park is within the Susquehannock State Forest. Cherry Springs Park is known for its dark night skies, making it an ideal location for stargazing and astronomy. National Fuel proposes the following lighting controls to minimize unwanted light pollution:

- only light the areas necessary for safety/operations;
- use of motion activated lighting;
- use of fully shielded cut-off fixtures (pointed downward) to eliminate light emitted above horizontal;
- spectral management to control blue and red light emissions with a strong preference for amber colored lighting, and

- minimize lighting intensity where possible.

National Fuel is continuing coordination with the PADCNR to obtain approval for use of the existing roads and other workspaces to abandon portions of Line FM100.

Sproul State Forest

Sproul State Forest is the largest forest in the state forest system, covering over 305,450 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, 2019k). The Leidy South Project would cross 5.5 miles of Sproul State Forest and would affect 103.0 acres of the state forest in Clinton County during construction. Approximately 15.2 acres would be maintained during operation of the project. Leidy Line D of the Hensel Replacement would cross 5.5 miles, while 5.3 miles of the Leidy Line A would be abandoned within the state forest. The Hilltop Loop crosses Sproul State Forest for less than 0.1 mile. The portion of Leidy Line A within the Tamarack Swamp Natural Area and associated wetlands would be abandoned in place and grouted.

We received a comment that the proposed Hensel Replacement should avoid impacts on the Tamarack Swamp Natural Area. As proposed, the Hensel Replacement pipeline avoids the Tamarack Swamp Natural Area, but impacts Sproul State Forest land. Consultation with the PADCNR is ongoing for approval to construct and operate on the portions of the Hensel Replacement and Hilltop Loop that cross Sproul State Forest (see additional discussion in Section B.4.2).

Impacts on state forest lands from construction and abandonment of the Projects is expected to be minimal. Recreational uses within the state forest, such as hunting or hiking, could be interrupted for short periods during construction and abandonment activities. However, the use of existing corridors in state forests lands, the abandonment of various lines within the state forests, and the Projects' continued coordination with the Commonwealth of Pennsylvania, we believe impacts would be minimized.

B.5.5.2 State Game Land

National Fuel would cross PGC state game lands (SGL) 61, 59, and 34. SGLs are owned and managed by the PGC for the purposes of managing habitat for wildlife and providing opportunities for lawful hunting and trapping. Pennsylvania SGL 61 is comprised of 9,886 acres in McKean County and provides opportunity for hunting game species such as bear, deer, turkey, and ruffed grouse. National Fuel's Line YM58 crosses Pennsylvania SGL 61 for 0.9 mile and would affect 8.8 acres during construction. Pennsylvania SGL 59 is comprised of 7,024 acres in McKean and Potter Counties and provides habitat and hunting opportunities for game species such as deer, turkey, squirrel, and grouse. National Fuel's Line YM58 crosses Pennsylvania SGL 59 for 5.6 miles and would affect 40.7 acres during construction. Pennsylvania SGL 34 is comprised of 10,248 acres in Clearfield and Elk Counties and provides habitat and hunting opportunities for game species such as bear, deer, turkey, and waterfowl. National Fuel's FM100 abandonment crosses Pennsylvania SGL 34 for 0.2 mile and would not affect the SGL during construction. National Fuel would work with the PGC to avoid impacts on SGLs during high-use periods such as hunting seasons for big game and turkey. Consultation with the PGC is ongoing for portions of the abandonment for Line FM100 and installation of Line YM58.

B.5.5.3 Natural Areas

Bucktail State Park Natural Area

Bucktail State Park Natural Area is an approximately 16,433-acres state park in Cameron and Clinton Counties (PADCNR, 2019d). The FM100 Project would cross 1.2 miles of Bucktail State Park Natural Area and would affect 0.3 acre during construction on the state forest in Cameron County. Several workspaces for the Line FM100 abandonment would be within Bucktail State Park Natural Area; however, the workspaces would be entirely within National Fuel's existing right-of-way. One access road would be used for the Line FM100 abandonment (SR 12 North Access) in the state park. National Fuel is coordinating with the PADCNR to obtain approval for use of the existing road and other workspaces to abandon portions of Line FM100.

Johnson Run Natural Area

Johnson Run Natural Area is a state managed, 216-acre natural area on the steep slopes above Sinnemahoning Creek and features an old growth hemlock hardwood mix (PADCNR, 2019d). The FM100 Project would cross less than 0.1 mile of Johnson Run Natural Area and would affect less than 0.1 acre during construction. One workspace for the Line FM100 abandonment would be within Johnson Run Natural Area; however, the workspace would be entirely within National Fuel's existing right-of-way. One access road would be used for the Line FM100 abandonment (SR 12 North Access) in the natural area. National Fuel is coordinating with the PADCNR to obtain approval for use of the existing road and other workspaces to abandon portions of Line FM100.

Square Timber Wild Area

Square Timber Wild Area is approximately 8,461 acres (a portion of which is in the Bucktail State Park Natural Area) and features deep narrow valleys and steep ridges (PADCNR, 2019d). The FM100 Project would cross 0.9 mile of Square Timber Wild Area and would affect less than 0.1 acre during construction. Two workspaces for the Line FM100 abandonment would be within natural area; however, the workspaces would be entirely within National Fuel's existing right-of-way. National Fuel is coordinating with the PADCNR to obtain approval for use of the workspaces to abandon portions of Line FM100.

Based on the extent of activities proposed in the natural areas (abandonment activities on existing rights-of-way and use of access roads), we believe there would be minimal impact.

B.5.5.4 Trails and Bicycle Routes

BicyclePA Route Y would be crossed by Natural Fuel's Line YM58. Impacts on the bicycle route would be avoided since it parallels State Highway 6, which would be a conventional bore crossing. The Line FM100 abandonment crosses several snowmobile trails; impacts on the snowmobile trails would be short-term in nature, and National Fuel would work with the PADCNR to notify the agency of trail crossing times and locations to minimize impacts on trail users. National Fuel would post appropriate signage at trailheads or other locations notifying users that a portion of the trail is closed for the duration of the construction activities and refer them to the PADCNR's website for alternative trail options.

Transco would cross Two Mile Run Snowmobile Trail and Donut Hole Trail. Each crossing would be less than 0.1 mile, and disturbance during construction and operation would be less than 0.1

acre. Both trails are within Sproul State Forest. Transco is continuing to coordinate with the PADCNR's Bureau of Forestry to identify measures to minimize disturbance.

The EPA commented that impacts on recreational fishing opportunities, especially around Compressor Station 620, should be considered. With the exception of the construction timeframe in the immediate areas of the Projects near waterbody crossings, we do not expect any long-term impacts on recreational fishing opportunities. The areas along the pipelines would be restored, allowing for fishing to resume shortly after construction. Property rights and access to areas where land ownership changes (such as at aboveground facilities) could restrict fishing if Transco or other landowners did not allow access that was previously available. This impact is a matter of property rights, and even if Transco prevented fishing from areas impacted by the Leidy South Project (i.e., compressor station property that it acquires), fishing in other areas that are open and available for fishing immediately adjacent would not be impacted.

National Fuel and Transco continue to consult with state agencies regarding specific measurements required in state lands. In general, the Projects' impacts on recreational and special interest areas occurring in addition to long-term forest/woodland impacts would be temporary and limited to the period of active construction, which typically would last several days to several weeks in any one area. These impacts would be minimized by implementing National Fuel's ESCAMP and Transco's ECP.

Following construction, most open land uses would revert to their former uses. Forest/woodland affected by the temporary construction right-of-way and ATWS areas would experience long-term impacts because of the time required to restore the woody vegetation to its preconstruction condition. In addition, forest/woodland within the permanent rights-of-way would experience permanent impacts because a portion would be maintained in an herbaceous state, as described in section B.5.2.3.

B.5.6 Coastal Zone Management Act

Based on review of the Pennsylvania Coastal Zone Management program and coastal zone map, the FM100 and Leidy South Projects fall outside the geographical boundaries of the Pennsylvania Coastal Zones (PADEP, 2019f); therefore, neither of the Projects is subject to coastal consistency.

B.5.7 Hazardous Waste

National Fuel and Transco reviewed federal and state regulatory databases including the EPA's Regulated Facility database (EPA, 2019b), the EPA's Enviromapper for Envirofacts (EPA, 2019c), and data layers available through PADEP's Water Monitoring Report (PADEP, 2019g) to identify known and potential contamination near the FM100 Project and Leidy South Project. The results of the database search indicate that none of the proposed facilities for the Projects would be expected to encounter previously existing contaminated water or soil.

Based on our review of the environmental databases and alignment sheets, the Projects would not cross any potentially contaminated sites. National Fuel developed an Unanticipated Discovery of Contaminated Materials Plan and Transco developed an Unanticipated Discovery of Contamination Plan, both of which include measures that would be implemented in the event contaminated media is encountered during construction. We have reviewed these plans and find them acceptable.

B.5.8 Visual Resources

B.5.8.1 Pipeline Facilities

Visual resources along the Projects' pipeline routes are a function of geology, climate, and historical process, and include topographic relief, vegetation, water, wildlife, land use, and human uses and development. Visual impacts associated with the pipeline construction rights-of-way and ATWS would include the removal of existing vegetation and the exposure of bare soils, as well as earthwork and grading scars associated with heavy equipment tracks, trenching, blasting (if required), rock formation alteration or removal, and machinery and tool storage. Other visual effects could result from the removal of large individual trees that have intrinsic aesthetic value, the removal or alteration of vegetation that may currently provide a visual barrier, or landform changes that introduce contrasts in visual scale, spatial characteristics, form, line, color, or texture.

Visual impacts are typically greatest where pipeline routes parallel or cross roads and may be seen by passing motorists, and on residences where vegetation used for visual screening of existing utility rights-of-way or for ornamental value would be removed. The duration of visual impacts would depend on the type of vegetation that is cleared or altered. The impact of vegetation clearing would be shortest in areas consisting of short grasses and scrub-shrub vegetation and in agricultural crop and pasture lands, where the re-establishment of vegetation following construction would be relatively fast (generally less than 3 years). The impact would be greater in forest/woodland, which would take 30 to 50 years to regenerate mature trees. The greatest potential visual impact in forest/woodland would result from the removal of large specimen trees, which would take longer than other vegetation types to regenerate and would be prevented from re-establishing within the permanent right-of-way. The timing of restoration for vegetation is discussed in section B.4.2.3. Although stretches of forest/woodland are present along the proposed routes, a majority of the pipeline and pipeline replacements would be installed within or parallel to existing rights-of-way. These existing rights-of-way are maintained periodically to remain as non-forested land. As a result, along a majority of the Projects, visual resources have been previously affected by other activities.

Because the Projects would expand existing rights-of-way in most areas, the visual impact on motorists who observe road crossings would be minor. About 75 percent of the FM100 Project and 96 percent of the Leidy South Project would be within or adjacent to existing rights-of-way. Construction within or adjacent to existing rights-of-way reduces the severity of impacts on visual resources because it minimizes vegetation clearing for the construction work areas and permanent right-of-way and also minimizes new fragmentation of vegetation and habitat.

After construction, disturbed areas would be restored and returned to preconstruction conditions in compliance with federal, state, and local permits; landowner agreements; National Fuel's ESCAMP; Transco's ECP; and applicable right-of-way requirements, with the exception of aboveground facility sites that are discussed further below.

B.5.8.2 Aboveground Facilities

Aboveground facilities associated with the Projects could alter existing visual resources in two ways: (1) construction activity and equipment may temporarily alter the viewshed; and (2) aboveground facilities would represent permanent alterations to the viewshed. Construction of new aboveground facilities would result in temporary visual impacts including increased numbers of construction personnel, equipment, and materials, removal of vegetation cover, and disturbance of soil. Construction impacts would generally cease following the completion of construction and restoration.

Following construction, new aboveground facilities would be the most visible components of the Projects and would result in long-term to permanent impacts on visual resources. The extent of these visual impacts depends on factors such as quality of the viewshed, the degree of alteration of that view, the sensitivity or concern of potential viewers, the remoteness of the location, and the number of viewpoints from which the facility would be seen.

FM100 Project

National Fuel proposes to construct the Marvindale and Tamarack Compressor Stations, Marvindale Interconnect, and Carpenter Hollow OPP Station; and proposes to remove the Costello Compressor Station, Station WHP-MS-4317X, and associated facilities.

Marvindale Compressor Station

National Fuel's Marvindale Compressor Station would be surrounded by mature vegetation. The Marvindale Interconnect (discussed below) would be constructed to the southeast of the proposed Marvindale Compressor Station. Due to the presence of existing mature vegetation, we do not anticipate the compressor station would be visible from State Route 146, approximately 0.4 mile away. No sensitive receptors (e.g., users of roadways or residences) are present to the north, south, east, or west of the proposed site.

Tamarack Compressor Station

National Fuel's Tamarack Compressor Station site is also surrounded by mature vegetation and a utility right-of-way. The closest structure is a camp approximately 0.2 mile northeast, and there are residences approximately 0.25 mile or more north of the proposed Tamarack Compressor Station. Stewart Hill Road is approximately 0.25 mile to the west and north of the proposed site, and Hensel Fork Road is approximately 0.4 mile to the east. There are no sensitive receptors to the south of the Tamarack Compressor Station site. The compressor station would be screened from sensitive receptors to the north, south, east, and west by existing mature vegetation. However, the camp located to the northeast of the Tamarack Compressor Station would experience visual impacts given the proximity of the station and the limited amount of mature vegetation between the site and the camp. To mitigate this visual impact, National Fuel has committed to stockpiling, finish grading, and seeding spoil along the northeast fence line to a sufficient height so as to screen the primary view of the facility from the camp. This screening method is part of a landowner agreement and would minimize visual impacts.

Marvindale Interconnect

The Marvindale Interconnect would be visible to users of State Route 146 and several residences south of the facility. However, it would be adjacent to existing aboveground facilities and would be consistent with the other features in the viewshed and therefore impacts on visual resources would be minimal. No additional sensitive receptors are present to the east, west, or north of the facility.

Carpenter Hollow OPP Station

The Carpenter Hollow OPP Station would be visible to residences south of the facility. However, the Carpenter Hollow OPP Station would be adjacent to existing aboveground facilities and would be consistent with the other features in the viewshed and therefore impacts on visual resources would be minimal. No additional sensitive receptors are present east, west, or north of the facility.

Costello Compressor Station, WHP-MS-4317X

National Fuel's proposed removal of the Costello Compressor Station, Station WHP-MS-4317X, and associated facilities would change the visual resources in the area. Following abandonment and removal of these facilities, National Fuel would return the facilities to existing contour and condition, surface gravel would be removed, and the site would be regraded, seeded, and allowed to revert to an open, vegetated condition.

Carpenter Hollow OPP Station

National Fuel's Marvindale Interconnect and the Carpenter Hollow OPP Station would be adjacent to existing aboveground facilities and would be consistent with the other features in the viewshed.

Leidy South Project

Transco proposes to make modifications to Compressor Stations 605 and 610, install two new launchers/receivers and MLV sites, and construct Compressor Stations 607 and 620.

Compressor Station 605 and 610

Modifications to Transco's existing Compressor Stations 605 and 610 would occur on previously disturbed land owned wholly by Transco. The additional facilities would be consistent with the existing visual characteristics of the existing facilities in the viewshed and therefore impacts on visual resources would be minimal.

Launchers/Receivers and Mainline Valve Cites

Construction of the two new launchers/receivers and MLV sites would occur within existing Transco right-of-way and adjacent land. The modifications would be consistent with the existing facilities in the viewshed and therefore impacts on visual resources would be minimal.

Compressor Station 607

We received comments regarding visual impacts associated with construction and operation of Compressor Station 607. Operation of Compressor Station 607 would result in permanent visual impacts on the viewshed. However, as discussed below, Transco has committed to using vegetation screening and other mitigation measures such as designing the buildings to blend in with the existing landscape to minimize visual impacts on sensitive receptors.

Compressor Station 607 would be constructed on open land, forest/woodland, and wetland. The compressor station is surrounded by forest/woodland and open land to the north; residences to the west; and wooded areas to the east and south. Prior to construction of the compressor station, Transco would demolish the existing building on site to accommodate the facility. Construction of Compressor Station 607 would result in a permanent change in the viewshed and would add an industrial element to a currently rural setting. The compressor station would be enclosed by a 6-foot-tall security fence topped with an additional 1-foot three-strand barbed wire section and controlled access gates. There are dense mature trees and bushes between the compressor station and residences west of Bridge Out Road and Jackson Hill Road that would provide screening from the compressor station for most of the year. During the winter months leaf loss may make the compressor station visible to the residences; however, as

discussed below, Transco has committed to plant evergreens trees to create year-round screening from visual impacts.

Transco completed visual simulations to assess the permanent potential visual impacts on nearby residences from the proposed Compressor Station 607 (appendix K). Compressor Station 607 would be visible to users of Maransky Road, 600 feet northwest of the proposed compressor station and to users of Bridge Out Road, 750 feet west of the compressor station.

Transco has committed to planting evergreen trees approximately 4 to 9 feet in height adjacent to the compressor station, within the defined limits of disturbance to minimize permanent visual impacts to residences. The trees would be planted in a staggered arrangement to provide additional visual screening. Transco estimates that based on the anticipated growth rate of the trees planted, the tree heights would range from between 14 to 17 feet in approximately 10 years. Additionally, Compressor Station 607 would be green in color so the building and associated aboveground equipment would blend into the surrounding existing environment to mitigate visual impacts.

Nighttime lighting would be required at Compressor Station 607. Main gates, yards, and entry and exit doors to all buildings would be lit. Transco would limit outdoor lighting to the minimum amount they require for security purposes. Lighting would have directional control or would be positioned downward to minimize visibility and mitigate nighttime visual impacts to adjacent residences.

Compressor Station 620

We received comments regarding visual impacts associated with construction and operation of Compressor Station 620. Operation of Compressor Station 620 would result in permanent visual impacts on the viewshed. However, as discussed below, Transco has committed to using vegetation screening and other mitigation measures such as designing the buildings to blend in with existing landscape to minimize visual impacts on sensitive receptors.

Compressor Station 620 would be constructed on agricultural land surrounded by existing commercial agricultural buildings to the north, residences to the west, and wooded areas to the east and south. Construction of Compressor Station 620 would result in a permanent change in the viewshed and would add an industrial element to a currently rural/agricultural setting. Compressor Station 620 would be visible from Deep Creek Road and the agricultural buildings to the north, and from the residences on Bridge Road 600 to 800 feet west of the site (see appendix K). Transco would install green lattice fencing along the northwest and southwest fence line and around aboveground piping to provide screening and minimize visual impacts of the compressor station on residences and motorists.

In addition to the lattice fencing, Transco would install a 2-foot-tall berm along Bridge Road and would plant two rows of vegetation screening. Transco has committed to planting a variety of evergreen trees ranging in height from 4 to 9 feet. Transco estimates that based on the anticipated growth rate of the trees planted, the tree heights would range from between 14 to 17 feet in approximately 10 years.

Compressor Station 620 would also be visible from multiple locations on Valley Road, approximately 0.6 mile from the proposed site and from higher elevations in the surrounding valley. The compressor station would be green in color and would be designed to fit in with the existing commercial agricultural buildings adjacent to the site. Therefore, the compressor building and associated aboveground equipment would blend into the surrounding existing environment to mitigate visual impacts.

Nighttime lighting would be required at Compressor Station 620. Main gates, yards, and entry and exit doors to all buildings would be lit. Transco would limit outdoor lighting to the minimum amount they require for security purposes. Lighting would have directional control or would be positioned downward to minimize visibility and mitigate nighttime visual impacts on adjacent residences.

Visual simulations provided by Transco outline its proposed visual screening plans and additional mitigation measures to minimize visual impacts on nearby residences, and we believe the proposed mitigation measures would adequately minimize visual impacts, especially over time as trees grow. Should any additional measures be identified or proposed measures modified during the final design stages, Transco would be required to file such modifications with the Commission for our review and approval.

Through National Fuel's and Transco's implementation of proposed construction and mitigation measures at aboveground facilities as discussed above, we conclude that visual impacts would be minimized and would not be significant.

B.6 CULTURAL RESOURCES

Section 106 of the NHPA, as amended, requires FERC to take into account the effect of its undertakings on properties listed, or eligible for listing, on the National Register of Historic Places (NRHP), and to afford the Advisory Council on Historic Preservation an opportunity to comment. National Fuel and Transco, as non-federal parties, are assisting FERC in meeting our obligations under section 106 by providing data, analyses, and recommendations in accordance with 36 CFR 800.2(a)(3) and FERC's regulations at 18 CFR 380.12(f).

B.6.1 Survey Results

FM100 Project

National Fuel completed an archaeological resources survey for the FM100 Project and provided a *Phase I Archaeological Survey FM100 Project FERC Docket #PF17-10-000, Cameron, Clearfield, Clinton, Elk, McKean, and Potter Counties, Pennsylvania* (Lembo and Davenport, 2019) report to FERC and the SHPO. The investigations included a combination of pedestrian 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 deposits were completed at waterbody crossings. In a letter dated September 19, 2017, the SHPO recommended the FM100 Project, as proposed, would have no effect on historic, aboveground properties. Therefore, an architectural field survey was not required for the FM100 Project.

The Phase I archaeological survey covered 1,295.9 acres, including a typically 300-foot-wide corridor for Line YM58; a typically 150-foot-wide corridor for the Line YM224 Loop; associated workspaces, staging/laydown areas, and access roads; the Carpenter Hollow OPP Station; the Marvindale Compressor Station and Interconnect; and the Tamarack Compressor Station. The SHPO indicated no survey was required for the existing facilities to be abandoned. The archaeological survey was augmented with 4,426 shovel test units. As a result of this survey, six newly identified and one previously identified archaeological resources were within the YM58 survey area. No archaeological resources were identified for the YM224 Loop, Carpenter Hollow OPP Station, Marvindale Compressor Station and Interconnect, or the Tamarack Compressor Station. Archaeological sites 36MC0313, 36MC0314, 36MC0317, and 36PO0051 were all prehistoric lithic scatters recommended ineligible for the NRHP. Sites 36MC0315, 36MC0316, and 36PO0007 (the previously recorded site) were all the remnants

of prehistoric camp sites and recommended eligible for the NRHP. Avoidance of these three sites was recommended.

In a letter dated June 27, 2019, the SHPO concurred with the recommendation that sites 36MC0313, 36MC0314, 36MC0317, and 36PO0051 were not eligible for the NRHP and that no additional archaeological survey was necessary for the FM100 Project. Furthermore, the SHPO concurred that sites 36MC0315, 36MC0316, and 36PO0007 should be avoided and requested an avoidance plan be submitted prior to construction. National Fuel submitted the avoidance plan on September 25, 2019. The SHPO concurred with the plan in a letter dated October 8, 2019. We agree with the SHPO.

The 0.4-mile-long Line KL Extension was added after archaeological survey completion for all other FM100 Project components. National Fuel conducted additional archaeological survey for the Line KL Extension workspace on July 31, 2019 and provided a Negative Survey Form to FERC and the SHPO. The field survey covered 1.8 acres and included 20 shovel tests. No archaeological sites were identified during this survey and no additional survey was recommended. In a September 20, 2019 letter, the SHPO concurred that no further archaeological work was necessary for the Line KL Extension. We concur also.

Leidy South Project

Transco completed a cultural resources survey for the Leidy South Project and provided the survey results in two reports: *Phase I Cultural Resources Survey, Leidy South Project: Compressor Station 607-A* (Bergman et al., 2019a), and *Phase I Cultural Resources Survey for Leidy South Project* (Bergman et al., 2019b). These reports were provided to FERC and the SHPO. The investigations included a combination of pedestrian 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 deposits and a Phase I reconnaissance-level historic resources survey were both completed for the Leidy South Project in spring 2019.

The survey of Compressor Station 607 included both archaeological and architectural resources and covered a total of 53.8 acres. The archaeological survey was augmented with 125 shovel test units. One archaeological site (36LU0346) was identified. The multi-component site was composed of a single prehistoric artifact and a 73-count historic scatter of domestic and architectural debris. Transco recommended that site 36LU0346 was not eligible for the NRHP and no further archaeological work was recommended. In a July 9, 2019 letter, the SHPO concurred that site 36LU0346 was not eligible for the NRHP and no further archaeological investigation was necessary for the Leidy South Project. We concur also.

The Phase I architectural field investigation for Compressor Station 607 identified the presence of two previously-inventoried aboveground properties. The Shaw Farmstead, circa 1870, was present within the compressor station footprint but was determined not eligible for the NRHP by the SHPO in 2016. The Harrison Property lies outside the compressor station footprint but within the area of indirect effects. This property was recommended not eligible for the NRHP. Transco has not yet provided the SHPO's comments on the architectural aspects of the survey report for Compressor Station 607.

The survey of all remaining Leidy South Project components included both archaeological and architectural resources and covered a total of 1,194.9 acres. The survey included a typical 300-foot-wide corridor for the pipelines, temporary-use access roads, staging areas, contractor/pipe yards, and all compressor station workspaces besides Compressor Station 607. The archaeological survey was augmented with 2,237 shovel test units. As a result of this survey, five historic-era archaeological

resources were identified: three resources in the Hilltop Loop corridor and work area, one within the Hensel Replacement work area, and one within the footprint of Compressor Station 620. The three resources identified for the Hilltop Loop include two historic artifact scatter sites (36CN0208 and 36CN0228) and one historic isolated find (H-LEP-01). The one resource identified for the Hensel Replacement was a historic artifact scatter non-site/isolated find (H-KSJ-01). The site (36SC0092) identified in the Compressor Station 620 footprint consists of a historic artifact deposit and foundation remnants previously recorded and reidentified during the current investigation. All five resources were recommended not eligible for the NRHP and no further archaeological work was recommended. The SHPO concurred with the NRHP recommendations and that no additional archaeological surveys were necessary for the Leidy South Project in a letter dated August 13, 2019. We concur also.

The study area for the Phase I architectural history survey included parcels crossed by, or adjacent to, workspaces associated with the three proposed pipeline alignments, as well as a 0.25-mile buffer around Compressor Station 620 and existing Compressor Stations 605 and 610. The survey resulted in 30 newly identified historic resources, including 25 farmsteads and/or residential dwellings, 1 20th-century church, 1 cemetery, 1 springhouse, and 2 commercial properties. Twenty-nine of these were recommended not eligible for the NRHP and one (the cemetery) was unevaluated. The cemetery would be avoided. In a letter dated October 1, 2019, the SHPO requested additional information (including full Historic Resource Survey Forms, and "Photo Sims") for six properties in proximity to Compressor Station 620. Transco has not yet provided the additional information requested by the SHPO.

Wetland Mitigation Site

Transco provided a "Negative Survey Form" for the wetland mitigation site. No cultural resources were identified. In a letter dated January 6, 2017, the SHPO agreed with the recommendations in the form and indicated no further archaeological work was necessary. We agree also.

B.6.2 Unanticipated Discoveries Plan

FM100 Project

National Fuel developed an Unanticipated Discovery Plan[16] to address the protocols to be implemented in the event cultural resources or human remains are encountered during construction, and submitted it to FERC and the SHPO. The plan provides procedures to notify the appropriate parties, including Native American tribes, in the event of a discovery. We have reviewed the plan and found it acceptable.

Leidy South Project

Transco developed an Unanticipated Discovery Plan for Paleontological Resources included in its ECP to address the protocols to be implemented in the event cultural resources or human remains are encountered during construction, and submitted it to FERC and the SHPO. The plan provides procedures to notify the appropriate parties, including Native American tribes, in the event of a discovery. The SHPO found the plan to be acceptable in correspondence dated November 19, 2018. We requested minor revisions to the plan. Transco provided a revised plan which we found acceptable.

[16] Available on eLibrary at http://www.ferc.gov under accession no. 20191018-5167.

B.6.3 Native American Consultations

FM100 Project

National Fuel contacted 15 federally recognized Native American tribes regarding the FM100 Project on August 23, 2017, providing a project description and mapping. The letters requested communication regarding concerns tribes may have with respect to places of traditional or cultural significance. Follow-up calls were made October 13, 17, 19, 20, 23, and 26, 2017. The tribes contacted included the Absentee-Shawnee Tribe of Oklahoma; Cayuga Nation; Delaware Tribe; Shawnee Tribe; Tuscarora Nation; Delaware Nation; Eastern Shawnee Tribe of Oklahoma; Oneida Indian Nation; Oneida Nation of Wisconsin; Onondaga Nation; Seneca Nation of Indians; Seneca-Cayuga Tribe of Oklahoma; St. Regis Mohawk Tribe; Stockbridge-Munsee Band of the Mohican Nation of Wisconsin; and Tonawanda Seneca Nation.

The Absentee Shawnee Tribe of Oklahoma responded to National Fuel stating that the tribe was unaware of properties of significance within the FM100 Project area, but requested it be contacted in the event of unanticipated discoveries. The Delaware Nation concurred with the proposed FM100 Project and requested it be given the opportunity to review and comment on any unanticipated discoveries. The Eastern Shawnee Tribe of Oklahoma stated that no sites would be impacted by the FM100 Project, but requested to be consulted in the event of an unanticipated discovery. The Oneida Indian Nation indicated that it had no concerns regarding the FM100 Project. The Seneca Nation acknowledged that no archaeological sites significant to the tribe would be impacted by the FM100 Project, and also asked to be contacted in the event of an unanticipated discovery uncovered during construction. The Stockbridge-Munsee Mohican Nation of Wisconsin requested to be a consulting party on the FM100 Project with authority to review and comment on cultural resource survey methodologies and survey findings. The Stockbridge-Munsee Mohican Nation further stated that it should be contacted immediately in the event of inadvertent discovery of human remains. The Tuscarora Nation responded that its office need not be contacted further regarding the FM100 Project unless the project area changed to include property outside of Cameron, Clearfield, Elk, McKean, or Potter Counties. National Fuel provided the survey report and avoidance plan to the Absentee-Shawnee Tribe of Oklahoma, Delaware Nation, Eastern Shawnee Tribe of Oklahoma, Seneca Nation of Indians, and Stockbridge-Munsee Band of the Mohican Nation of Wisconsin. The Delaware Nation commented on the avoidance plan and indicated the FM100 Project should proceed as planned with use of an archaeological monitor. The FM100 Project would be monitored by EIs during construction. No other responses have been received.

We sent our NOI to these same tribes. No comments from the tribes have been received in response to our NOI.

Leidy South Project

Transco contacted 15 federally recognized Native American tribes regarding the Leidy South Project on December 3, 2018, providing a project description and mapping. The letters requested any information or concerns regarding places of traditional or cultural significance. Follow-up phone calls were made March 11-15, 2019, June 14, 2019, and August 21, 2019, to confirm delivery of initial consultation letters and to identify any tribal concerns with the proposed Leidy South Project. The tribes contacted included the Cayuga Nation; Delaware Nation; Delaware Tribe of Indians; Eastern Shawnee Tribe of Oklahoma; Oneida Indian Nation; Oneida Nation Wisconsin; Onondaga Indian Nation; Onondaga Nation; Seneca Nation of Indians; Seneca-Cayuga Tribe of Oklahoma; Shawnee Tribe; St. Regis Mohawk Tribe; Stockbridge-Munsee Community Band of Mohican Indians; Tonawanda Seneca Nation; and Tuscarora Nation.

The Delaware Nation acknowledged that the Leidy South Project would not impact properties significant to the tribe, but requested its office be contacted within 24 hours of an unanticipated discovery. The Delaware Tribe of Indians stated that the tribe has no concerns with the Leidy South Project. The Oneida Indian Nation responded with no concerns regarding the Leidy South Project. The St. Regis Mohawk Tribe responded that the Leidy South Project was beyond the areas of concern for its traditional homelands. The Stockbridge-Munsee Community Band of Mohican Indians did not have any comments or concerns as the Leidy South Project was outside the tribe's area of interest. The Tuscarora Nation voiced no concerns with the Leidy South Project, but requested its office be contacted in the event of unanticipated discoveries during construction. The Cayuga Nation acknowledged that it had no comments or concerns regarding the Leidy South Project. No other responses have been received.

We sent our NOI to these same tribes. No comments from the tribes have been received in response to our NOI.

B.6.4 Compliance with the National Historic Preservation Act

National Fuel has completed necessary surveys, provided survey reports, and consulted with the SHPO and other appropriate parties regarding the potential for the FM100 Project to affect historic properties. FERC and the SHPO agree that the FM100 Project would have no effect on historic properties. Therefore, the process of complying with section 106 of the NHPA is complete for the FM100 Project.

Transco has completed necessary surveys, provided survey reports, and consulted with the SHPO and other appropriate parties regarding the potential for the Leidy South Project to affect historic properties; however, Transco has not yet provided the additional information requested by the SHPO in its October 1, 2019 letter, the SHPO's comments on the additional information, or the SHPO's comments on the architectural aspects of the survey report for Compressor Station 607. Therefore, to ensure that FERC's responsibilities under the NHPA and its implementation are met, **we recommend that:**

- **Transco should <u>not begin</u> construction of the Leidy South Project facilities and/or use of staging, storage, or temporary work areas and new or to-be-improved access roads <u>until</u>:**
    - **Transco files with the Secretary:**
        - **the SHPO's comments on the architectural aspects of the survey report for Compressor Station 607;**
        - **the additional information requested by the SHPO in its October 1, 2019 letter, and the SHPO's comments on the additional information; and**
        - **any additional required report(s) or plan(s), and the SHPO's comments on the report(s) or plan(s).**
    - **the Advisory Council on Historic Preservation is afforded an opportunity to comment if historic properties would be adversely affected; and**
    - **FERC staff reviews and the Director of OEP approves the cultural resources report(s) and plan(s), and notifies Transco in writing that treatment**

plans/mitigation measures (including archaeological data recovery) may be implemented and/or construction may proceed.

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

B.7 SOCIOECONOMICS

Construction of the Projects would have temporary and localized impacts on the socioeconomic conditions in the area of the Projects due to the limited construction period and distribution of workforce. The FM100 Project would require about 1 year to construct new facilities and about 5 months to conduct abandonment activities, and the Leidy South Project would require a maximum of 16 months to complete all construction and modification activities.

B.7.1 Population and Employment

Table B.7.1-1 provides a summary of selected demographic and socioeconomic conditions by county for the Projects. Construction of the Projects would temporarily increase the population in the area of the Projects. National Fuel estimates it would need an average of 240 workers (peak of 345 workers) for construction of the FM100 Project facilities. Construction of the pipeline facilities would require an average of between 90 to 105 workers (peak of 125 to 140 workers) for 1 to 3 months for Line YM58 and Line KL Extension, and an average of 30 workers (peak of 40 workers) for 1 month for construction of Line YM58. Construction of the aboveground facilities would require an average of 25 workers (peak of 35 workers) for 4 months for construction of the Carpenter Hollow Station, and an average of 40 workers each (peak of 65 workers each) for 1 year for construction of the Marvindale and Tamarack Compressor Stations. National Fuel estimates it would need an average of 10 workers (peak of 15 workers) for 2 weeks to 1 month for activities associated with the abandonment of Line FM100 and the Costello Compressor Station.

National Fuel estimates 85 percent of its construction workforce would temporarily relocate to the FM100 Project area; therefore, it is anticipated that an average of 204 non-local workers (peak of 293 non-local workers) would relocate to the FM100 Project area for the duration of construction activities, and an estimated 9 non-local workers (peak of 12 non-local workers) would relocate to the FM100 Project area for the duration of abandonment activities. National Fuel anticipates permanent hires for operation of the Marvindale and Tamarack Compressor Stations would be minimal because the stations are fully automated.

Transco anticipates an average workforce of 545 workers (peak of 714 workers) for construction of the Leidy South Project facilities. Construction of the pipeline facilities would take approximately 6 to 7 months and would require an average of 142 workers (peak of 171 workers) for the Hensel Replacement, including activities associated with the Leidy Line A abandonment; an average of 86 workers (peak of 104 workers) for the Hilltop Loop; and an average of 115 workers (peak of 138 workers) for the Benton Loop. Modification of Compressor Station 605 would take approximately 6 months and would require an average of 6 workers (peak of 10 workers). Construction of the other aboveground facilities would take approximately 1 year and would require an average of 82 workers (peak of 122 workers) for Compressor Station 607; an average of 62 workers (peak of 92 workers) for Compressor Station 610; and an average of 52 workers (peak of 77 workers) for Compressor Station 620.

Transco estimates 60 percent of its construction workforce would temporarily relocate to the Leidy South Project area; therefore, it is anticipated that an average of 327 non-local workers (peak of

428 non-local workers) would relocate to the Leidy South Project area for the duration of construction activities. Transco would hire five new fulltime employees to operate Compressor Stations 607 and 620, while Compressor Stations 607 and 610 would be staffed by current Transco employees.

TABLE B.7.1-1

Existing Socioeconomic Conditions in the FM100 Project and Leidy South Project Areas

State/County	Population [a]	Per Capita Income (dollars) [b]	Civilian Labor Force [b]	Unemployment (%) [b]	Top Three Employment Sectors [b, c]
Pennsylvania	12,807,060	$31,476	6,518,993	6.5	E,M,R
FM100 PROJECT					
Cameron	4,492	$24,933	2,218	4.1	M,E,R
Clearfield	79,388	$22,568	36,581	8.2	E,R,M
Clinton	38,684	$22,794	18,672	5.9	E,M,R
Elk	30,169	$27,163	15,926	4.8	M,E,R
McKean	40,968	$24,868	19,791	7.5	E,M,R
Potter	16,622	$23,213	7,233	6.7	E,M,R
LEIDY SOUTH PROJECT					
Clinton	38,684	$22,794	18,672	5.9	E,M,R
Columbia	65,456	$24,908	31,648	5.1	E,M,R
Luzerne	317,646	$26,809	159,612	7.0	E,R,M
Lycoming	113,664	$26,265	57,437	6.2	E,M,R
Schuylkill	142,067	$25,224	67,581	6.9	E,M,R
Wyoming	27,046	$28,046	13,953	6.5	E,R,M

[a] U.S. Census Bureau, 2018a.

[b] U.S. Census Bureau, 2018b.

[c] Industries are defined under the 2012 North American Industry Classification System and abbreviated as follows: E = Educational, Health and Social Services; M = Manufacturing; P = Professional, Scientific, Management, Administrative, and Waste Management Services; Pu = Public Administration; and R = Retail Trade.

Impacts on the local population would primarily result from the short-term influx of temporary workers during construction of the Projects, and temporary increases in population levels would occur as a result of this influx. Due to the limited duration of construction, we do not anticipate that non-local workers would bring family members with them to the general area of the Projects. Impacts on local populations in the area of the Projects are expected to be temporary and minor given that the influx of non-local workers would represent a negligible increase in the population of the area of the Projects. Additionally, the temporary increase in population would be distributed throughout the area of the Projects and would have no permanent impact on the population.

A brief decrease in the unemployment rates in the area of the Projects could occur as a result of hiring local workers for construction. The influx of non-local construction workers may also generate increased work opportunities in local services industries. Due to the anticipated small size of the construction workforce in the area of the Projects compared to the existing population and workforce, impacts on population and employment during construction of the Projects is expected to be short-term and minor. Due to the small number of permanent employees hired for operation of the Projects' facilities, permanent or long-term impacts on employment are expected to be negligible.

B.7.2 Economy and Tax Revenue

Table B.7.1-1 provides a summary of economic and employment conditions in the area of the Projects. The estimated per capita income in the FM100 Project area ranges from $22,568 in Clearfield County to $27,163 in Elk County, and in the Leidy South Project area from $22,794 in Clinton County to $28,046 in Wyoming County. The counties in the area of the Projects have per capita incomes below the estimated per capita income for Pennsylvania at $31,476. The unemployment rates in the FM100 Project area range from 4.1 percent in Cameron County to 8.2 percent in Clearfield County, and in the Leidy South Project area from 5.1 percent in Columbia County to 7.0 percent in Luzerne County. The unemployment rate for the state of Pennsylvania is 6.5 percent. The top three industries in the counties crossed by the Projects are education, health, and social services, followed by manufacturing and retail trade.

National Fuel estimates that payroll spending would be approximately $119.7 million during construction, of which about $4.9 million would go to the local construction workforce. National Fuel estimates that during construction, $3.3 million would be spent locally on the purchase of material goods and services of a total of $79.3 million in expenditures on goods and services during construction.

Transco estimates that payroll spending would be approximately $108.5 million during construction, of which about $43.4 million would go to the local construction workforce. Transco estimates that during construction, $47.3 million would be spent locally on the purchase of material goods and services.

The increase in economic activity resulting from spending during construction would result in a temporary, positive economic impact in the area of the Projects.

National Fuel stated that operation of the FM100 Project would add a small number of permanent jobs (no specific number was identified), and Transco stated the operation of the Leidy South Project would add five permanent jobs. These jobs would add more employment opportunities and would result in indirect economic benefits to the local area as the workers spend their salaries. Due to the small number of permanent employees hired for operation of the Projects' facilities, permanent impacts on the local economy and employment are expected to be negligible.

Construction and operation of the Projects would result in increased tax revenues to the State of Pennsylvania, counties crossed by the Projects, and other local taxing authorities. Construction activities would result in additional state and local tax revenues related to retail sales and payroll. Non-local construction workers would spend money locally on housing, transportation, food, and entertainment. Once in operation, National Fuel estimates that annual property tax revenue for Leidy Township and McKean County would be $1,893 and $9,014, respectively. Transco estimates the Leidy South Project would generate approximately $1.3 million in state tax revenue.

Construction activities would increase revenue for state and local tax bases in the counties crossed by the Projects. Expenditures on goods and services by construction would also generate additional tax revenues, which would have a minor, temporary, and positive impact on local and state economies. Due to the nominal number of new permanent staff required for operation of the Projects, long-term beneficial impacts on state and local taxes are not anticipated.

B.7.3 Housing

Housing statistics for the Projects are provided in table B.7.3-1.

TABLE B.7.3-1

Available Housing in the FM100 Project and Leidy South Project Areas

State/County	Total Housing Units [a]	Owner Occupied [a]	Renter Occupied [a]	Rental Vacancy Rate (%) [a]	Vacant Housing Units for Rent [a]	Hotels and Motels [b]	Campgrounds /RV Parks [c]
Pennsylvania	5,653,599	3,456,360	1,551,082	5.9	97,964	--	--
FM100 PROJECT							
Cameron	4,431	1,583	613	8.4	60	4	3
Clearfield	39,057	23,969	7,183	6.5	505	19	9
Clinton	19,198	10,378	4,297	7.2	346	24	3
Elk	17,706	10,598	2,849	6.5	202	8	4
McKean	21,243	12,696	4,503	4.8	229	6	10
Potter	12,981	5,045	1,491	6.3	103	6	6
LEIDY SOUTH PROJECT							
Clinton	19,198	10,378	4,297	7.2	346	24	3
Columbia	29,970	18,336	8,228	5.1	450	18	6
Luzerne	149,737	87,714	40,533	5.5	2,376	23	6
Lycoming	53,193	32,145	13,846	8.8	1,354	18	4
Schuylkill	69,737	43,942	14,816	5.2	828	7	6
Wyoming	13,469	8,415	2,386	2.6	64	7	6

[a] U.S. Census Bureau, 2018b.

[b] Allegheny National Forest Visitors Bureau, 2019a; Pennsylvania Great Outdoors Visitors Bureau, 2019a; 2019b; Clinton County Economic Partnership, 2019; Columbia-Montour Visitors Bureau, 2019; Visit Luzerne County, 2019a; Lycoming County Visitors Bureau, 2019; Schuylkill Visitors Bureau, 2019; Endless Mountains, 2019a; Visit Potter-Tioga Pennsylvania, 2019a.

[c] Allegheny National Forest Visitors Bureau, 2019b; Pennsylvania Great Outdoors Visitors Bureau, 2019a; 2019b; Clinton County Economic Partnership, 2019; Visit Luzerne County, 2019b; Lycoming County Visitors Bureau, 2019; Schuylkill Visitors Bureau, 2019; Endless Mountains, 2019b; Visit Potter-Tioga Pennsylvania, 2019b.

Note: Inventory of hotels, motels, campgrounds, and RV parks was collected at county-level only.

Vacancy rates in the vicinity of the FM100 Project are lowest in McKean County (4.8 percent) and highest in Cameron County (8.4 percent) but are predominately higher than the state average of 5.9 percent. A total of 67 hotels and motels, 35 campgrounds and RV parks, and 1,445 vacant housing units are available in the FM100 Project area. National Fuel estimates construction activities would require an average of 240 workers and a maximum of 345 workers at any one time over the course of a 1- to 12-month period, and that approximately 85 percent of the total workforce would temporarily relocate to the FM100 Project area. Based on the availability of local rental properties, hotels/motels, campgrounds, and RV parks, the increased demand for short-term housing from non-local construction workers during construction would be temporary and minor. Only a minimal permanent workforce is required for operation of National Fuel's automated compressor station facilities; therefore, long-term effects on housing are also not anticipated.

Vacancy rates in the Leidy South Project area range from 2.6 percent in Wyoming County to 8.8 percent in Lycoming County, and are generally in line with the state average of 5.9 percent. A total of 97 hotels and motels, 31 campgrounds and RV parks, and 5,418 vacant housing units are available in the Leidy South Project vicinity. Transco anticipates an average of 91 workers with a peak of 275 workers in any one county during a 0.5- to 16-month construction period, and that about 60 percent of the total workforce would temporarily relocate to the area. Based on the availability of local rental properties,

hotels/motels, campgrounds, and RV parks, the increased demand for short-term housing from non-local construction workers during construction would be temporary and minor. Five new permanent staff are required for operation of Transco's compressor station facilities; therefore, long-term effects on housing would be negligible.

The influx of non-local workers needed for construction would cause a minor and temporary increase in demand for short-term rental housing, hotels, motels, RV parks, and campgrounds in the vicinity of the Projects. This could result in short-term positive impacts on area rental industries in the form of higher occupancy rates and increased revenue. Although non-local workers could create additional competition (and cost) for temporary housing while decreasing housing availability for local renters or residents, the demand is not expected to exceed the available number of hotels, motels, and campground units in the area of the Projects; therefore, we do not anticipate any significant impacts on housing.

B.7.4 Public Services

A range of public services and facilities are available in the general area of the Projects. Services and facilities include hospitals, full-service law enforcement, paid and volunteer fire departments, and public schools. Table B.7.4-1 provides an overview of select public services available for the counties crossed by the Projects.

TABLE B.7.4-1

Public Services in the FM100 Project and Leidy South Project Areas [a]

County	Hospitals	Nearest Distance to Project (miles)	Fire and Rescue Units	Nearest Distance to Project (miles)	Law Enforcement Agencies [b]	Nearest Distance to Project (miles)
FM100 PROJECT						
Cameron	1	6.1	4	6.7	2	8.0
Clearfield	3	12.3	37	13.2	6	10.7
Clinton	2	11.0	24	10.0	5	10.0
Elk	3	15.5	16	15.2	5	14.9
McKean	3	14	19	9.3	8	9.2
Potter	2	9.5	9	9.0	7	9.2
LEIDY SOUTH PROJECT						
Clinton	1	19.6	17	1.6	7	4.1
Columbia	2	6.5	23	2.5	9	2.4
Luzerne	3	18.6	82	0.9	48	10.4
Lycoming	3	18.6	30	2.5	13	6.8
Schuylkill	3	14.6	73	4.3	46	4.3
Wyoming	1	7.3	9	0.4	7	4.3

[a] Pennsylvania Department of Health, 2017; FireDepartment.net, 2018; Pennsylvania Department of Education, 2018; Clinton County, 2014; Columbia County Sheriff, 2019; Columbia County, 1993; Luzerne County, n.d.; Schuylkill County Emergency Management Association, 2017; Wyoming County, 2012; Lycoming County, n.d.

[b] Includes county sheriff's office.

The non-local workforce would be relatively small compared to the current populations in areas affected by the Projects; therefore, no major impacts on the availability of public services are anticipated.

As indicated in table B.7.4-1, there are multiple local fire departments, police departments, and medical facilities near each segment of the Projects that could handle emergencies should they arise. Due to the relatively small number of workers required for the Projects and the unlikelihood that they may bring families with children to the area for a short construction period, we do not anticipate an impact on local schools. National Fuel and Transco each estimate the non-local workforce relocating for construction would represent a less than 1 percent increase in the overall population. In addition, any temporary increase in population would be distributed throughout the general area of the Projects and would not have a permanent impact on public services in any one location.

Temporary increased demand on local public services may occur including the need for local police to direct traffic during construction and for local emergency services to respond to emergencies associated with Project construction. Fire departments may have to respond to Project-related fires or other emergencies, and medical services may be necessary for workforce personnel illnesses or injuries. National Fuel and Transco would work with local law enforcement, fire departments, and emergency medical services prior to construction to coordinate for effective emergency response.

We received comments expressing concern about the ability for emergency public services to respond in the event of an accident or emergency. As discussed in section B.10, National Fuel and Transco would communicate regularly with emergency response personnel regarding safety and emergency response plans.

B.7.5 Traffic and Transportation

The local road and highway systems in the general area of the Projects consist of interstate highways, U.S. highways, state highways, secondary state highways, county roads, and private roads.

TABLE B.7.5-1

Primary Transportation Routes for the FM100 Project and the Leidy South Project

Project Component	Primary Routes
FM100 PROJECT	US 6, US 219, State Route 46, State Route 146
Line YM58	State Route 155, State Route 2001, State Route 4001, State Route 4003, State Route 4005, State Route 4006
Line YM224 Loop	State Route 4008
Line KL Extension	State Route 146
Tamarack Compressor Station	State Route 144
	US 6
Marvindale Compressor Station	State Route 146
LEIDY SOUTH PROJECT	I-80, State Route 120, State Route 144
Hensel Replacement and Hilltop Loop	US 220, Summerson Mountain Road, Hensel Fork Road, Stewart Hill Road
Benton Loop	I-180, State Route 118, State Route 239, US 220, Bradley Road, Keller Hollow Road, N. Woods Road, Boudman Road, N. Peterman Road
Compressor Station 605	I-81, US 11
Compressor Station 607	State Route 118, State Route 309, State Route 415
Compressor Station 610	I-80, State Route 42, State Route 487
Compressor Station 605	I-81, State Route 25

We received comments regarding impacts on existing roads and on traffic from construction of the Leidy South Project. Construction of the Projects could result in minor, short-term impacts along some roads and highways due to the movement and delivery of equipment, materials, and workers.

Daily commuting of the construction workforce to the general area of the Projects could temporarily affect traffic. National Fuel and Transco anticipate construction crews would work 6 days a

week. National Fuel anticipates workers would carpool to work sites to keep workforce traffic to a minimum, while Transco anticipates providing shuttle busses where practicable and would encourage carpooling where not.

Transco estimates a peak total of 519 daily vehicle trips would occur across the Leidy South Project area. In order to minimize the amount of traffic on local roads, Transco would use multilane highways for the transportation of heavy equipment and large vehicles. Additionally, Transco would transport equipment and materials along the right-of-way in order to minimize traffic on public roads in the Leidy South Project area.

To maintain safe conditions, National Fuel and Transco would use flagmen and signs, and minimize the amount of heavy traffic during peak travel times. Additionally, National Fuel and Transco would acquire necessary permits for construction-related impacts to roadways and would repair all roads to preconstruction conditions or better after construction and abandonment activities have been completed.

Workers commuting to and from the Project worksites every day would result in a short-term, temporary increase in traffic during construction. In addition to the construction workforce, the delivery of construction equipment and materials to the Projects could temporarily congest existing transportation networks. Traffic associated with the delivery of materials and equipment to the Projects' sites would result in short-term, temporary increases in traffic and traffic congestion on the roads near the Projects' facilities for the duration of construction.

Construction activities would result in temporary and minor effects on local transportation infrastructure and vehicle traffic, including disruptions from increased transportation of construction equipment, materials, and workforce; disruptions from construction of pipeline facilities at or across existing roads; and damage to local roads caused by heavy machinery and materials. To minimize and mitigate potential impacts on vehicle traffic and emergency services, National Fuel has developed a Residential Access and Traffic Management Plan,[17] and Transco has developed a Traffic Management Plan. Commute times for workers traveling to and from the site would generally occur outside of peak traffic hours to minimize increases in traffic congestion. Since operation of the Projects would not require many new personnel, long-term impacts on transportation infrastructure and traffic are not expected.

B.7.6 Property Values and Nearby Structures

We received several comments regarding potential impacts on property values. While there is recently published literature indicating that there is no identifiable or consistent link between the presence of natural gas pipeline easements or compressor stations and residential property values (Diskin et al., 2011), valuation is subjective and is generally not considered in appraisals. Potential impacts on the land values depend on multiple factors, including the size of the disturbance area, the values of affected and adjacent properties, presence of other industrial facilities or pipelines, and the extent of development or other aspects of current land use. The effect of a pipeline right-of-way on property value is typically a damage-related issue that would be negotiated during the right-of-way acquisition process, which is designed to provide fair compensation to the landowner for the right to use the property for pipeline construction and operation. Appraisal methods used to value land are usually based on objective characteristics of the property and any improvements, whereas subjective valuation is generally not considered in appraisals. A potential purchaser may decide to purchase land based on his or her planned land use. For example, an industry might prefer having a pipeline onsite for a potential energy source, or

[17] Available on eLibrary at http://www.ferc.gov under accession no. 20190718-5087.

a farmer looking for grazing or tillable land may or may not find it objectionable. If the presence of a pipeline renders a planned use infeasible, it is possible that a potential purchaser would decide not to purchase the property; however, each potential purchaser has different criteria and differing capabilities to purchase land. Property taxes are commonly based on the actual use of the land and, while construction of the pipeline would not change the general use of the land, it would preclude construction of aboveground structures over the permanent right-of-way.

A 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 and 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 and Seale, Inc., 2014). The report compared units in a subdivision in Luzerne County that had an existing natural gas transmission line 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.

For our analysis of the Constitution Pipeline and Wright Interconnect Projects (Docket Nos. CP13-499-000 and CP13-502-000), in Pennsylvania and New York, several appraisers were contacted about the potential impacts on property values due to the presence of a natural gas pipeline (FERC, 2014). One appraiser, who teaches seminars for appraisers and realtors that include discussions of mineral rights and pipeline easements, provided information on the subject. According to the appraiser, "the empirical evidence indicates no difference in value attributable to the existence of the pipeline easement." The appraiser further noted that he was not aware of appraisers adjusting the appraiser reports for the existence of a pipeline easement. He stated that the large number of variables that impact home values make it difficult to determine the incremental effect that any one variable may have on a home's value. Regardless, it is possible that the perceived safety issues or the limitations on land use within the permanent easement could reduce the number of potential buyers for a property, which may extend the number of days a property is on the market.

In 2016, the Interstate Natural Gas Association of America released a study conducted by Integra Reality Resources (IRR) that analyzed the impacts on property values from several FERC-jurisdictional natural gas transmission lines sited throughout the country. Case studies were analyzed from Ohio, Virginia, New Jersey, Pennsylvania, and Mississippi. The investigation focused on single-family homes and townhomes, and looked at sales prices over several years. In all case studies, sale prices were adjusted for square footage, and a linear regression model was run to determine correlations between home prices and proximity to pipeline easements. IRR found there were no statistically significant differences between prices paid within a same subdivision for houses adjacent to a pipeline easement and houses farther away (IRR, 2016).

We also examined the impact the presence of a natural gas compressor station had on residential property values. Staff identified a recent study that assessed the effects of natural gas pipeline compressor stations on property values prepared for National Fuel. The study assesses the impacts on property values in neighborhoods surrounding compressor stations in seven locations in New York state. Sales data over the previous 15 years were evaluated, and assessors from six of the seven areas were interviewed. The study found no quantifiable evidence of a discernable effect on property values or appreciation rates of properties within 0.5 mile of compressor stations. The study, which notes the general lack of sales data for analysis, identified the following commonalities among the seven areas: the

compressor stations were sited on large land parcels and set back from the road, natural and constructed buffers were utilized, and compressor station sites were generally in rural areas removed from higher density development (Griebner, 2015).

Based on the research we have reviewed, we find no conclusive evidence indicating that natural gas pipeline easements or compressor stations would have a significant negative impact on property values, although this is not to say that any one property may or may not experience an impact on property value for either the short or long term. Impacts on residential land are discussed in detail in section B.5.2.7.

B.7.7 Environmental Justice

For projects with major aboveground facilities, FERC regulations (18 CFR 380.12[g][1]) direct us to consider the impacts on human health or the environment of the local populations, including impacts that would be disproportionately high and adverse for minority and low-income populations. Additionally, during project scoping, we received comments from the EPA recommending that we identify and evaluate impacts on low-income and/or minority populations.[18]

Below, we address the potential for disproportionately high and adverse health or environmental effects of the Projects on minority and low-income populations. Based on published EPA guidance concerning environmental justice reviews (2016), we used a three-step approach to conduct our review of the Projects. These steps are to:

1) determine the existence of minority and low-income populations;

2) determine if resource impacts are high and adverse; and

3) determine if the impacts fall disproportionately on environmental justice populations.

Minority populations are defined where either (a) the minority population of the affected area exceeds 50 percent, or (b) the minority population of the affected area is meaningfully greater[19] than the minority population percentage in the general population or other appropriate unit of geographic analysis (Council on Environmental Quality, 1997). "Minority populations" are defined as individuals who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. Low-income populations are defined where the percent low income population of the affected block group is equal to or greater than that of the county where the affected area is located. Table B.7.7-1 below provides demographic and low-income population data in the state and counties affected by the Projects.

[18] The EPA's Environmental Justice Policies are directed, in part, by Executive Order 12898: *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations*.

[19] A minority population is considered "meaningfully greater" when the minority population in the block group affected is 10 percentage points higher than the minority population percentage in the county where the block group is in.

TABLE B.7.7-1

Demographics and Low-Income Populations in the FM100 Project and Leidy South Project Areas [a]

State/County/Census Block Group	% White	% Black/ African-American	% American Indian or Alaskan Native	% Asian	% Native Hawaiian/ Pacific Islander	% Some Other Race	% Two or More Races	% Total Minority [b]	% Below Poverty Level
Pennsylvania	81.1	11.1	0.2	3.3	0.0	2.0	2.3	22.7	13.1
FM100 PROJECT									
Pipeline Facilities									
McKean County	94.6	2.6	0.1	0.4	0.0	0.6	1.5	6.5	17.3
Census Tract 4207, Block Group 2	99.4	0.2	0.0	0.0	0.0	0.0	0.5	0.5	6.2
Census Tract 4207, Block Group 4	95.9	0.3	0.0	0.0	0.0	0.0	3.8	3.7	14.8
Census Tract 4208, Block Group 2	99.4	0.1	0.3	0.0	0.0	0.0	0.3	0.6	9.6
Census Tract 4208, Block Group 3	99.1	0.0	0.0	0.0	0.0	0.0	0.9	0.9	13.0
Census Tract 4209, Block Group 2	92.6	0.2	0.0	0.0	0.0	0.0	7.2	7.4	8.7
Potter County	97.3	0.4	0.2	0.3	0.0	0.2	1.6	3.3	14.4
Census Tract 9501, Block Group 3	98.3	0.0	0.6	0.0	0.0	0.0	1.1	1.3	6.7
Census Tract 9502, Block Group 3	95.0	0.0	0.3	0.0	0.0	0.5	4.2	4.6	4.4
Census Tract 9504, Block Group 1	97.0	0.0	0.0	0.0	0.9	0.0	3.0	0.0	7.6
Tamarack Compressor Station									
Clinton County	96.3	1.5	0.1	0.7	0.0	0.2	1.1	4.7	17.2
Census Tract 301, Block Group 2	92.8	5.3	0.2	0.0	0.0	0.0	1.7	6.3	2.9
Marvindale Compressor Station									
McKean County	94.6	2.6	0.1	0.4	0.0	0.6	1.5	6.5	17.3
Census Tract 4209, Block Group 2	92.6	0.2	0.0	0.0	0.0	0.0	7.2	7.4	8.7
Abandonment Facilities									
Cameron County	97.3	1.2	0.2	0.4	0.0	0.1	0.8	3.4	14.4
Census Tract 9602, Block Group 1	99.5	0.0	0.2	0.0	0.0	0.0	0.3	0.5	7.6

TABLE B.7.7-1 (cont'd)

Demographics and Low-Income Populations in the FM100 Project and Leidy South Project Areas [a]

State/County/Census Block Group	% White	% Black/ African-American	% American Indian or Alaskan Native	% Asian	% Native Hawaiian/ Pacific Islander	% Some Other Race	% Two or More Races	% Total Minority [b]	% Below Poverty Level
Clearfield County	95.2	2.7	0.2	0.6	0.0	0.3	1.0	6.9	15.3
Census Tract 3305, Block Group 3	97.4	0.0	0.0	0.0	0.0	0.0	2.6	1.3	12.5
Census Tract 3306, Block Group 1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Elk County	98.2	0.5	0.2	0.4	0.0	0.0	0.6	2.4	9.4
Census Tract 9509, Block Group 1	99.7	0.0	0.0	0.3	0.0	0.0	0.0	0.3	12.9
Potter County	97.3	0.4	0.2	0.3	0.0	0.2	1.6	3.3	14.4
Census Tract 9504, Block Group 3	96.6	0.0	1.1			1.0	0.5	3.1	2.9
LEIDY SOUTH PROJECT									
Pipeline Facilities									
Clinton County	96.3	1.5	0.1	0.7	0.0	0.2	1.1	4.7	17.2
Census Tract 301, Block Group 1	99.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	8.1
Census Tract 301, Block Group 2	92.8	5.3	0.2	0.0	0.0	0.0	1.7	7.2	10.6
Lycoming County	92.0	4.9	0.1	0.6	0.0	0.5	1.8	9.3	14.0
Census Tract 106, Block Group 4	98.1	0.8	0.0	0.4	0.0	0.0	0.6	2.5	15.8
Compressor Station 605									
Wyoming County	97.2	0.7	0.1	0.4	0.0	0.3	1.4	4.2	10.4
Census Tract 4003, Block Group 1	91.5	6.0	0.0	0.0	0.0	0.0	2.5	12.7	4.2
Census Tract 4003, Block Group 2	97.6	0.1	0.2	0.7	0.0	0.0	1.4	3.1	**12.8**
Compressor Station 607									
Luzerne County	89.1	4.3	0.2	1.2	0.0	3.3	1.8	16.2	15.2
Census Tract 2158, Block Group 1	99.0	0.0	0.0	0.0	0.0	0.0	1.0	5.9	4.9
Census Tract 2159, Block Group 1	98.1	0.4	0.0	0.0	0.0	0.0	1.5	2.2	10.8

TABLE B.7.7-1 (cont'd)

Demographics and Low-Income Populations in the FM100 Project and Leidy South Project Areas [a]

State/County/Census Block Group	% White	% Black/ African-American	% American Indian or Alaskan Native	% Asian	% Native Hawaiian/ Pacific Islander	% Some Other Race	% Two or More Races	% Total Minority [b]	% Below Poverty Level
Compressor Station 610									
Columbia County	95.1	1.8	0.1	1.2	0.0	0.7	1.0	6.6	15.9
Census Tract 502, Block Group 2	98.2	0.0	0.0	0.4	0.0	0.1	1.3	3.6	14.6
Census Tract 503, Block Group 1	95.6	0.9	0.8	1.4	0.0	0.0	1.4	5.5	9.8
Census Tract 504, Block Group 1	99.3	0.3	0.0	0.1	0.0	0.0	0.3	1.0	6.2
Compressor Station 620									
Schuylkill County	93.8	2.8	0.2	0.5	0.0	1.2	1.5	8.3	12.5
Census Tract 11, Block Group 1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8
Census Tract 11, Block Group 2	98.4	0.1	1.5	0.0	0.0	0.0	0.0	2.6	5.9
Census Tract 12, Block Group 1	96.1	0.0	0.0	0.0	0.0	0.0	3.9	4.6	6.0
Census Tract 12, Block Group 2	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6

[a] U.S. Census Bureau, 2018b.

[b] Percent total minority is calculated by subtracting the percent of White, non-Hispanic from 100 percent.

Note: Bolded and underlined figures in the table indicate low-income populations with a higher percentage of persons below poverty level than that of the county.

As shown in Table B.7.7-1, no counties or census block groups crossed by the FM100 Project pipeline facilities or abandonment activity sites or within a 1-mile radius of the proposed compressor stations have minority populations that comprise more than 50 percent or a meaningfully greater percent of the population. A low-income population was identified in one census block group in the FM100 Project area. Census Tract 9509, Block Group 1 in Elk County would be the location of activities associated with the abandonment of the FM100 Line and has a higher percentage of persons below poverty level (12.9 percent) than that of Elk County (9.4 percent).

As shown in Table B.7.7-1, no counties or census block groups crossed by the Leidy South Project pipeline facilities or within a 1-mile radius of the proposed compressor stations and compressor station modifications have minority populations that comprise more than 50 percent or a meaningfully greater percent of the population. Low-income populations were identified in two census block groups in the Leidy South Project area. Census Tract 106, Block Group 4 in Lycoming County would be crossed by the Benton Loop and has a larger percent of persons below poverty level (15.8 percent) when compared to that of Lycoming County (14.0 percent). Census Tract 4003, Block Group 2 in Wyoming County would be within a 1-mile radius of the proposed upgrades to Compressor Station 605 and has a larger percentage of persons below poverty level (12.8 percent) when compared to that of Wyoming County (10.4 percent). The Benton Loop route was selected based on Transco's existing infrastructure and sited parallel to existing pipeline right-of-way.

We received comments expressing concern for impacts on low-income populations. The Projects would result in negligible to minor negative impacts and minor positive impacts on socioeconomic characteristics and economies in the counties crossed by or otherwise affected by the Projects. As discussed throughout this EA, potentially adverse environmental effects associated with the Projects would be minimized or mitigated, as applicable. Potential pollution emissions from the Projects, when considered with background concentrations, would be below the National Ambient Air Quality Standards (NAAQS), which are designated to protect public health. Therefore, the Projects would not have significant adverse air quality impacts on low-income or minority populations. Air quality impacts are discussed in more detail within section B.8.5. Temporary construction impacts on residences in proximity to construction work areas could include noise. As discussed in section B.9.2, noise levels resulting from construction would vary over time and would depend upon the number and type of equipment operating, the level of operation, and the distance between sources and receptors. Alternatively, operational noise associated with the new compressor stations would be persistent; however, National Fuel and Transco would be required to meet FERC's sound level requirements, which are discussed in detail in section B.9.3. With National Fuel's and Transco's proposed mitigation measures and our recommendations in section B.9.3, the Projects would not result in significant noise impacts on local residents and the surrounding communities.

As indicated in table B.7.7-1, the poverty level of one census block group traversed by the FM100 Project and two census block groups traversed by the Leidy South Project are slightly greater than county-level statistics. There is no evidence that the Projects would cause a disproportionate share of adverse environmental or socioeconomic impacts on any racial, ethnic, or socioeconomic group. Potentially adverse environmental effects associated with the Projects on surrounding communities, including environmental justice populations, would be minimized and/or mitigated, as applicable, and would not be high and adverse. Therefore, we conclude the Projects would not disproportionately affect racial, ethnic, or low-income population groups.

B.8 AIR QUALITY

Both the FM100 and Leidy South Projects would result in temporary impacts on regional air quality through short-term construction activities associated with each project; however, both Projects would result in permanent impacts associated with the long-term operation of the compressor stations.

B.8.1 Existing Air Quality

B.8.1.1 Ambient Air Quality Standards

Construction and operation of the Projects would affect local and regional air quality. Ambient air quality is protected by federal and state regulations. The EPA has established NAAQS for "criteria pollutants" to protect human health and welfare (EPA, 2019d). These criteria pollutants are ground-level ozone, carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), fine particulate matter (i.e., inhalable particulate matter with an aerodynamic diameter less than or equal to 10 microns [PM_{10}] and less than or equal to 2.5 microns [$PM_{2.5}$]), and airborne lead. Ozone is not emitted into the atmosphere from an emissions source but 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 and are regulated to control the potential for ozone formation. The NAAQS include primary standards that are designed to protect human health, including the health of "sensitive" individuals such as children, the elderly, and those with chronic respiratory problems. The NAAQS also include secondary standards designed to protect public welfare, including visibility, vegetation, animal species, economic interests, and other concerns not related to human health.

Hazardous air pollutants (HAP), also known as toxic air pollutants or air toxics, are specific pollutants that are known or suspected to cause cancer (carcinogens) or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. There are no national air quality standards for HAPs, but their emissions are limited through permit thresholds and technology standards.

Greenhouse gases (GHG), the most common of which are carbon dioxide (CO_2), methane, nitrous oxide (N_2O), ozone, hydrofluorocarbons, and perfluorocarbons, are naturally occurring pollutants in the atmosphere and products of human activities, including burning fossil fuels. Fossil fuel combustion emits CO_2, methane, and N_2O. GHG emissions are generally calculated in terms of carbon dioxide equivalents (CO_2e) where the atmospheric heating potential of each gas is expressed as a multiple of the atmospheric heating potential of CO_2.

B.8.1.2 Existing Air Quality and Attainment Status

Air quality control regions (AQCR) are areas established by the EPA and local agencies for air quality planning purposes, which are managed through State Implementation Plans that describe how the NAAQS would be achieved and maintained. The AQCRs are intra- and interstate regions, such as large metropolitan areas, where improvement of the air quality in one portion of the AQCR requires emission reductions throughout the AQCR. Each AQCR or smaller portion within an AQCR (such as a county or multiple counties) is designated, based on compliance with the NAAQS, as "attainment," "unclassifiable," "maintenance," or "nonattainment" on a pollutant-by-pollutant basis. Areas in compliance, or below the NAAQS, are designated as attainment, while areas not in compliance, or above the NAAQS, are designated as nonattainment. Areas that were previously designated as nonattainment and have since demonstrated compliance with the NAAQS are designated as maintenance. Areas without sufficient data available are designated as unclassifiable and are treated as attainment areas. All components of the Projects are in attainment areas.

The EPA as well as state and local agencies have established a network of ambient air quality monitoring stations to measure and track the background concentrations of criteria pollutants across the United States. To characterize the existing ambient air quality for the Projects, available data were gathered from air quality monitoring stations that are nearest to the Projects' sources of operational emissions. The most recent validated data from these monitoring sites are presented in table B.8.1-1, which compares the monitored data with the appropriate NAAQS standard for each criteria pollutant (EPA, 2019e). All monitored data are below the NAAQS.

TABLE B.8.1-1

Ambient Air Quality Concentrations Representative of the FM100 Project and Leidy South Project Areas

Project/Facility/ Pollutant	Averaging Period	Rank	2016	2017	2018	3-year average	Units	Monitor Number [a]	NAAQS
FM100 PROJECT									
Marvindale Compressor Station									
SO_2	1-Hour	99%	13.1	5.2	5.2	7.9	µg/m^3	36-101-0003	196
PM_{10}	24-Hour	2nd	27.0	27.0	19.0	24.3	µg/m^3	42-081-0100	150
$PM_{2.5}$	24-Hour	98%	10.0	11.0	13.0	11.3	µg/m^3	36-101-0003	35
$PM_{2.5}$	Annual	Mean	4.5	4.3	4.5	4.4	µg/m^3	36-101-0003	12
NO_2	Annual	Average	3.5	3.6	1.2	2.8	µg/m^3	42-117-4000	100
NO_2	1-Hour	98%	18.8	18.8	18.8	18.8	µg/m^3	42-117-4000	188
CO	8-Hour	2nd	343.7	343.7	343.7	343.7	µg/m^3	36-101-0003	40,000
CO	1-Hour	2nd	229.1	458.2	343.7	323.7	µg/m^3	36-101-0003	10,000
O_3	8-Hour	4th	0.067	0.064	0.065	0.065	ppm	42-047-9991	0.70
Tamarack Compressor Station									
SO_2	1-Hour	99%	13.1	5.2	5.2	7.9	µg/m^3	36-101-0003	196
PM_{10}	24-Hour	2nd	27.0	27.0	19.0	24.3	µg/m^3	42-081-0100	150
$PM_{2.5}$	24-Hour	98%	16.0	18.0	17.0	17.0	µg/m^3	42-117-4000	35
$PM_{2.5}$	Annual	Mean	7.3	10.2	6.6	8.0	µg/m^3	42-117-4000	12
NO_2	Annual	Average	3.5	3.6	1.2	2.8	µg/m^3	42-117-4000	100
NO_2	1-Hour	98%	18.8	18.8	18.8	18.8	µg/m^3	42-117-4000	188
CO	8-Hour	2nd	343.7	343.7	343.7	343.7	µg/m^3	36-101-0003	40,000
CO	1-Hour	2nd	229.1	458.2	343.7	343.7	µg/m^3	36-101-0003	10,000
O_3	8-Hour	4th	0.066	0.064	0.064	0.065	ppm	42-033-4000	0.70
LEIDY SOUTH PROJECT									
Compressor Station 607									
SO_2	1-Hour	99%	13.1	7.9	7.9	9.6	µg/m^3	42-079-1101	196
PM_{10}	24-Hour	2nd	31.0	27.0	32.0	30.0	µg/m^3	42-079-1101	150
$PM_{2.5}$	24-Hour	98%	19.0	17.0	25.0	20.3	µg/m^3	42-069-2006	35
$PM_{2.5}$	Annual	Mean	8.2	8.6	8.9	8.6	µg/m^3	42-069-2006	12
NO_2	Annual	Average	18.5	16.7	14.5	16.6	µg/m^3	42-069-2006	100
NO_2	1-Hour	98%	86.6	80.9	73.4	80.3	µg/m^3	42-069-2006	188
CO	1-Hour	2nd	1,489	916	1,489	1,298	µg/m^3	42-069-2006	40,000
CO	8-Hour	2nd	1,031	802	1,146	993	µg/m^3	42-069-2006	10,000
O_3	8-Hour	4th	3.0	0.060	0.067	1.042	ppm	42-079-1101	0.070
Compressor Station 610									
SO_2	1-Hour	99%	13.1	7.9	7.9	9.6	µg/m^3	42-079-1101	196
PM_{10}	24-Hour	2nd	31.0	27.0	32.0	30.0	µg/m^3	42-079-1101	150
$PM_{2.5}$	24-Hour	98%	19.0	17.0	25.0	20.3	µg/m^3	42-069-2006	35
$PM_{2.5}$	Annual	Mean	8.2	8.6	8.9	8.6	µg/m^3	42-069-2006	12
NO_2	Annual	Average	4.6	6.7	3.5	4.9	µg/m^3	42-015-0011	100
NO_2	1-Hour	98%	33.9	26.3	33.9	30.7	µg/m^3	42-015-0011	188

TABLE B.8.1-1 (cont'd)

Ambient Air Quality Concentrations Representative of the FM100 Project and Leidy South Project Areas

Project/Facility/ Pollutant	Averaging Period	Rank	2016	2017	2018	3-year average	Units	Monitor Number [a]	NAAQS
CO	1-Hour	2nd	1,489	916	1,489	1,298	µg/m^3	42-069-2006	40,000
CO	8-Hour	2nd	1,031	802	1,146	993	µg/m^3	42-069-2006	10,000
O_3	8-Hour	4th	0.065	0.062	0.063	0.063	ppm	42-081-0100	0.070
Compressor Station 620									
SO_2	1-Hour	99%	13.1	18.3	10.5	14.0	µg/m^3	42-011-0011	196
PM_{10}	24-Hour	2nd	44.0	28.0	38.0	36.7	µg/m^3	42-071-0007	150
$PM_{2.5}$	24-Hour	98%	30.0	30.0	28.0	29.3	µg/m^3	42-075-0100	35
$PM_{2.5}$	Annual	Mean	8.7	11.5	11.7	10.6	µg/m^3	42-075-0100	12
NO_2	Annual	Average	18.5	16.7	14.5	16.6	µg/m^3	42-069-2006	100
NO_2	1-Hour	98%	90.3	79.0	69.6	79.7	µg/m^3	42-133-0008	188
CO	1-Hour	2nd	1,604	1,146	1,604	1,451	µg/m^3	42-069-2006	40,000
CO	8-Hour	2nd	1,031	802	917	917	µg/m^3	42-133-0008	10,000
O_3	8-Hour	4th	0.072	0.064	0.070	0.069	ppm	42-075-0100	0.070

[a] 36-101-0003 – Coming, NY
42-081-0100 – Montoursville, PA
42-117-4000 – Tioga County, PA
42-047-9991 – Kane Forest (Elk County, PA)
42-033-4000 – Moshannon Forest (Clearfield County, PA)
42-079-1101 – Chilwick and Washington Street, Wilkes-Barre, Luzerne County, PA
42-069-2006 – George Street Troop, Scranton, Lackawanna County, PA
42-015-0011 – 4148 Main Street, Monroe, Bradford County, PA
42-081-0100 – 899 Cherry Street, Montoursville, Lycoming County, PA
42-011-0011 – 1059 Arnold Road, Reading, Berks county, PA
42-071-0007 – Abraham Lincoln Jr. High School, Grofftown Road, Lancaster, Lancaster County, PA
42-075-0100 – 125 Birch Road, Lebanon, Lebanon County, PA
42-133-0008 – Hill Street, York, York County, PA

ppb = parts per billion
µg/m^3 = microgram per cubic meter
ppm = parts per million
NO_2 = nitrogen dioxide
O_3 = ozone

B.8.2 Permitting/Regulatory Requirements

The Clean Air Act (CAA) is the basic federal statute governing air pollution in the United States. The provisions of the CAA that are potentially relevant to the Projects include the items discussed below.

B.8.2.1 New Source Review/Prevention of Significant Deterioration

New Source Review (NSR) is a preconstruction permitting program designed to protect air quality when air pollutant emissions are increased either through the modification of existing sources or through the construction of a new source of air pollution. There are three basic categories of NSR permitting: Prevention of Significant Deterioration (PSD), Nonattainment NSR, and Minor Source NSR. Separate procedures have been established for federal preconstruction air permit review of certain large projects in attainment areas and nonattainment areas. In areas with good air quality, NSR ensures that the new emissions do not degrade the air quality, which is achieved through the implementation of the PSD permitting program. In addition, NSR ensures that any large, new, or modified industrial source uses air pollution control technology. Projects for which pollutants are not subject to PSD or Nonattainment NSR

may be subject to minor source NSR, which is the minor source permitting process for the state or local jurisdictional agency. The PADEP has been delegated authority by the EPA and administers the NSR and PSD program in Pennsylvania.

Based on potential to emit calculations, National Fuel's Marvindale and Tamarack Compressor Stations would be required to obtain minor source NSR permits prior to construction. For Transco, the proposed modifications to Compressor Station 605, and the proposed Benton Loop, Hilltop Loop, and Hensel Replacement are exempt from NSR permitting requirements. Compressor Stations 607, 610, and 620 would be required to obtain minor source NSR permits prior to construction. All facilities associated with the Projects requiring minor source NSR permitting qualify for streamlined permitting under PADEP's general plan approval and general operating permit for natural gas compressor stations (GP-5). The GP-5 minor NSR permit authorizes construction and operation of the stations. National Fuel filed applications for the Tamarack and Marvindale Compressor Stations in December 2019 and Transco plans to file applications by early 2020. Approval from the PADEP is required to be obtained prior to construction.

B.8.2.2 Title V Operating Permit

Title V of the CAA requires states to establish an air operating permit program. If a facility's potential to emit is equal to or greater than the criteria pollutant or HAP thresholds, the facility is considered a major source. The major source threshold level for an air emission source is 100 tons per year (tpy) for criteria pollutants and 10 tpy of any single HAP or 25 tpy of all HAPs in aggregate. The potential to emit at the new and modified compressor stations would be below the Title V thresholds; therefore, the facilities would not be subject to Title V permitting requirements. As noted above, all compressor stations associated with the Projects qualify for streamlined permitting under PADEP's general plan approval and general operating permit for natural gas compressor stations (GP-5). However, the EPA noted in a comment that 40 CFR 70.3(a) details other circumstances under which a title V permit may be required, including in 40 CFR 70.3(a)(2) when a facility is subject to an NSPS. The companies will continue to consult with PADEP on the applicable air permitting regulations for the compressor stations.

B.8.2.3 New Source Performance Standards

The EPA promulgates New Source Performance Standards (NSPS), codified in 40 CFR 60, that require new, modified, or reconstructed sources to control emissions as specified in the applicable source category provisions. Any source that is subject to provisions under an NSPS subpart is also subject to the general monitoring, reporting, and record keeping provisions of NSPS Subpart A (*General Provisions*), except as noted in the applicable subpart. This section outlines the applicability of NSPS subparts for the Projects facilities.

Subpart KKKK, *Standards of Performance for Stationary Combustion Turbines*, applies to stationary combustion turbines with a maximum heat input equal to or greater than 10 million British thermal units per hour, that were constructed, modified, or reconstructed after February 18, 2005. NSPS Subpart KKKK regulates emissions of NO_x and SO_2. The proposed new turbines associated with National Fuel's Marvindale and Tamarack Compressor Stations and Transco's Compressor Stations 607, 610, and 620 would be subject to NSPS Subpart KKKK. The new and modified turbines must meet the applicable emission limits and operational requirements, as well as record keeping and reporting requirements of this subpart.

Subpart JJJJ, *Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*, applies to manufacturers and owner/operators of spark ignition internal combustion engines

manufactured after the applicability date stated in the rule for the particular type and size engine. National Fuel proposes to install two compressor engines and one emergency generator engine at the Marvindale Compressor Station and one emergency generator engine at the Tamarack Compressor Station, all of which would be subject to NSPS Subpart JJJJ. Transco proposes to install one new emergency generator each at Compressor Stations 607, 610, and 620, which would be subject to NSPS Subpart JJJJ. Subpart JJJJ limits non-emergency operation of emergency engines to 100 hours per year to allow for maintenance, readiness, and non-emergency activities. The new and modified natural gas-fired engines subject to this rule must meet the applicable emission limits and operational requirements, as well as record keeping and reporting requirements of this subpart.

Subpart OOOOa, *Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution*, establishes emission standards and compliance schedules for the control of VOCs and SO_2, which would apply to the collection of fugitive emissions components at National Fuel's Marvindale and Tamarack Compressor Stations and Transco's Compressor Stations 607, 610, and 620.

B.8.2.4 National Emissions Standards for Hazardous Air Pollutants

The CAA Amendments established a list of 189 HAPs resulting in the promulgation of National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Source Categories. The NESHAPs, codified in 40 CFR 61 and 63, regulate the emissions of HAPs from new and existing stationary sources by setting emission limits, monitoring, testing, recordkeeping, and notification requirements. Any source that is subject to a subpart of 40 CFR 61 or 63 would also be subject to the general provisions of Subpart A (*General Provisions)*, unless otherwise noted in the applicable subpart. This section outlines the applicability of NESHAP subparts for the Projects facilities.

Subpart ZZZZ (*National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*) would apply to the emergency fire pump engines and emergency electrical power generators associated with National Fuel's Marvindale and Tamarack Compressor Stations and Transco's Compressor Stations 607, 610, and 620. These units would be subject to all applicable Subpart ZZZZ monitoring, recordkeeping, and reporting requirements, and/or would comply with NESHAPs Subpart ZZZZ by complying with NSPS Subpart JJJJ requirements.

B.8.2.5 General Conformity

The General Conformity Rule is codified in 40 CFR 96, Subpart B and was developed to ensure that federal actions in nonattainment and maintenance areas do not impede states' attainment of the NAAQS. A conformity determination must be conducted by the lead federal agency if a federal action's construction and operation activities are likely to result in generating direct and indirect emissions that would exceed the conformity applicability threshold level of the pollutant(s) for which a county is designated as nonattainment or maintenance. Conforming activities or actions should not, through additional air pollutant emissions:

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

The General Conformity Rule entails both an applicability analysis and a subsequent conformity determination, if applicable. According to the conformity regulations, emissions from sources that are

subject to any Nonattainment NSR or PSD permitting/licensing (major or minor) are exempt and are deemed to have conformed. A General Conformity Determination must be completed when the total direct and indirect emissions of a project would equal or exceed the specified pollutant thresholds on a calendar year basis for each nonattainment or maintenance area.

As discussed previously, all areas of the Projects are in attainment; therefore, general conformity requirements do not apply. However, because these counties are located in the Ozone Transport Region, they are treated as nonattainment. As such, general conformity must be analyzed for NO_x and VOCs from construction emissions as well as operational emissions not subject to major or minor NSR permitting. Ongoing operation emissions from the Projects that are not subject to NSR permitting are limited to minor fugitive releases that would not exceed general conformity applicability thresholds. Detailed construction emissions for the Projects are presented in table B.8.3-1. As shown, construction emissions would not exceed the general conformity applicability thresholds of 50 tons of VOCs and 100 tons of NO_x for a single calendar year. Therefore, a general conformity determination is not required.

B.8.2.6 Greenhouse Gas Reporting Rule

The EPA established the final Mandatory Greenhouse Gas Reporting Rule, requiring the reporting of operational GHG emissions from applicable sources that emit greater than or equal to 25,000 metric tons of GHGs (as CO_2e) in 1 year. Recent additions to the Reporting Rule effective for calendar year 2016 require reporting of GHG emissions generated during operation of natural gas pipeline transmission systems, including blowdown emissions, equipment leaks, and vent emissions at compressor stations, as well as blowdown emissions between compressor stations.

Although the rule does not apply to construction emissions, we have provided GHG construction emission estimates as CO_2e for accounting and disclosure purposes in section B.8.3 and table B.8.3-1. Operational GHG emission estimates for the Projects are presented as CO_2e in section B.8.4 and table B.8.4-1. Based on the emission estimates presented, actual GHG emissions from operation of National Fuel's Marvindale and Tamarack Compressor Stations as well as Transco's Compressor Stations 607, 610, and 620 have the potential to exceed the 25,000-metric-tpy reporting threshold for the Mandatory Reporting Rule. Therefore, if the actual operational emissions from the compressor stations or the system are greater than 25,000 metric tpy, National Fuel and/or Transco would be required to report GHG emissions.

B.8.2.7 State Air Quality Requirements

In addition to federal regulations, Pennsylvania has its own regulations that the Projects would need to comply with during construction and operation. Air pollution control regulations are promulgated in Pennsylvania Administrative Code (PAC) Title 25, Chapters 121 through 145. Pennsylvania has full delegation from the EPA for all air permitting programs. As discussed in section B.8.2.1 of this EA, a Plan Approval or General Permit from the PADEP is required prior to construction of National Fuel's Marvindale and Tamarack Compressor Stations and Transco's Compressor Stations 605, 607, 610, and 620. National Fuel and Transco would submit GP-5 applications to request new or modified sources to be permitted prior to construction. The Projects would be required to be in compliance with all applicable PAC air pollution control regulations.

B.8.3 Construction Emissions

Construction of the Projects would result in intermittent and temporary emissions of criteria pollutants. These emissions generally include fugitive dust (PM_{10} and $PM_{2.5}$) generated from soil-disturbing activities, such as earthmoving and wind erosion of disturbed areas, and vehicle traffic during

construction. The amount of dust generated during construction would be a function of precipitation, vehicle numbers and types, vehicle speeds, and roadway characteristics. Dust emissions would be greater during dry periods and in areas of fine-textured soils.

Construction also results in combustion emissions from diesel- and gasoline-fueled vehicles used in various construction activities. Combustion-related emissions would include NO_x, CO, VOC, SO_2, PM, small amounts of HAPs, and GHGs. The EPA requires manufacturers of on- and off-road engines to certify their products to engine emission standards based on the year of manufacture. For diesel engines, the emission standards have been phased in over the past two decades in four steps, referred to as Tier 1 to Tier 4. Each engine must comply with the emission standards throughout its life. In 2010, the EPA required the sulfur concentration in diesel fuels be lowered from historical concentration of 500 ppm to 15 ppm (ultra-low sulfur diesel fuel), which allows diesel engines to meet current Tier 4 emission requirements.

Construction-related emission estimates are based on typical diesel-fueled construction equipment, hours of operation, and vehicle miles traveled by the construction equipment and supporting vehicles for each construction spread. Construction emissions for the Projects are presented in table B.8.3-1. The following assumptions and protocols were used in the emissions estimates for both Projects:

- Combustion emissions from on-road vehicles (e.g., delivery and material removal vehicles) and non-road construction equipment operation were estimated using the EPA Motor Vehicle Emission Simulator model, which estimates emissions for on-road and non-road vehicles and equipment based on the anticipated types of non-road equipment and their associated levels of use.

- Fugitive particulate emissions of PM_{10} and $PM_{2.5}$ were calculated using the EPA's Compilation of Air Pollutant Emission Factors (AP-42) recommended emission factors for heavy construction equipment, combined with estimates of the extent and duration of active surface disturbance during construction. Fugitive emissions from soil pile wind erosion were calculated using the EPA's *Fugitive Dust Background Document and Technical Information Document For Best Available Control Measures* (EPA, 2019f).

- GHG emissions were estimated from non-road construction equipment using factors from the *2016 Climate Registry Default Emission Factors*. HAP emissions from non-road construction equipment were estimated using EPA AP-42 factors.

TABLE B.8.3-1

Construction Emissions Summary for the FM100 Project and Leidy South Project

	Emissions (tons)							
	Criteria Pollutants							Total for All HAPs
Project/County/Source	NO_x	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	CO_2e	
FM100 PROJECT								
McKean County								
Marvindale Compressor Station	6.36	2.34	0.02	0.06	18.81	2.58	2,264	1.07E-01
Marvindale Interconnect Station	0.95	0.41	0.01	0.01	0.73	0.22	950	1.34E-02
Line YM58 Pipeline	8.45	3.25	0.04	0.11	21.05	4.57	5,444	1.25E-01
McKean County Subtotal	**15.76**	**6.00**	**0.07**	**0.18**	**40.59**	**7.37**	**8,658**	**2.46E-01**
Clinton County								
Tamarack Compressor Station	7.67	3.4	0.02	0.09	21.98	3.05	2,374	1.55E-01
Clinton County Subtotal	**7.67**	**3.40**	**0.02**	**0.09**	**21.98**	**3.05**	**2,374**	**1.55E-01**

TABLE B.8.3-1 (cont'd)

Construction Emissions Summary for the FM100 Project and Leidy South Project

Project/County/Source	Emissions (tons)							
	Criteria Pollutants							Total for All HAPs
	NO_x	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	CO_2e	
Potter County								
Carpenter Hollow OPP Station	2.09	0.69	0.00	0.02	0.40	0.16	588	2.59E-02
Costello CS Station Abandonment	8.91	5.46	0.01+0	0.12	35.48	4.16	2,260	1.62E-01
Line YM58 Pipeline	9.30	4.33	0.04	0.10	22.47	4.85	5,592	1.66E-01
YM224	2.51	0.92	0.01	0.02	0.60	0.28	723	3.37E-02
FML100 Abandonment	0.17	0.06	0.00	0.00	0.30	0.07	75	2.58E-03
Potter County Subtotal	**22.98**	**11.46**	**0.05**	**0.26**	**59.25**	**9.52**	**9,238**	**3.91E-01**
Clearfield County								
FML100 Abandonment	0.16	0.06	0.00	0.01	0.14	0.03	77	6.71E-03
Clearfield County Subtotal	**0.16**	**0.06**	**0.00**	**0.01**	**0.14**	**0.03**	**77**	**6.71E-03**
Cameron County								
FML100 Abandonment	0.20	0.07	0.00	0.01	0.51	0.07	115	6.84E-03
Cameron County Subtotal	**0.20**	**0.07**	**0.00**	**0.01**	**0.51**	**0.07**	**115**	**6.84E-03**
Elk County								
FML100 Abandonment	0.18	0.06	0.00	0.00	0.12	0.02	79	2.96E-03
Elk County Subtotal	**0.18**	**0.06**	**0.00**	**0.00**	**0.12**	**0.02**	**79**	**2.96E-03**
FM100 Project Subtotal	**46.95**	**21.05**	**0.14**	**0.55**	**122.59**	**20.06**	**20,541**	**8.08E-01**
LEIDY SOUTH PROJECT								
Clinton County								
36" Hensel Replacement	24.85	31.65	0.08	2.43	23.83	8.79	10,653	0.87
36" Hilltop Loop	15.35	15.41	0.04	1.32	12.85	5.08	5,581	0.47
Clinton County Subtotal	**40.2**	**47.05**	**0.12**	**3.75**	**36.67**	**13.88**	**16,234**	**1.35**
Lycoming County								
42" Benton Loop	17.19	18.53	0.05	1.55	16.40	6.20	7,531	0.57
Lycoming County Subtotal	**17.19**	**18.53**	**0.05**	**1.55**	**16.40**	**6.20**	**7,531**	**0.57**
Wyoming County								
Compressor Station 605 Modifications	1.67e-3	0.03	1.76e-5	2.74e-4	0.04	0.01	3.42	1.88e-5
Wyoming County Subtotal	**1.67e-3**	**0.03**	**1.76e-5**	**2.74e-4**	**0.04**	**0.01**	**3.42**	**1.88e-5**
Luzerne County								
New Compressor Station 607	25.2	51.05	0.08	2.87	28.34	9.82	11,322	0.89
Luzerne County Subtotal	**25.20**	**51.05**	**0.08**	**2.87**	**28.34**	**9.82**	**11,322**	**0.89**
Columbia County								
Compressor Station 610 Modifications	10.75	32.59	0.04	1.48	13.51	4.28	5,385	0.40
Columbia County Subtotal	**10.75**	**32.59**	**0.04**	**1.48**	**13.51**	**4.28**	**5,385**	**0.40**
Schuylkill County								
New Compressor Station 620	23.84	47.75	0.07	2.77	21.34	7.67	10,178	0.86
Schuylkill County Subtotal	**23.84**	**47.75**	**0.07**	**2.77**	**21.34**	**7.67**	**10,178**	**0.86**
Leidy South Project Subtotal	**117.18**	**197.00**	**0.36**	**12.42**	**116.30**	**41.86**	**50,653**	**4.07**
Projects Total	**164.13**	**218.05**	**0.50**	**12.97**	**238.89**	**61.92**	**71,194**	**4.88**

Most construction-related emissions on the pipeline projects would be temporary and localized and would dissipate with time and distance from areas of active construction. Further, construction emissions along the pipelines would subside once construction is complete. Based on the mitigation measures outlined in National Fuel's and Transco's Fugitive Dust Control Plans and the commitment to obtain the applicable air permits and adhere to air quality regulations, and the temporary nature of

pipeline construction, we conclude that construction of the Projects would not have a significant impact on regional air quality.

B.8.4 Operational Emissions

Most of the operational emissions from the Projects would result from natural gas combustion sources at National Fuel's Marvindale and Tamarack Compressor Stations and Transco's Compressor Stations 607, 610, and 620. Transco's Compressor Station 605 would involve installing electric-driven compression and therefore would not generate combustion-related emissions. All aboveground facilities, including the compressor stations, and OPP along with the pipelines, would generate fugitive emissions of natural gas. Compressor station combustion sources include turbines, emergency engines and heaters; and fugitive emissions could result from miscellaneous small storage tanks, truck loading, piping components, blowdown events, and pigging operations. The Marvindale and Tamarack Compressor Stations and Compressor Stations 607, 610, and 620 would incorporate SoLo NOX (i.e., dry low NO_x or lean pre-mix) combustors to control NO_x emissions on turbines. Estimated emissions for each facility from the turbines and engines are based on manufacturer supplied emission factors, PADEP's GP-5 Best Available Control Technology limits, and the EPA's emission factors and assumptions that the compressor station engines operate at full load for the entire year (8,760 hours). All combustion sources would use natural gas, and the lean burn compressor engines and combustion turbines would be equipped with oxidation catalysts to reduce emissions of CO and VOC. The rich burn compressor engine at the Tamarack Compressor Station would be equipped with a three-way catalyst (Non Selective Catalytic Reduction) for reducing emissions of NO_x, CO, and VOC.

Air pollutant emissions from operation of the proposed new and modified compressor stations were calculated using emissions factors from vendor data, the EPA's AP-42, and 40 CFR 98. Fugitive gas emissions were estimated using gas compositions provided by National Fuel and Transco. Emissions from pig launching and receiving events at the compressor stations are included in the facility blowdown emissions. The potentials to emit from the compressor stations and pipeline operation are summarized in table B.8.4-1.

TABLE B.8.4-1

Operational Emissions from the FM100 Project and Leidy South Project

Project/Facility	NO_X	CO	SO_2	VOC	$PM/PM_{10}/PM_{2.5}$	CO_2e	Formalde-hyde	Total for All HAPs
	(tons per year)							
FM100 PROJECT								
Marvindale Compressor Station								
Solar Taurus 70 turbine (TURB-001)	21.06	15.17	1.19	2.96	10.53	46,758	0.13	0.24
Caterpillar 3608 Compressor Engine (ENG-001)	7.75	6.46	0.05	7.75	0.89	10,384	1.29	3.01
Caterpillar 3516 Compressor Engine (ENG-002)	2.67	4.00	0.03	3.13	0.95	5,725	0.47	1.05
Caterpillar G3512 Emergency Generator (GEN-001))	1.62	3.24	0	0.96	0.03	337	0.15	0.15
Main Heater (HTR-001)	1.95	1.64	0.01	0.11	0.15	2,370	0	0.04
Catalytic Building Heaters (HTR-002 to HTR-015)	0.55	0.46	0	0.03	0.04	663	0	0.01
Storage Tanks (T-001, T-002, T-003)	0	0	0	0	0	0.05	0	0
Liquids Loading (L-001)	0	0	0	0	0	0	0	0
Fugitives, Pneumatics & Miscellaneous Gas Venting (FUG-001)	0	0	0	0.79	0	3,622	0	0
Marvindale Compressor Station Subtotal	**35.58**	**30.96**	**1.29**	**15.73**	**12.59**	**70,253**	**2.04**	**4.50**
Tamarack Compressor Station								
Solar Taurus 70 Turbine (TURB-001)	21.06	15.17	1.19	2.96	10.53	45,891.06	0.13	0.24
Solar Taurus 70 Turbine (TURB-002)	21.06	15.17	1.19	2.96	10.53	45,891	0.13	0.24
Caterpillar G3512 Emergency Generator (GEN-001)	1.62	3.24	0	0.96	0.03	338	0.15	0.15
Waste Fluid Tank (T-001)	0	0	0	0	0	0.05	0	0
Liquids Loading (L-001)	0	0	0	0	0	0	0	0
Catalytic Building Heaters (HTR-001 to HTR-012)	0.47	0.39	0	0.03	0.04	568	0	0.01
Fugitives, Pneumatics & Miscellaneous Gas Venting (FUG-001)	0	0	0	0.66	0	2,996	0	0
Tamarack Compressor Station Subtotal	**44.20**	**33.98**	**2.39**	**7.57**	**21.13**	**96,587**	**0.41**	**0.64**
Line YM58 Operational Emissions (Potter County)	0	0	0	0.01	0	31	0	0
Line YM58 Operational Emissions (McKean County)	0	0	0	0.01	0	31	0	0

TABLE B.8.4-1 (cont'd)

Operational Emissions from the FM100 Project and Leidy South Project

Project/Facility	NO_X	CO	SO_2	VOC	$PM/PM_{10}/PM_{2.5}$	CO_2e	Formalde-hyde	Total for All HAPs
	(tons per year)							
Line YM224 Operational Emissions (Potter County)	0	0	0	0.001	0	3	0	0
Line KL Operational Emissions (McKean County)	0	0	0	0	0	1	0	0
Marvindale Interconnect Operational Emissions	0	0	0	0.08	0	256	0	0
Carpenter Hollow OPP Station	0	0	0	0.17	0	538	0	0
FM100 Project Total Maximum Potential Emissions	**79.78**	**64.94**	**3.68**	**23.57**	**33.72**	**167,700**	**2.45**	**5.14**
LEIDY SOUTH PROJECT								
Compressor Station 607								
Solar Titan 130 Turbine (MLU-01)	27.32	23.59	2.93	6.31	5.68	101,627	2.48	2.75
Solar Titan 130 Turbine (MLU-02)	27.32	23.59	2.93	6.31	5.68	101,627	2.48	2.75
Auxiliary Generator (AUX-01)	0.19	0.28	0.01	0.19	0.08	458	0.05	0.09
Storage Tanks (TANK-01, TANK-02)	0	0	1.0E-03	1.0E-03	0	8	0	2.05E-06
Tank Truck Loadout (TANK-LDG)	0	0	2.14E-04	2.14E-04	0	2.31E-03	0	1.05E-10
Piping Fugitives (FUGS)	0	0	0.09	0.09	0	681	0	6.86E-04
Unit Blowdown Silencers (BDS-01 to BDS-04)	0	0	0.52	0.52	0	3,999	0	4.04E-03
Compressor Station 607 Subtotal	**54.83**	**47.46**	**5.87**	**13.42**	**11.44**	**208,400**	**5.01**	**5.59**
Compressor Station 610								
Solar Titan 250 Turbine (MLU-003)	32.63	27.62	3.55	6.68	6.90	123,195	3.01	3.34
Auxiliary Generator (AUX-01)	0.97	1.94	0.01	0.49	0.02	214	0.10	0.13
Auxiliary Generator (AUX-02)	0.19	0.28	0.01	0.19	0.08	458	0.05	0.09
Storage Tanks (TANK-01 to TANK-03)	0	0	0	1.90E-03	0	11	0	2.04E-06
Tank Truck Loadout (TANK-LDG)	0	0	0	2.14E-04	0	0.01	0	2.33E-10
Piping Fugitives (FUGS)	0	0	0	0.14	0	1,058	0	1.07E-03
Unit Blowdown Silencers (BDS-01 to BDS-05)	0	0	0	1.41	0	8,220	0	1.07E-02
Compressor Station 610 Subtotal	**33.79**	**39.84**	**3.57**	**8.91**	**7.00**	**133,155**	**3.15**	**3.57**
Compressor Station 620								
Solar Titan 250 Turbine (MLU-001)	32.84	27.76	3.58	6.73	6.94	123,998	3.03	3.36
Auxiliary Generator (AUX-01)	0.19	0.28	0.01	0.19	0.08	457	0.05	0.09
Storage Tanks (TANK-01, TANK-02)	0	0	0	1.00E-03	0	8.15E+00	0	2.04E-06

TABLE B.8.4-1 (cont'd)

Operational Emissions from the FM100 Project and Leidy South Project

Project/Facility	NO_X	CO	SO_2	VOC	$PM/PM_{10}/PM_{2.5}$	CO_2e	Formalde-hyde	Total for All HAPs
	(tons per year)							
Tank Truck Loadout (TANK-LDG)	0	0	0	2.14E-04	0	2.31E-03	0	1.05E-10
Piping Fugitives (FUGS)	0	0	0	0.06	0	478	0	4.81E-04
Unit Blowdown Silencers (BDS-01 to BDS-03)	0	0	0	0.5	0	3,822	0	3.86E-03
Compressor Station 620 Subtotal	**33.03**	**28.04**	**3.59**	**7.48**	**7.02**	**128,764**	**3.07**	**3.45**
Leidy South Project Total Maximum Potential Emissions	**121.67**	**105.34**	**13.03**	**29.81**	**25.46**	**470,319**	**11.23**	**12.62**
Projects Total Maximum Potential Emissions	**201.45**	**170.28**	**16.71**	**53.38**	**59.18**	**638,019**	**13.68**	**17.76**

B.8.5 Air Modeling of Compressor Stations

To evaluate the air quality impacts of operational emissions from the compressor stations, National Fuel performed air quality modeling analyses for the Marvindale and Tamarack Compressor Stations, and Transco performed air quality modeling analyses for Compressor Stations 607, 610, and 620. The new compressor at Transco's Compressor Station 605 would be electric-driven and therefore no modeling was conducted for this station. Background pollutant concentrations were estimated using existing ambient monitoring data for the region. Data were obtained for representative air quality monitoring stations to characterize the background air quality for each compressor station and are presented in table B.8.1-1 above. The background monitors were determined based on proximity and general representativeness of the monitoring sites to each of the aboveground facilities.

Modeling for the Projects was performed using the EPA-approved air dispersion model AERMOD Version 18081. National Fuel and Transco conducted screening analyses to determine whether operating emissions of SO_2, nitrogen dioxide (NO_2), CO, PM_{10}, or $PM_{2.5}$ would cause a significant impact. If impacts are determined to be significant, the cumulative impact of the facility is required to be reviewed. The modeling parameters for the Projects are presented in table B.8.5-1.

TABLE B.8.5-1

Compressor Station Modeling Parameters

		Stack Data				Pollutant Emission Rate (lb/hr)			
Project/Facility	Source ID	Height (feet)	Temp (°F)	Exit Velocity (fps)	Exit Diameter (feet)	NO_x	CO	SO_2	$PM_{2.5}/PM_{10}$
FM100 PROJECT									
Marvindale Compressor Station	Solar Taurus 70 Turbine (TURB-001)	52.0	858	80.4	5.97	4.79	1.94	0.272	2.40
	Compressor Engine #1 (ENG-001)	51.0	819	39.1	2.99	1.77	1.48	0.012	0.202
	Compressor Engine #2 (ENG-002)	34.5	919	67.3	1.31	0.609	0.913	0.007	0.217
	Fuel Gas Heater #1 (HTR-001)	14.0	275	10.0	0.98	0.301	0.253	0.002	0.023
Tamarack Compressor Station	Solar Taurus Turbine #1 (TURB-001)	55.0	858	78.9	5.97	4.79	1.94	0.27	2.4
	Solar Taurus Turbine #2 (TURB-002)	95.0	858	78.9	5.97	4.79	1.94	0.27	2.4
LEIDY SOUTH PROJECT									
Compressor Station 607	Titan 130 (MLU01)	45.9	884	139.3	6.56	6.03	4.13	0.63	1.27
	Titan 130 (MLU02)	45.9	884	139.3	6.56	6.03	4.13	0.63	1.27
Compressor Station 610	Titan 250 (MLU01)	49.2	852	103.0	8.2	7.30	4.92	0.79	1.59
Compressor Station 620	Titan 250 (MLU01)	49.2	851	101.6	8.2	7.38	5.00	0.79	1.59

National Fuel and Transco completed their screening analyses by modeling operating emissions from the compressor stations to determine the maximum ground level concentrations for each pollutant. As shown in table B.8.5-2, the screening results for the compressor stations indicate that further modeling is required for those pollutants that exceeded the corresponding Significant Impact Level (SIL).

TABLE B.8.5-2

Significant Impact Analysis for Operating Emissions from the FM100 Project and Leidy South Project

Facility/Pollutant	Averaging Period	Maximum Modeled Concentration (µg/m^3)	SIL (µg/m^3)	Below SIL? (Yes or No)
MARVINDALE COMPRESSOR STATION				
SO_2	1-hour	2.3	7.8	Yes
	3-hour	2.3	25	Yes
NO_2	1-hour	115.1	7.5	No
	Annual	10.1	1	No
CO	1-hour	119.3	2,000	Yes
	8-hour	96.4	500	Yes
$PM_{2.5}$	24-hour	13.8	1.2	No
	Annual	0.8	0.2	No
PM_{10}	24-hour	19.2	5	No
TAMARACK COMPRESSOR STATION				
SO_2	1-hour	2.5	7.8	Yes
	3-hour	2.4	25	Yes
NO_2	1-hour	39.0	7.5	No
	Annual	0.9	1	Yes
CO	1-hour	18.0	2,000	Yes
	8-hour	12.9	500	Yes
$PM_{2.5}$	24-hour	7.9	1.2	No
	Annual	0.5	0.2	No
PM_{10}	24-hour	9.7	5	No
COMPRESSOR STATION 607				
SO_2	1-hour	10.05	7.8	No
	3-hour	10.05	25	Yes
NO_2	1-hour	95.44	7.5	No
	Annual	9.54	1	No
CO	1-hour	65.30	2,000	Yes
	8-hour	58.77	500	Yes
$PM_{2.5}$	24-hour	12.06	1.2	No
	Annual	2.01	0.2	No
PM_{10}	24-hour	20.09	5	No
COMPRESSOR STATION 610				
SO_2	1-hour	2.0	7.8	Yes
	3-hour	2.0	25	Yes
NO_2	1-hour	18.40	7.5	No
	Annual	1.84	1	No
CO	1-hour	12.40	2,000	Yes
	8-hour	11.16	500	Yes
$PM_{2.5}$	24-hour	2.40	1.2	No
	Annual	0.40	0.2	No
PM_{10}	24-hour	4.0	5	Yes

TABLE B.8.5-2 (cont'd)

Significant Impact Analysis for Operating Emissions from the FM100 Project and Leidy South Project

Facility/Pollutant	Averaging Period	Maximum Modeled Concentration (µg/m^3)	SIL (µg/m^3)	Below SIL? (Yes or No)
COMPRESSOR STATION 620				
SO_2	1-hour	2.85	7.8	Yes
	3-hour	2.85	25	Yes
NO_2	1-hour	26.49	7.5	No
	Annual	2.65	1	No
CO	1-hour	17.95	2,000	Yes
	8-hour	16.15	500	Yes
$PM_{2.5}$	24-hour	3.42	1.2	No
	Annual	0.57	0.2	No
PM_{10}	24-hour	5.70	5	No

µg/m^3 = microgram per cubic meter

Screening results for National Fuel's Marvindale and Tamarack Compressor Stations indicate that SO_2 and CO impacts and the NO_2 annual impacts at the Tamarack Compressor Station are below their respective PSD modeling SILs; therefore, further modeling was not required. However, the 1-hour NO_2, annual NO_2 (at Marvindale only), $PM_{2.5}$ (24-hour and annual), and PM_{10} (24-hour) exceed the corresponding SIL. For pollutants that are above the SIL, a cumulative modeling analysis was required. The cumulative analysis was completed for each pollutant and averaging period based on EPA rulemaking by combining background concentrations with the modeled results and comparing to the NAAQS. Table B.8.5-3 presents the results of the refined modeling analysis. These results indicate that the FM100 Project would not contribute to a violation of the corresponding NAAQS.

TABLE B.8.5-3

Summary of NAAQS Full Impact Analysis for the FM100 Project Compressor Stations

Facility/Pollutant	Averaging Period	Model Concentration (µg/m^3)	Background Monitored Concentration (µg/m^3)	Total Concentration (µg/m^3)	NAAQS (µg/m^3)
MARVINDALE COMPRESSOR STATION					
NO_2	1 hour	111.4	18.8	130.2	188
	Annual	10.1	2.8	12.9	100
$PM_{2.5}$	24 hour	6.1	11.3	17.4	35
	Annual	0.8	4.4	5.2	12
PM_{10}	24 hour	11.3	24.3	35.6	150
TAMARACK COMPRESSOR STATION					
NO_2	1 hour	33.8	18.8	52.6	188
$PM_{2.5}$	24 hour	4.9	17.0	21.7	35
	Annual	0.5	8.0	8.5	12
PM_{10}	24 hour	6.7	24.3	31.0	150

For pollutants that are above the SIL at Transco's Compressor Stations 607, 610, and 620, a cumulative modeling analysis was required. The cumulative analysis was completed using the AERMOD in SCREEN mode only, which only evaluates the 1-hour high first high results. These 1-hour high first high results were used by combining with the background and comparing to the NAAQS. Table B.8.5-4 presents the results of the screening analysis. These results indicate that the Leidy South Project would not contribute to a violation of the corresponding NAAQS.

TABLE B.8.5-4

Summary of NAAQS Screening Analysis for the Leidy South Project Compressor Stations

Facility/Pollutant	Averaging Period	Model Concentration ($\mu g/m^3$)	Background Monitored Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
COMPRESSOR STATION 607					
SO_2	1 hour	10.1	9.6	19.7	196
NO_2	1 hour	95.4	80.3	175.7	188
	Annual	9.5	16.6	26.1	100
PM_{10}	24 hour	20.1	30.0	50.1	150
$PM_{2.5}$	24 hour	12.1	16.6	28.8	35
	Annual	2.0	8.6	10.6	12
COMPRESSOR STATION 610					
NO_2	1 hour	18.4	30.7	49.1	188
	Annual	1.8	4.9	6.7	100
$PM_{2.5}$	24 hour	2.4	20.3	22.7	35
	Annual	0.4	8.6	9.0	12
COMPRESSOR STATION 620					
NO_2	1 hour	26.5	79.7	106.2	188
	Annual	2.7	16.6	19.3	100
$PM_{2.5}$	24 hour	3.4	29.3	32.7	35
	Annual	0.6	10.6	11.2	12
PM_{10}	24 hour	5.7	36.7	42.4	150

Air quality impacts from operation of the Projects' compressor stations would be minimized by the use of equipment, emissions controls, and operating practices that meet or exceed best management practices. Compliance with federal and state air regulations and state permit requirements would ensure that air quality impacts would be minimized during installation and operation of the Projects' compressor units.

The EPA and numerous commentors requested an analysis of impacts on public health from operational and intermittent blowdown emissions, especially with respect to Transco's Compressor Station 620. Commentors expressed concern over health impacts on humans, including children, asthmatics, the elderly, and other sensitive populations, and requested that FERC conduct a health impact assessment. As demonstrated in tables B.8.5-3 and B.8.5-4, full-capacity upper-bound (i.e., the station's potential to emit) emissions from each compressor station would be less than the NAAQS, which were established to be protective of human health (including sensitive subpopulations such as children or those with chronic illnesses) and public welfare. As described above, all compressor stations would employ air pollution control measures to reduce NO_x, CO, and HAP emissions, and would be considered minor sources of air emission under federal programs (e.g., NSR and Title V). Based on our analysis, we conclude that construction and operation of the Projects would not have a significant impact on air quality, therefore, a health impact assessment is not warranted.

Commentors expressed concerns with regards the impact of air emissions from Transco's Compressor Station 620 on a nearby wildlife, vegetation, crops, livestock (e.g., an adjacent chicken farm) and specifically a non-GMO organic egg production facility located approximately 1.4 miles from the station. The EPA established the NAAQS to address human health and public welfare. The primary NAAQS standards provide public health and protection while the secondary NAAQS provide public welfare protection, including protection against decreased visibility, economic interests, and damage to animals, crops, vegetation, and buildings. Transco's modeling results in table B.8.5-4 demonstrate that

Compressor Station 620 would meet the NAAQS. Therefore, we conclude that there would be no significant impact from air emissions on nearby vegetation, crops, or the organic egg facility.

Commentors also expressed concern that Compressor Station 620 is located in a valley, which could cause an increase in emissions to be contained within the valley. The hill to the northwest is approximately 730 feet above the valley, and the peak of the southwest hill side is approximately 430 feet, with the distance between peaks approximately 1.7 miles. Based on these hill heights and the relative distance between peaks, we conclude that there would be no significant impacts due to the location of the compressor station in the valley since these elevations and the terrain are included in NAAQS modeling run used to determine compliance with the NAAQS.

The air dispersion modeling analysis for the operation of the facilities described above demonstrates that the Projects would be in compliance with the NAAQS. We conclude that operation of the Projects would not have significant impacts on local or regional air quality.

B.9 NOISE

Construction and operation of the Projects may affect overall local noise levels. The ambient sound level of a region is defined by the total noise generated within the specific environment and is comprised of natural and man-made sounds. At any location, both the magnitude and frequency of environmental noise may vary considerably over the course of a day, as well as seasonally. This variation is caused in part by changing weather conditions and the effect of seasonal vegetation cover.

We received several comments regarding noise impacts of the Projects, which are addressed in the following sections. The Projects would result in temporary increases of noise through the short-term construction activities associated with each project. The Projects would also result in permanent (ongoing) noise impacts associated with operation of the aboveground facilities.

B.9.1 Regulations

Two measurements are used to relate the time-varying quality of environmental noise to its known effects on people including 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. The L_{dn} considers the time of day and duration the noise is encountered since sound levels are perceived differently, depending on the length of exposure and time of day.

In 1974, the EPA published its *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. This document provides information for state and local governments to use in developing their own ambient noise standards. The EPA has indicated that a L_{dn} of 55 decibels on the A-weighted scale (dBA) protects the public from indoor and outdoor activity interference. The FERC has adopted this criterion and used it to evaluate the potential noise impacts from the Projects at pre-existing noise-sensitive areas (NSAs) such as schools, hospitals, and residences. At locations where existing ambient noise exceeds the 55-dBA threshold, Commission guidelines require project-related noise increase to be below 10 dBA at any NSA. In addition, Commission regulations state that operation of project facilities may not result in any perceptible increase in vibration at any NSA.

Specifically, in calculation of the L_{dn}, late night to early morning (10:00 p.m. to 7:00 a.m.) noise exposures are increased by 10 dBA to account for people's greater sensitivity to sound during nighttime hours. Due to the 10 dBA nighttime penalty added prior to calculation of the L_{dn}, for a facility to meet the

55 dBA L_{dn} limit established by the EPA to protect the public from indoor and outdoor activity interference, a facility must be designed such that the constant 24-hour noise level does not exceed a L_{eq} of 48.6 dBA at any NSA. The A-weighted scale is used because human hearing is less sensitive to low and high frequencies than mid-range frequencies. The human ear's threshold of perception for a noticeable change in loudness is about 3 dBA, whereas a 5 dBA change is clearly noticeable, and a 10 dBA change is perceived as either twice or half as loud.

There are no Pennsylvania state noise regulations that would apply to the Projects and no local noise ordinances that are relevant to the FM100 Project. One local noise ordinance is relevant to the Leidy South Project; Hegins Township Zoning Ordinance has qualitative nuisance regulations in place to prevent nuisance type noise and vibrations.

B.9.2 Construction Noise Impacts and Mitigation

Noise would be generated during construction of the pipeline and aboveground facilities for the Projects. Noise levels would be highest in the immediate vicinity of construction activities and would diminish with distance from the work areas. These impacts would be localized and temporary. The changing number and type of construction equipment at construction sites would result in varying levels of noise. Construction activities associated with the Projects would be performed with standard heavy equipment such as track-excavators, backhoes, cranes, bulldozers, dump trucks, and boring equipment. Noise would also be generated by trucks and other light vehicles traveling in and near areas under construction. Construction would generally not affect nighttime noise levels as most activity would be limited to 7 a.m. to 7 p.m. Monday through Saturday, except for HDD activities, and specific, limited construction activities such as tie-ins and hydrostatic testing.

Surface topography, vegetation cover, wind, and weather conditions also affects the distance that construction-related noise extends from a work area. Tall, dense vegetation and rolling topography typically attenuates noise when compared to less vegetated, open land. For the Projects, the most prevalent sound source during construction would typically be the internal combustion engines used to power the construction equipment. In order to mitigate construction noise, the following work practices and measures would be implemented by the companies during construction:

- National Fuel and Transco would inform nearby residents of the Projects and the upcoming construction activities and respond to and investigate concerns.
- National Fuel's and Transco's contractors would position equipment so noise propagates away from the nearest NSAs and position non-noise generating equipment between the drilling operation and the nearby NSAs, where possible, to provide shielding.
- National Fuel and Transco would restrict onsite vehicle idle time while in the construction area for all equipment and vehicles that are not using their engines to operate a loading, unloading, or processing device (e.g., concrete mixing trucks) or are otherwise required for the proper operation of the engine.
- Contractors would be required to use sound control devices no less effective than those provided by the manufacturer and to maintain equipment in accordance with manufacturer's recommendations. No equipment would have un-muffled exhausts.
- When possible, National Fuel and Transco would use construction equipment specifically designed for low noise emissions (e.g., generators with noise enclosures).

- National Fuel and Transco would prepare the layout of the construction activities with the goal of reducing noise from back-up alarms (alarms that signal vehicle travel in reverse).

Construction of the aboveground facilities would consist of earth work (e.g., site grading, clearing, grubbing, trenching operations) and construction of the site foundations and equipment. It is assumed that the highest level of construction noise would occur during earth work when the largest amount of construction equipment is operating.

Construction of the pipeline loops would be performed with standard heavy-duty construction equipment, such as trucks, backhoes, excavators, loaders, and cranes. Noise from pipeline construction would be limited to short durations over a period of 3 to 4 weeks at any one location. Blasting is not anticipated on these Projects.

FM100 Project

National Fuel proposes to use the HDD construction method to cross the Allegheny River, Portage Creek, and Potato Creek as a mitigative measure to avoid foreign pipelines, utilities, and impacts on those waterbodies. The HDD activities would generate continuous noise at drill entry and exit points and could last three to four weeks depending on the length of the drill and the hardness of the substrate.

Typical noise-generating equipment used at the HDD entry sites would include:

- drilling rig and engine-driven hydraulic power unit;
- engine-driven mud pump(s) and engine-driven generator set(s);
- mud mixing/cleaning equipment;
- mobile equipment including a crane, backhoe, front loader, forklift, and/or trucks(s);
- frac tanks; and
- engine-driven lights.

Noise associated with HDD exit sites could result from use of the following equipment:

- backhoe, side boom, and/or truck(s);
- engine-driven generator and pump; and
- engine-driven lights.

National Fuel completed an acoustical assessment of cumulative noise impacts from the three HDDs proposed for the FM100 Project. Table B.9.1-1 lists the ambient and estimated mitigated and unmitigated noise levels anticipated at NSAs based on HDD activities.

TABLE B.9.1-1

Estimated Noise Levels for NSAs for HDDs – FM100 Project [a]

HDD Site	Type of NSA	Distance and Direction	Entry or Exit Site	Ambient (L_{dn},dBA)	Unmitigated (dBA)			With Mitigation (dBA)		
					HDD Noise Level	HDD + Ambient (L_{dn})	Increase Above Ambient	HDD Noise Level	HDD + Ambient (L_{dn})	Increase Above Ambient
HDD #1 Allegheny River	Residence	220 ft SE	Entry	47.1	76.4	-	-	61.1	61.3	15.4
	Residence	540 ft SE	Exit	47.8	56.0	-	-	48.6	51.2	3.5
HDD #2 Portage Creek	Residence	340 ft S	Entry	44.2	72.3	-	-	58.4	58.5	14.4
	Residence	725 ft W	Exit	42.0	50.4	50.9	9.0	-	-	-
HDD #3 Potato Creek	Residence	180 ft NW	Entry	46.1	78.2	-	-	64.2	64.3	18.2
	Residence	710 ft NE	Exit	47.9	48.8	51.4	3.5	-	-	-

[a] Existing sound level at each NSA from measured ambient sound data and estimated noise impacts reported in the "HDD Construction Noise Assessment associated with the FM100 Project" report prepared April 19, 2019 by Hoover & Keith Inc.

National Fuel would reduce noise impacts on the NSA by utilizing noise mitigation measures including:

- stationary engines would have hospital-grade exhaust silencers;
- mobile equipment would be equipped with factory exhaust silencers;
- skid mounted generator sets and light plants would be equipped with a factory acoustical enclosure, and the enclosure doors would be closed during operation; no unenclosed generator sets, or light plants would be permitted;
- a 16-foot-high acoustical barrier wall would be erected on three sides of each HDD entry point;
- an acoustical enclosure would be used for the power unit; and
- an acoustical enclosure would be used for mud pump nos. 1 and 2.

As shown in table B.9.2-1, the HDD noise levels for the FM100 Project could exceed 55 dBA L_{dn} at the NSAs near the HDD entry sites, which are all residences, even with the use of noise mitigation measures. National Fuel would commit to completing all HDD activities during daytime hours. However, if 24-hour HDD operations become necessary, National Fuel would offer temporary relocation and/or compensation to all NSAs identified as being above the L_{dn} of 55 dBA.

Leidy South Project

In general, construction activities would take place during daylight hours from 7 a.m. to 7 p.m. Monday through Saturday. However, certain activities may require extended construction hours, including preparation for performance of strength and leak testing of pipeline segments; final tie-in welds and x-rays; electrical conductor installation into conduit runs and wiring raceways (compressor stations); terminations and verifications of conductors (compressor stations); and certain pre-commissioning and commissioning activities. Transco is not proposing any HDD crossings.

Construction noise for the Projects would be short-term and temporary, and any nighttime HDD noise would be mitigated to reduce impacts. Based on National Fuel's and Transco's proposed mitigation measures, we conclude that construction noise resulting from the Projects would not be significant.

B.9.3 Operational Noise Impacts and Mitigation

The FM100 Project would include new aboveground facilities, including the Marvindale Compressor Station and Interconnect, Tamarack Compressor Station, and Carpenter Hollow OPP Station. No other sources of operational noise are anticipated on the FM100 Project. The Leidy South Project would include modifications to Compressor Stations 605 and 610 and construction of new Compressor Stations 607 and 620. No other sources of operational noise are anticipated from the Leidy South Project. National Fuel and Transco conducted ambient sound surveys and acoustical analysis for the nearest NSAs to these facilities. Table B.9.3-1 summarizes the estimated operational noise impacts at the nearest NSAs during operation of the Projects.

TABLE B.9.3-1

Estimated Noise Impacts for the FM100 Project and Leidy South Project [a]

Facility or Project/Nearest NSAs	Distance and Direction from Station (feet)	Projects Acoustic Impact (dBA)			
		Measured Ambient (L_{dn}) [b]	Estimated Projects Impact (L_{dn})	Total Ambient + Projects (L_{dn})	Increase Above Existing
FM100 PROJECT					
Marvindale Compressor Station and Interconnect					
NSA #1 (Residence)	2,300 ft S-SW to Center of CS 900 ft S-SE to Center of Interconnect	52.5	46.9	53.5	1.0
NSA #2 (Residence)	3,500 ft E to Center of CS 4,900 ft E-NE to Center of Interconnect	50.1	38.6	50.4	0.3
NSA #3 (Residence)	4,900 ft W to Center of CS 3,650 ft N-NW to Center of Interconnect	51.1	35.6	51.2	0.1
Tamarack Compressor Station					
NSA #1 (Residence)	1,000 ft N	41.7	43.3	45.6	3.9
NSA #2 (Residence)	1,250 ft NE	43.0	41.0	45.1	2.1
NSA #3 (Residence)	2,850 ft NE	44.7	32.5	45.0	0.3
NSA #4 (Residence)	3,350 ft SW	53.4	30.8	53.5	0.1
NSA #5 (Residence)	3,700 ft W	44.9	29.9	45.0	0.1
NSA #6 (Residence)	1,550 ft N	41.7	38.8	43.5	1.8
NSA #7 (Residence)	1,900 ft NE	43.0	36.7	43.9	0.9
Carpenter Hollow OPP					
NSA #1 (Residence)	1,350 ft S-SW	38.5	41.3	43.1	4.6
LEIDY SOUTH PROJECT					
Compressor Station 605					
NSA #1 (Residence)	1,500 ft NE	42.4	36.7	43.9	1.5
NSA #2 (Residence)	1,865 ft W	53.4	34.4	54.9	1.5
NSA #3 (Residence)	2,150 ft SE	48.6	36.5	50.1	1.5
Compressor Station 607					
NSA #1 (Residence)	1,150 ft W	35.1	47.1	47.4	12.3
NSA #2 (Residence)	1,225 ft SW	37.0	46.5	46.9	9.9
NSA #3 (Residence)	1,325 ft NW	30.4	45.7	45.9	15.5
NSA #4 (Residence)	1,325 ft N	34.5	45.7	46.1	11.6

TABLE B.9.3-1 (cont'd)

Estimated Noise Impacts for the FM100 Project and Leidy South Project [a]

Facility or Project/Nearest NSAs	Distance and Direction from Station (feet)	Projects Acoustic Impact (dBA)			
		Measured Ambient (L_{dn}) [b]	Estimated Projects Impact (L_{dn})	Total Ambient + Projects (L_{dn})	Increase Above Existing
Compressor Station 610					
NSA #1 (Residence)	1,020 ft S	44.6	50.0	51.1	6.5
NSA #2 (Residence)	1,890 ft E	41.1	43.5	45.5	4.4
NSA #3 (Residence)	1,220 ft NW	45.1	48.1	49.9	4.8
Compressor Station 620					
NSA #1 (Residence)	800 ft N-NW	41.1	49.4	50.0	8.9
NSA #2 (Residence)	850 ft W	42.6	48.8	49.8	7.2
NSA #3 (Residence)	1,100 ft N- NE	41.1	46.2	47.4	6.3
NSA #4 (Residence)	1,850 ft S	39.4	40.8	43.2	3.8

[a] Existing sound level at each NSA from measured ambient sound data and estimated noise impacts reported in reports prepared April 19, 2019 by Hoover & Keith Inc.

[b] For existing Compressor Stations 607 and 610 the measured ambient sound levels include the existing compressor station operated at full load.

The noticeable noise increase threshold for the human ear is 3 dB; 5 dB is a clearly noticeable increase in noise, and an increase of 10 dB is perceived to be a doubling of noise. Although National Fuel and Transco's noise levels are well below our standard of 55 dBA, the unusually low ambient noise would make noise produced by the compressor stations more noticeable. National Fuel and Transco commit to ensuring noise attributable to the facility would not exceed 55 dBA L_{dn} at the NSAs. The noise mitigation measures for the Projects would include the use of acoustically insulated compressor buildings; air inlet and exhaust silencers; a unit blowdown silencer; insulated, self-closing, and well-sealed access doors; and, if necessary, acoustical pipe insulation on aboveground outdoor piping.

Commentors expressed concern that Compressor Station 620 would be located in a slight valley, which could cause an amplifying of the sound generated by the compressor station. The nearby hills are covered with abundant trees and other foliage, and therefore not considered sound-reflective surfaces. Therefore, based on the relative distance from the compressor station to the hillsides and vegetation, we conclude that there would be no significant impacts or amplifying of the sound generated at the compressor station due to its location within the valley. However, to ensure that noise levels due to operation of National Fuel's new Marvindale and Tamarack Compressor Stations do not significantly impact nearby NSAs, **we recommend that:**

- **National Fuel should make all reasonable efforts to ensure its predicted noise levels from the Marvindale and Tamarack Compressor Stations are not exceeded at nearby NSAs and file a noise survey with the Secretary no later than 60 days after placing the Marvindale Compressor Station and Tamarack Compressor Station into service. If full load condition noise surveys are not possible, National Fuel should 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 either of these facilities at any load exceeds a L_{dn} of 55 dBA at any nearby NSAs, National Fuel should file a report on what changes are needed and install additional noise controls to meet that level within 1 year of the facility's in-service date. National Fuel should confirm compliance with the L_{dn} of 55 dBA requirements by**

filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.

Due to the potential for a large change in ambient noise levels and to ensure that noise levels due to operation of the new Transco Compressor Stations 607 and 620 do not significantly impact nearby NSAs, **we recommend that:**

- **Transco should make all reasonable efforts to ensure its predicted noise levels from Compressor Stations 607 and 620 are not exceeded at nearby NSAs and file a noise survey with the Secretary no later than 60 days after placing the new Compressor Stations 607 and 620 into service. If full load condition noise surveys are not possible, Transco should 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 either of these facilities at any load exceeds a L_{dn} of 55 dBA at any nearby NSAs, Transco should file a report on what changes are needed and install additional noise controls to meet that level within 1 year of the facility's in-service date. Transco should confirm compliance with the L_{dn} of 55 dBA requirements by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.**

In addition, to ensure that noise levels due to operation of the modified Transco Compressor Stations 605 and 610 do not significantly impact nearby NSAs, **we recommend that:**

- **Transco should make all reasonable efforts to ensure its predicted noise levels from Compressor Stations 605 and 610 are not exceeded at nearby NSAs and file noise surveys with the Secretary no later than 60 days after placing the authorized unit(s) at Compressor Stations 605 and 610 in service. If full load condition noise surveys are not possible, Transco should provide an interim survey at the maximum possible horsepower load and provide the full load survey within 6 months. If the noise attributable to operation of the modified stations at full load exceeds a L_{dn} of 55 dBA at any nearby NSAs, Transco shall file a report on what changes are needed and install additional noise controls to meet that level within 1 year of the in-service date. Transco shall confirm compliance with the L_{dn} of 55 dBA requirement by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.**

Commentors expressed concern about the possible health and nuisance impacts of vibration emanating from Transco's Compressor Station 620 while it is in operation. Vibration could be caused by direct vibration or by low-frequency noise emitted from a compressor station. Transco would mitigate low frequency exhaust noise with a two-stage silencer system. With mitigation there should be no increase in noise-induced perceptible vibrations, or airborne vibrations, at nearby NSAs. In addition, due to the type of compression engines being installed, direct perceptible vibration, or ground borne vibration, should not be felt beyond 200 feet of the vibration source, thereby minimizing any possible impacts on health due to vibrations. Therefore, there should be no increase in perceptible vibration due to the Projects.

Based on the proposed mitigation measures and our recommendation, we conclude that the noise attributable to operation of the Projects would not cause a significant impact.

B.10 RELIABILITY AND SAFETY

The transportation of natural gas by pipeline involves some incremental risk to the public due to the potential for accidental release of natural gas. The greatest hazard is a fire or explosion following a major pipeline rupture.

Methane, the primary component of natural gas, is colorless, odorless, and tasteless. Methane is not toxic, but is classified as a simple asphyxiate, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death. Methane has an auto-ignition temperature of 1,000 °F and is flammable at concentrations between 5.0 percent and 15.0 percent in air. An unconfined mixture of methane and air is not explosive; however, it may ignite and burn if there is an ignition source. A flammable concentration within an enclosed space in the presence of an ignition source can explode. Methane is buoyant at atmospheric temperatures and disperses rapidly in air.

B.10.1 Safety Standards

The DOT is mandated to provide pipeline safety under 49 USC Chapter 601. The DOT's Pipeline and Hazardous Materials Safety Administration (PHMSA) administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. PHMSA develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards that set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety. PHMSA ensures that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the federal, state, and local level.

Section 5(a) of the Natural Gas Pipeline Safety Act provides for a state agency to assume all aspects of the safety program for intrastate facilities by adoption and enforcing the federal standards, while Section 5(b) permits a state agency that does not qualify under Section 5(a) to perform certain inspection and monitoring functions. A state may also act as the DOT's agent to inspect interstate facilities within its boundaries; however, the DOT is responsible for enforcement actions. Pennsylvania is authorized by PHMSA under 5(a) to assume all aspects of the safety program for intrastate, but not interstate, facilities.

The DOT pipeline standards are published in 49 CFR Parts 190-199. Part 192 specifically addresses natural gas pipeline safety issues. Under a Memorandum of Understanding on Natural Gas Transportation Facilities (Memorandum) dated January 15, 1993, between the DOT and FERC, the DOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of FERC's regulations require that an applicant certify that it would design, install, inspect, test, construct, operate, replace, and maintain the facility for which a Certificate is requested in accordance with federal safety standards and plans for maintenance and inspection. Alternatively, an applicant must 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. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum to promptly alert the DOT. The Memorandum also provides for referring complaints and inquiries made by state and local governments and the general public involving safety matters related to pipelines under the Commission's jurisdiction.

The FERC also participates as a member of the DOT's Technical Pipeline Safety Standards Committee, which determines if proposed safety regulations are reasonable, feasible, and practicable.

B.10.2 Project Design Requirements

The pipeline and aboveground facilities associated with the Projects must be designed, constructed, operated, and maintained in accordance with the DOT Minimum Federal Safety Standards in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. The DOT specifies material selection and qualification, minimum design requirements, and protection from internal, external, and atmospheric corrosion.

Safety guidelines for the design and construction of compressor stations are established in 49 CFR 192 in addition to pipeline safety standards. Part 192.163 requires the location of each main compressor building at a compressor station to be on a property under the control of the operator. The station must also be far enough away from adjacent property, not under control of the operator, to minimize the possibility of fire spreading to the compressor building from structures on adjacent properties. Part 192.163 also requires each building at a compressor station site be made of specific building materials and to have at least two separate and unobstructed exits. The station must be in an enclosed fenced area and must have at least two gates to provide a safe exit during emergency.

The compressor station safety systems for the Projects would be engineered with automated control systems to ensure the stations and pipeline pressures are maintained within safe limits and would include several additional over-pressure protection systems that provide an additional layer of safety to back-up the primary controls. The stations would also have an automated emergency system that would shut down the station to prevent an incident should an abnormal operating condition occur, and, if appropriate, would evacuate the gas from the station piping at a safe location.

B.10.3 Pipeline Safety

In addition to the requirements reviewed above, the DOT also defines area classifications, based on population density in the vicinity of the pipeline, and specifies more rigorous safety requirements for populated areas. The class location unit is an area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipeline. The four area classifications are defined below:

Class 1	Location with 10 or fewer buildings intended for human occupancy.
Class 2	Location with more than 10 but less than 46 buildings intended for human occupancy.
Class 3	Location with 46 or more buildings intended for human occupancy or where the pipeline lies within 100 yards of any building, or small well-defined outside area occupied by 20 or more people on at least 5 days a week for 10 weeks in any 12-month period.
Class 4	Location where buildings with four or more stories aboveground are prevalent.

Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. For instance, pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil and 18 inches in consolidated rock. Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 36 inches in normal soil and 24 inches in consolidated rock.

Class locations also specify the maximum distance between sectionalizing block valves (e.g., 10.0 miles in Class 1; 7.5 miles in Class 2; 4.0 miles in Class 3; and 2.5 miles in Class 4). Pipe wall thickness and pipeline design pressures, hydrostatic test pressures, Maximum Allowable Operating Pressure,

inspection and testing of welds, and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas.

The Projects would be constructed through Class 1, 2, and 3 areas as summarized in table B.10.3-1. National Fuel and Transco would design, test, and operate sections of their pipelines by their designated pipeline class locations, in accordance with 49 CFR 192, Subpart G. Through the life of the pipelines and aboveground facilities, changes in population density near the proposed facilities would be monitored to document that the new facilities would continue to meet the appropriate design criteria and safety standards where class locations change in accordance with 49 CFR 192, Subpart L, Sections 192.609 and 192.611. When changes in population density occur, National Fuel and Transco would modify the pipeline to comply with DOT requirements by replacing sections of pipe, reducing the operating pressure in the line, or taking other similar safety measures.

TABLE B.10.3-1

Class Locations of Pipeline Facilities for the FM100 Project and Leidy South Project

Project/Facility	Beginning Milepost	Ending Milepost	Class Designation
FM100 PROJECT			
Line YM58	0	6.7	1
	6.7	8.2	2
	8.2	13.8	1
	13.8	15.2	2
	15.2	15.3	3
	15.3	16.0	2
	16.0	26.2	1
	26.2	27.3	2
	27.3	29.5	1
YM224 Loop	0	1.41	1
Line KL Extension	0	0.4	1
LEIDY SOUTH PROJECT			
Hensel Replacement (Proposed Leidy Line D)	188.51	193.33	1
	193.33	194.00	2
Hilltop Loop	183.55	184.90	1
	184.90	185.19	2
	185.19	186.01	1
Benton Loop	116.87	120.42	1

The DOT's Pipeline Safety Regulations require operators to develop and follow a written integrity management program that contains all the elements described in 49 CFR 192.911 and address the risks on each transmission pipeline segment. The rule establishes an integrity management program which applies to all high consequence areas (HCA).

The DOT has published rules that define HCAs where a natural gas pipeline accident could do considerable harm to people and their property and requires an integrity management program to minimize the potential for an accident. This definition satisfies, in part, the Congressional mandate for the DOT to prescribe standards that establish criteria for identifying each gas pipeline facility in a high-density population area.

The HCAs may be defined in one of two ways. In the first method, an HCA includes:

- current Class 3 and 4 locations;

- any area in Class 1 or 2 where the potential impact radius[20] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle;[21] or

- any area in Class 1 or 2 where the potential impact circle includes an identified site.[22]

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 and for its facilities, it must apply the elements of its integrity management program to those segments of the pipeline within HCAs. The DOT regulations specify the requirements for the integrity management plan at 49 CFR Section 192.911.

Based on preliminary designs and available aerial imagery, the FM100 Project would cross two areas classified as HCAs along Line YM58, between mileposts 15.0 to 15.4 and mileposts 19.2 to 19.5. The Leidy South Project would not cross any HCAs. Should the Projects be granted a Certificate and DOT analysis confirms the FM100 Project's HCAs, they would be added to National Fuels Integrity Management Plan. The pipeline integrity management rule for HCAs requires inspection of the pipeline HCAs every 7 years.

On October 1, 2019 the PHMSA issued new regulations modifying and expanding the standard pipeline safety standards under 49 CFR Parts 191 and 192. These regulations, in part, established: new standards for in-line inspections; requirements for newly established moderate consequence areas (MCA); explicitly requires consideration of seismicity and geotechnical risks in its integrity management plan for the pipeline; new regulations on pipeline patrol frequency for HCAs, MCAs and grandfathered pipelines; a policy to reconfirm maximum allowable operating pressure (MAOP) for certain pipelines; installation of pressure relief for pig launcher/receivers, and report exceedances of MAOP to PHMSA. These regulations go into effect on July 1, 2020.

B.10.4 Aboveground Facilities

Parts 192.731 through 192.736 of 49 CFR establish safety guidelines for inspection, testing, and monitoring at compressor stations. National Fuel and Transco would be required to inspect the facilities at least once per calendar year, at intervals not exceeding 15 months. Inspections would ensure that the facilities and pipeline system are in good mechanical condition, set to control or relieve at the correct pressure consistent with the pressure limits in Part 192.201(a), and are properly installed and protected from dirt, liquids, or other conditions that might prevent proper operation.

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[20] The potential impact radius is calculated as the product of 0.69 and the square root of: the Maximum Allowable Operating Pressure of the pipeline in psig multiplied by the square of the pipeline diameter in inches.

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

[22] 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.

Part 192.163 of 49 CFR requires that each compressor station have an emergency shutdown system that must meet several specifications. The proposed compressor stations would be equipped with automatic detection and emergency shutdown systems, including:

- flame detection that uses ultraviolet sensors;
- gas detection for detecting low concentrations of natural gas;
- emergency shutdowns to isolate the gas piping, stop equipment, and safely vent station gas; and
- individual unit shutdown systems in case of mechanical or electrical failure of a compressor unit system or component.

National Fuel and Transco have committed to constructing all compressor stations, interconnects, mainline valves, and OPP stations to meet or exceed the specified requirements.

B.10.5 Emergencies

Under 49 CFR 192.615, each pipeline operator must establish an emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency. National Fuel and Transco would develop and implement Emergency Response Plans that would be used for their respective systems. Key elements of the plans would include procedures for the following:

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

The 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. Operators 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. National Fuel and Transco would provide the appropriate training to local emergency service personnel before the Projects are placed in service.

National Fuel would incorporate the proposed facilities from the FM100 Project into existing emergency response plans and work with local first responders in the community to develop modifications to local community plans as necessary. National Fuel would coordinate with public authorities and local public utilities to distribute information regarding the facilities including emergency telephone numbers.

Transco would establish site-specific emergency procedures for the Leidy South Project that would ensure, but are not limited to, the prompt and effective response to facility emergencies, annual training for appropriate operating personnel to effectively respond to an emergency, and establishing and maintaining communication with local fire, police, and other public officials. Transco would implement its existing Public Awareness and Damage Prevention Program and provide access to its 24-hour emergency response capabilities including an emergency-only phone number.

We received general comments concerning whether the local emergency responders would have the capability to respond to pipeline or compressor station emergencies. Through the plans outlined above, both National Fuel and Transco would work with the local emergency responders and conduct facility-specific training to inform them of specific response procedures. In addition, all personnel working at manned facilities would be trained as first responders. Additional comments were received regarding public awareness and public response to emergencies. Both National Fuel and Transco have programs in place to ensure information is distributed to the community along with 24-hr emergency phone numbers.

B.10.6 Pipeline Accident Data

The DOT requires all operators of natural gas transmission pipelines to notify the National Response Center at the earliest practicable moment following the discovery of an incident and to submit a report within 30 days to PHMSA. Significant incidents are defined as any leaks that:

- cause death or personal injury requiring hospitalization; or
- involve property damage of more than $50,000, in 1984 dollars.[23]

During the 20-year period from 1999 through 2018, a total of 1,373 significant incidents were reported on the more than 300,000 total miles of natural gas transmission pipelines nationwide (PHMSA, 2019). Additional insight into the nature of service incidents may be found by examining the primary factors that caused the failures. Table B.10.6-1 provides a distribution of the causal factors as well as the number of each incident by cause.

The dominant causes of pipeline incidents are pipeline material, weld, or equipment failure and corrosion, which constitute approximately 53.2 percent of all significant incidents. The pipelines included in the data set in table B.10.6-1 vary widely in terms of age, diameter, and level of corrosion control. Each variable influences the incident frequency that may be expected for a specific segment of pipeline.

[23] $50,000 in September 1984 dollars is approximately $122,266 as of September 2019 (U.S. Bureau of Labor Statistics, 2019).

TABLE B.10.6-1

Natural Gas Transmission Pipeline Significant Incidents by Cause (1999-2018)

Cause	Number of Incidents [a]	Percentage
Corrosion	317	23.1
Excavation	195	14.2
Pipeline material, weld, or equipment failure	413	30.1
Natural force damage	156	11.4
Outside Force [b]	95	6.9
Incorrect operation	55	4.0
All other causes [c]	142	10.3
Total	**1,373**	**100**

[a] All data gathered from PHMSA Serious Incident files, October 2019.
[b] Fire, explosion, vehicle damage, previous damage, intentional damage.
[c] Miscellaneous causes or other unknown causes.
Source: PHMSA, 2019.

The frequency of significant incidents is strongly dependent on pipeline age. Older pipelines have a higher frequency of corrosion incidents and material failure, since corrosion and pipeline stress/strain are time-dependent processes. The use of both an external protective coating and a cathodic protection system,[24] required on all pipelines installed after July 1971, significantly reduces the corrosion rate compared to unprotected or partially protected pipe.

Outside forces, excavation, and natural forces are the next three most significant causes of pipeline incidents, totaling approximately 32.5 percent of significant pipeline incidents. These result from the encroachment of mechanical equipment such as bulldozers and backhoes; earth movements due to soil settlement, washouts, or geologic hazards; weather effects such as winds, storms, and thermal strains; and willful damage. Older pipelines have a higher frequency of outside force incidents, in part because their location may be less well known and less well marked as compared to newer pipelines. In addition, older pipelines contain a disproportionate number of smaller-diameter pipelines; which have a greater rate of outside forces incidents. Small-diameter pipelines are more easily crushed or broken by mechanical equipment or earth movement.

Since 1982, operators have been required to participate in One-Call public utility programs in populated areas to minimize unauthorized excavation activities in the vicinity of pipelines. The One-Call program is a service used by public utilities and some private sector companies (e.g., oil pipelines and cable television) to provide preconstruction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts. National Fuel and Transco would use the state One-Call system for utility line locations prior to excavation.

The nationwide totals of accidental fatalities from various anthropogenic and natural hazards are listed in table B.10.6-2 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. The data nonetheless indicate a low risk of death due to incidents involving natural gas transmission pipelines compared to the other categories. Furthermore, the fatality rate is much lower than the fatalities from natural hazards such as lightning, tornados, or floods.

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

TABLE B.10.6-2

Nationwide Accidental Fatalities by Cause

Type of Accident	Annual Number of Deaths
All unintentional deaths	146,571
Motor vehicle [a]	35,369
Poisoning [a]	38,851
Falls [a]	30,208
Pedestrian-vehicle crash [b]	5,977
Drowning [a]	3,391
Fire, smoke inhalation, burns [a]	2,760
Floods [c]	81
Tornado [c]	72
Lightning [c]	49
Hurricane [c]	47
Natural gas distribution lines [d]	13
Natural gas transmission pipelines [d]	2

[a] Accident data presented for motor vehicle, poisoning, falls, drowning, fire, smoke inhalation, and burns represent the annual accidental deaths recorded in 2013 (Centers for Disease Control and Prevention, 2013; Deaths: Final Data for 2013; http://www.cdc.gov/nchs/data/nvsr/nvsr64/nvsr64_02.pdf. Accessed 2/17/2016.)

[b] National Highway Traffic Safety Administration 2017 data, October 2018

[c] Accident data presented for floods, tornados, lightning, and hurricanes represent the 30 year average of accidental deaths between 1985 and 2014 (NOAA, 2016. National Weather Service, Office of Climate, Water and Weather Services, National Hazard Statistics, 30 year average [1985-2014]; Available at: http://www.nws.noaa.gov/om/hazstats.shtml. Accessed 2/17/2016.)

[d] Accident data presented for natural gas distribution lines and transmission pipelines represent the 20-year average between 1996 and 2015 (U.S. Department of Transportation, 2016. Pipeline and Hazardous Materials Safety Administration, Pipeline Significant Incident 20 Year Trend: 20-Year Average [1996-2015]; Available at: http://opsweb.phmsa.dot.gov/primis_pdm/significant_inc_trend.asp. Accessed 2/17/2016.)

The available data show that natural gas transmission pipelines continue to be a safe, reliable means of energy transportation.

The Projects would represent a minimum increase in risk to the nearby public and we are confident that with adherence to the DOT Minimum Federal Safety Standards in 49 CFR Part 192 as well as regular monitoring and testing of the pipeline and aboveground facilities, the Projects would be constructed and operated safely.

B.11 CUMULATIVE IMPACTS

In accordance with NEPA and FERC policy, we evaluated the potential for cumulative impacts of the FM100 Project and the Leidy South Project when combined with other projects or actions in the area. 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. Consistent with Council on Environmental Quality guidelines, we have aggregated past actions that helped shape today's environment into our discussion of the affected environment in section B. Therefore, present and reasonably foreseeable future actions are discussed in this section.

This cumulative impacts analysis uses an approach consistent with the methodology set forth in relevant guidance (Council on Environmental Quality, 1997, 2005; EPA, 1999). Under these guidelines,

inclusion of actions within the analysis is based on identifying commonalities between the impacts that would result from the Projects and the impacts likely to be associated with other potential projects.

The geographic scope for each resource is unique and is generally more localized for somewhat stationary resources such as geological and soil resources; more expansive for resources with a large geographic area, such as visual impacts and air emissions; and based on jurisdictional boundaries for resources such as socioeconomics and public lands. We evaluated cumulative impacts from a geographical perspective recognizing that the proximity of other actions to the Projects is a major predictor of whether cumulative impacts would occur. In general, the closer another action is to the Projects, the greater the potential for cumulative impacts. Table B.11-1 summarizes the resource-specific geographic boundaries considered in this analysis and the justification for each. Actions occurring outside these geographical boundaries were generally not evaluated because their potential to contribute to a cumulative impact diminishes with increasing distance from the Projects.

TABLE B.11-1

Geographic Scope by Resource for Cumulative Impacts Associated with the FM100 Project and Leidy South Project

Resource	Geographic Scope	Justification for Geographic Scope
Geology and Soils	Construction workspaces and immediately adjacent areas	Impacts on soils and surficial geology would be highly localized and are not expected to extend much beyond the area of direct disturbance associated with the Projects.
Groundwater, Surface Water, Wetlands, Aquatic Resources	HUC-12 watersheds	Watersheds are natural, well-defined boundaries for surface water flow, and commonly contribute to the recharge of groundwater resources. Impacts on groundwater, surface water resources, wetlands, and aquatic resources could reasonably extend throughout a HUC-12 watershed (i.e., a detailed hydrologic unit that can accept surface water directly from upstream drainage areas and indirectly from associated surface areas such as remnant, noncontributing, and diversions to form a drainage area with single or multiple outlet points, as could the related impacts on aquatic resources and fisheries).
Vegetation, Wildlife, Special Status Species	HUC-12 watersheds	Consideration of impacts within a HUC-12 watershed sufficiently accounts for impacts on vegetation and wildlife (including special status species) that would be directly affected by construction activities and for indirect impacts such as changes in habitat availability and displacement of transient species.
Land Use	Construction workspaces (land use) and within 0.25 mile of the Projects (recreation)	Impacts on general land uses would be restricted to the construction workspaces and the adjacent landscape up to 0.25 mile where indirect impacts could occur.
Visual Resources	Within 0.25 mile of pipelines and 0.5 mile of aboveground facilities	Assessing the impact based on the viewshed allows for the impact to be considered with any other feature that could have an effect on visual resources.
Socioeconomics	County	The geographic scope of potential impact for socioeconomics was considered to include the counties affected by the Projects where most workers would be expected to reside during construction and operation of the Projects. Affected counties would experience the greatest impacts associated with employment, housing, public services, transportation, traffic, property values, economy and taxes, and environmental justice.
Cultural Resources	Area of Potential Effect, which typically includes overlapping impacts within the Projects' footprint (direct) and within 0.25 mile of aboveground facilities (indirect)	The impact area for direct effects (physical) includes areas subject to ground disturbance, while indirect effects (visual or audible) include aboveground ancillary facilities or other project elements that are visible from historic properties in which the setting contributes to their NRHP eligibility.

TABLE B.11-1 (cont'd)

Geographic Scope by Resource for Cumulative Impacts Associated with the FM100 Project and Leidy South Project

Resource	Geographic Scope	Justification for Geographic Scope
Air Quality – Construction [a]	Within 0.25 mile of all active construction (pipeline, road crossing, aboveground facilities)	Air emissions during construction would be limited to vehicle and construction equipment emissions and dust, and would be localized to the Projects' construction sites.
Air Quality – Operation [a]	50 kilometers (about 31.1 miles) from aboveground compression facilities	We adopted the distance used by the EPA for cumulative modeling of large PSD sources during permitting (40 CFR 51, appendix W), which is a 50-kilometer radius. Impacts on air quality beyond 50 kilometers (31.1 miles) would be *de minimis*.
Noise – Construction	NSAs within 0.25 mile of any construction and within 0.5 mile of compressor stations and HDD activities	Areas in the immediate proximity of pipeline or aboveground facility construction activities would have the potential to be affected by construction noise. NSAs within 0.5 mile of an HDD could be cumulatively affected if other projects had a concurrent impact on the NSA.
Noise – Operation	NSAs within 1 mile of a noise-emitting permanent aboveground facility	Noise from the Projects' permanent aboveground facilities could result in cumulative noise impacts on NSAs within 1 mile.

[a] We note that GHGs do not have a localized geographic scope. GHG emissions from the Projects combined with projects all over the planet lead to increased CO_2, methane, and other GHG concentrations in the atmosphere.

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 Projects was conducted using the following guidelines.

Projects and activities included in this analysis are generally those of comparable magnitude or nature of impact as the Projects and impact the same resources as the Projects. As such, this would include other utility projects of a similar linear nature. For the most part, this is possible when other projects are within the same general location as the Projects (i.e., within one or more of the cumulative impacts geographic scopes listed in table B.11-1). The effects of more distant projects generally are not assessed because their impacts would typically diminish with distance and, thus, would not significantly contribute to impacts in the area of the Projects. Certain exceptions may be made where a resource is regionally or nationally rare or unique and where concern for a cumulative impact is substantial. For example, an exception is air quality, which can affect larger areas; thus, the geographic scope for air quality is larger than that of other resources (see table B.11-1 and the associated discussion regarding resource-specific geographic scopes). Per EPA guidelines, project-specific analyses are usually conducted on the scale of counties, forest management units, or installation boundaries, whereas cumulative effects analysis should be conducted on the scale of human communities, landscapes, watersheds, or airsheds. As discussed in section A.10, impacts associated with the non-jurisdictional facilities associated with the Projects have been incorporated into the overall impacts of the Projects, and therefore the cumulative effects of these activities are already captured in the environmental analysis in section B and not discussed further in the analyses below.

The timeframe within which another planned, proposed, or ongoing project occurs could also result in a cumulative impact relative to the Projects depending on whether the impacts are temporary, short term, long term, or permanent. Once the effects cease, there is no longer a cumulative effect associated with the Projects. As discussed in the preceding environmental analysis, most of the Projects' impacts are temporary or short-term. Notable exceptions are forest clearing, operational noise and air emissions, as well as land use conversion for aboveground facilities, which are either long term or permanent. Impacts from older projects (completed 5 or more years ago) are considered to have been mitigated over time, with the disturbed environment having become part of the baseline character of the region described in the affected environment for each resource. As such, we have considered the impacts

associated with past projects that have resulted in permanent impacts on a resource or were constructed less than 5 years ago and are currently being restored.

We have also considered how concurrent (present) and reasonably foreseeable future projects would contribute further to the cumulative impact of the Projects. The potential for cumulative impacts associated with the Projects would be greatest during the construction phase for the pipelines and throughout construction and operation of the aboveground facilities. The potential long-term cumulative impacts associated with the operation of the Projects and other actions (i.e., cumulative impacts extending well beyond the period of construction of a project) such as effects related to forest loss and noise and air emissions from the aboveground facilities. For these resources, we expanded the temporal range of our cumulative impact analysis.

Both positive cumulative impacts (i.e., new jobs and tax revenues) and negative cumulative impacts (i.e., contribution to ongoing air emissions) were identified in the analysis. Where we determined that a potential for cumulative impacts exist, we quantified the impacts to the extent practicable. However, in some cases the potential impacts can only be described qualitatively. This is particularly the case for projects in the planning stages, which may be contingent on economic conditions, availability of financing, and/or the issuance of permits, or projects for which there is a lack of available information.

B.11.1 Projects and Activities Considered

Our cumulative impacts analysis looks at the potential impacts of other actions as described in relevant guidance. 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 scope of the cumulative impact assessment depends in part on the availability of information about other projects. For this assessment, other projects were identified from information provided by National Fuel and Transco; field reconnaissance; online research; FERC staff's knowledge of other planned, pending, and ongoing jurisdictional natural gas projects; communications with federal, state, and local agencies, and via comments received during the public scoping period. Cumulative impacts were typically derived from our approximation of project boundaries as interpreted from publicly available project descriptions, maps, and aerial photography.

Table B.11.1-1 and figure B.11.1-1 summarize the present and reasonably foreseeable projects or actions that occur within the geographic scope of each resource area as defined in table B.11-1.

TABLE B.11.1-1

Present and Reasonably Foreseeable Activities and Projects Considered in the Cumulative Impact Analysis for the FM100 Project and Leidy South Project [a]

Activity/Project	Counties Shared with Projects	Approximate Distance from Projects [b]	HUC 12 Watershed(s) Shared with Projects	Description	Status or Timeframe	Resources Potentially Cumulatively Affected [c]
INDUSTRIAL DEVELOPMENTS						
Pipeline System Projects						
Transco Atlantic Sunrise Project	Clinton, Columbia, Luzerne, Lycoming, Schuylkill, and Wyoming Counties, PA	0 miles	Beaver Run, Fishing Creek-Susquehanna River, Hans Yost Creek-Deep Creek, Headwaters Huntington Creek, Left Branch Young Womans Creek, Lower South Branch Tunkhannock Creek, Mud Run-Green Creek, Paddy Run	Transco constructed a 183-mile-long greenfield pipeline segment, two pipeline loops totaling 12 miles, 2.5 miles of pipeline replacement, and two new compressor stations in Pennsylvania. Transco also made additions or modifications to facilities in Pennsylvania, Maryland, Virginia, North Carolina, and South Carolina. Compressor Stations 605 and 610, built as part of the Transco Atlantic Sunrise Project, would be modified as part of the proposed Leidy South Project.	The project was placed into full service in October 2018. As of November 2019, restoration is ongoing.	All
National Fuel YM28 and FM120 Modernization Project	McKean, Elk, and Cameron Counties, PA	0 miles west (connects to YM58 at MP 0)	Marvin Creek	National Fuel is installing approximately 14.4 miles of new coated steel pipeline, inserting approximately 5.8 miles of FlexSteel pipe into the existing FM120, abandoning in-place approximately 7.7 miles of the existing YM28 pipeline, and removing from service approximately 12.5 miles of the FM120 pipeline south of the pipe insertion.	Clearing began March 2018, with construction starting in July 2019. Installation and interconnection portion of the project are currently in restoration monitoring, while the insertion portion has recently started.	All
National Fuel Northern Access 2016 Project	McKean County, PA	0 miles north/south (appears to cross FM100 near MP 2)	Marvin Creek, Red Mill Brook-Potato Creek; Potato Creek Outlet	National Fuel has proposed to install approximately 97.8 miles of new steel pipeline, associated facilities, and modifications.	Order Granting Abandonment and Issuing Certificates issued by FERC on February 3, 2017. As of November 2019, currently in litigation. Construction start date unknown.	All
Wells						
Various natural gas wells	Various locations in Cameron, Clearfield, Clinton, Elk, Lycoming McKean, Potter, and Wyoming Counties, PA	Varies	Varies	Natural gas well drilling.	Ongoing	Varies (although all resources are considered)

TABLE B.11.1-1 (cont'd)

Present and Reasonably Foreseeable Activities and Projects Considered in the Cumulative Impact Analysis for the FM100 Project and Leidy South Project [a]

Activity/Project	Counties Shared with Projects	Approximate Distance from Projects [b]	HUC 12 Watershed(s) Shared with Projects	Description	Status or Timeframe	Resources Potentially Cumulatively Affected [c]
UTILITIES AND TRANSPORTATION						
Renovo Energy Center	Clinton County, PA	3.8 miles southwest of Hilltop Loop	None	Renovo Energy Center is proposing to build a 950 MW natural gas fired power plant on a 70-acre former railyard.	As of November 2019, securing permits and financing. Construction anticipated for 2020.	S, A – Con, A – Ops, N – Con, N – Ops
Big Level Wind Project	Potter County, PA	13 miles east of Line YM224	None	Trans-Alta is constructing a 90-MW wind farm consisting of 25 turbines across 6,900 acres.	Construction began in February 2019 and has continued through at least December 2019.	S
Pennsylvania Department of Transportation (PennDOT) Road Resurfacing Projects	Cameron, Clearfield, Clinton, McKean, and Potter Counties, PA	Varies	Varies	PennDOT is conducting a series of road resurfacing and bridge replacement projects throughout the state as part of its 2019-22 Transportation Improvement Program.	Current construction projects began in 2019 and will continue through 2022.	Varies (although all resources are considered)

[a] This table lists those projects that are most likely to contribute to the cumulative impacts within the vicinity of the Projects as defined in this section; it is not intended to provide an all-inclusive listing of projects in the region.

[b] Approximate distance listed represents the feature or facility closest to the Projects.

[c]

All – all resources	W – Wetlands	LU – Land Use	A – Con – Air, Construction
GE – Geology	VG – Vegetation	Rec – Recreation	A – Ops – Air, Operations
SL – Soils	WL – Wildlife	V – Visual	N – Con – Noise, Construction
GW – Groundwater	PS – Protected Species	S – Socioeconomics	N – Ops – Noise, Operations
SW – Surface Waters		CR – Cultural Resources	

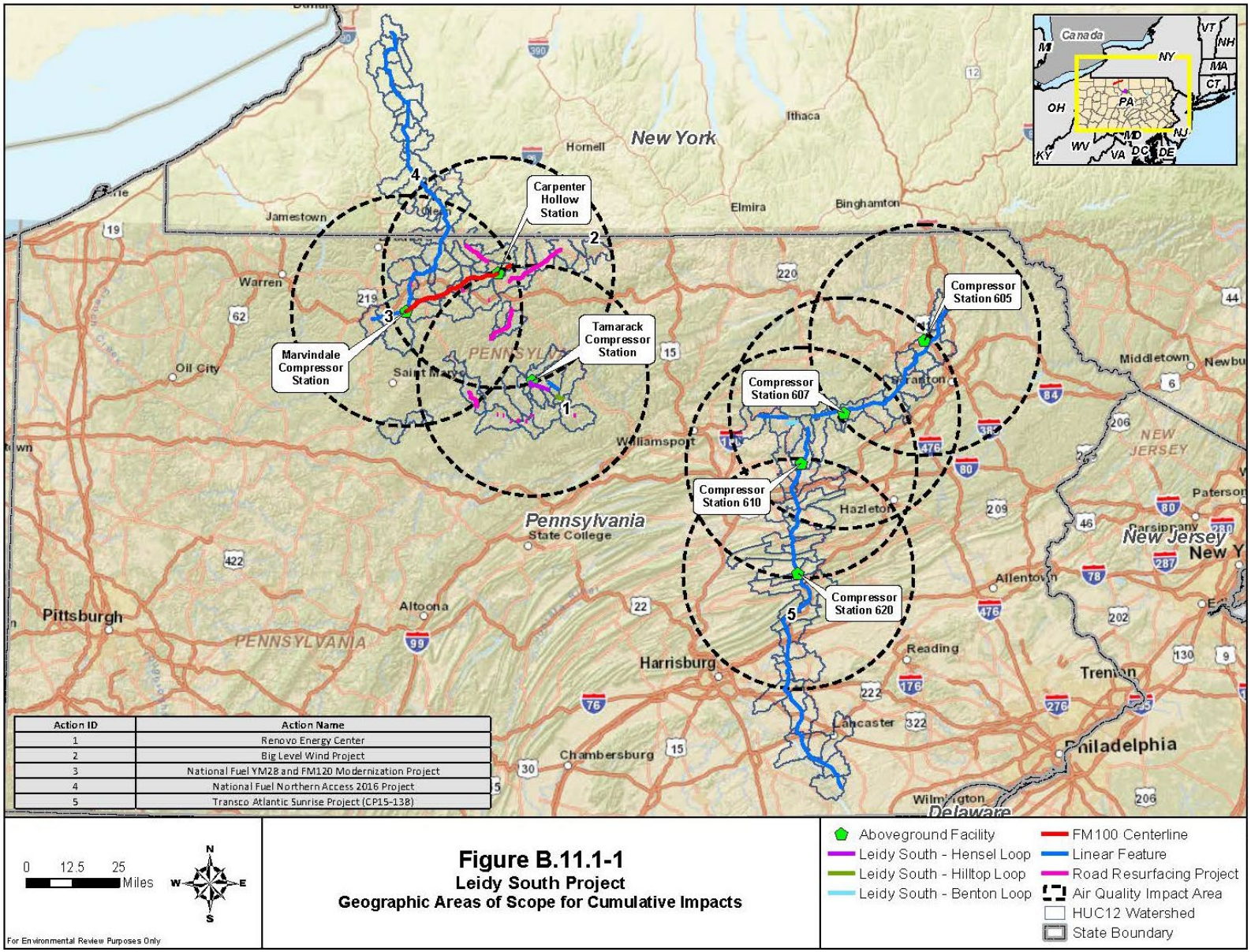

Figure B.11.1-1
Leidy South Project
Geographic Areas of Scope for Cumulative Impacts

We received comments during scoping that we should evaluate cumulative impacts from Transco's Atlantic Sunrise Project, National Fuel's Line YM28 and Line FM120 Modernization Project, and National Fuel's Northern Access 2016 Project. We determined that all three of these actions could occur within the geographic and temporal scope of the FM100 Project and Leidy South Project and, as such, have included them in our analysis.[25]

We also received comments about a possible future Transco Project. We note that as of February 2020, the Transco Regional Energy Access Project has not yet requested to participate in FERC's pre-filing process or filed an application with FERC. As such, this project is speculative and, because NEPA does not require a speculative analysis if not enough information is available to permit meaningful consideration, it is not discussed in detail in our analysis below.

B.11.2 Cumulative Impacts of FERC-Jurisdictional Projects

Table B.11.2-1 lists the general environmental impacts associated with FERC-regulated projects within the cumulative geographic scope area. Cumulative impacts were derived from FERC-issued environmental documents (i.e., EIS or EA) or applicant-prepared reports provided as part of the application or pre-filing materials, which can be quantified. The impacts listed reflect those associated with the entire project and not just those associated with impacts within the cumulative impacts area (e.g., HUC-12 watershed).

The identified FERC-jurisdictional projects would be constructed and maintained in accordance with general measures similar to those that are described throughout section B of this EA. Our additional recommended mitigation measures for each project, as applicable, and other construction, operation, and mitigation measures that may be required by federal, state, or local permitting authorities (see tables A.10-1 and A.10-2), would further reduce the potential for cumulative impacts.

Most cumulative impacts with the other FERC-jurisdictional projects would likely be limited to the areas where construction activities overlap with previously disturbed areas that are now restored or in the restoration process. The fact that certain resources, such as soils, were previously disturbed and are just re-impacted (not additive), or the impact has ceased to exist, often result in minimal to no cumulative impact. For additional aboveground facilities at existing facilities, the impacts are often re-impacting the same resources, or the resource has already been impacted. The exception would be visual, air, and noise impacts, which could cumulatively be impacted with additional facilities.

[25] Consistent with Council on Environmental Quality guidelines, our discussion of past actions is aggregated into the description of the affected environment. Therefore, only present and reasonably foreseeable future actions are discussed in this section.

TABLE B.11.2-1

Environmental Impacts Associated With FERC-Regulated Projects within the HUC-12 Cumulative Impacts Area [a]

Project Name	Impacts (acres) – Soils, Vegetation, Land Use		Prime Farmland Impacts – Permanent (acres)	Number of Waterbodies Crossed	Wetland Impacts (acres)		Forest Impacts (acres)		No. of Likely to Adversely Affect Species
	Con.	Op.			Temp.	Perm.	Temp.	Perm.	
Transco Atlantic Sunrise Project	3,741.0	1,235.4	84.3	388	46.3	8.3	1,043.2	425.8	0
National Fuel YM28 and FM120 Modernization Project	218.6	131.8	111.6	57	5.2	0.7	112.4	69.6	0
National Fuel Northern Access 2016 Project	1,307.0	619.0	8.0	206	89.4	6.8	623.7	344.0	0

[a] Quantitative data are approximate and based on information presented in a FERC-issued EIS or EA, or information presented in the proponent's FERC application.

B.11.3 Potential Cumulative Impacts by Resource

The following sections address the potential cumulative impacts on specific environmental resources from the Projects and the other projects identified within the cumulative geographic scope area.

B.11.3.1 Geology and Soils

Projects from table B.11.1-1 that are within the cumulative impacts area for geologic resources and soils include the Transco Atlantic Sunrise Project, the National Fuel YM28 and FM120 Modernization Project, the National Fuel Northern Access 2016 Project, and ongoing natural gas development in the region (i.e., natural gas wells).

Construction of the Transco Atlantic Sunrise Project is complete; however, restoration of the resources affected during construction of the pipeline (e.g., soils, vegetation, wetlands) is underway and only complete in some areas. The Leidy South Project is immediately adjacent to the footprint of the Transco Atlantic Sunrise Project in multiple counties (see table B.11.1-1). The eastern terminus of the Hensel Replacement abuts the western terminus of the Chapman Loop of the ASP Project. The western terminus of the Hilltop Loop abuts the eastern terminus of the Chapman Loop of the ASP Project. The eastern terminus of the Unity Loop of the ASP Project abuts the western terminus of the Benton Loop. Additionally, Transco would utilize construction workspace used for construction of the Chapman and Unity Loops for portions of the Leidy South Project. Finally, Compressor Stations 605 and 610, which were constructed as part of the Transco Atlantic Sunrise Project, are proposed to be modified as part of the Leidy South Project. Based on the scope of National Fuel's YM28 and FM120 Modernization Project and Northern Access 2016 Project, the potential workspaces that overlap with the FM100 Project would be National Fuel's proposed Marvindale Compressor Station, KL Extension, and the beginning of Line YM58, all in southeastern McKean County. Construction of the YM28 and FM120 Modernization Project is largely completed and restoration is underway. While FERC issued an Order Granting Abandonment and Issuing Certificate for National Fuel's Northern Access 2016 Project in February 2017, construction has not yet begun. When project construction proceeds, it would intersect with the proposed FM100 Project at milepost 0.0 of the Line KL Extension in McKean County.

The primary cumulative impacts on existing geologic conditions and soils resulting from the Projects and the other projects listed above would be limited to construction activities. This includes overlapping construction activities such as clearing, grading, trench excavation, backfilling, and the movement of construction equipment and the permanent disturbance of slopes within the work areas

where grading and filling is required to create a safe and stable land surface to support facilities, and equipment. Project activities such as grading, trenching, and backfilling would result in minor alteration of surficial geology and soil conditions within the pipeline construction workspace, and HDD activities would physically alter geologic materials along a very narrow subsurface drill path. Alterations in surficial geology and soil conditions could result in encountering or creating a future landslide; however, the risk associated with landslides is low in the area of the Projects, and these effects would be largely localized to disturbed and adjacent areas. National Fuel and Transco do not anticipate that any blasting would be required for the construction of the pipeline facilities and, following construction, would restore topographic contours along the pipeline rights-of-way to preconstruction conditions. Permanent cumulative impacts on geologic conditions and soils would occur where an aboveground facility such as a compressor station or well pad is installed.

Cumulative impacts on soil and geologic resources associated with the Transco Atlantic Sunrise Project, National Fuel YM28 and FM120 Modernization Project, National Fuel Northern Access 2016 Project, and ongoing natural gas development in the region (i.e., natural gas wells), when combined with the proposed Projects, would be similar to that described in sections B.1 and B.2, as well as incremental and repeated within the geographic scope (i.e., construction workspaces and immediately adjacent areas). Impacts would be incremental because they would expand the impacts already experienced at the given shared construction workspaces, and repeated because some of the impacts would all occur within the same work areas. Most of the impacts may not overlap though in temporal scope if the soils from the earlier projects are restored to pre-construction conditions prior to the disturbance of the proposed Projects.

The Projects would result in the permanent conversion of 49.6 acres of prime farmland and 25.5 acres of farmland of statewide importance to impervious ground. No permanent impacts on prime farmland or farmland of statewide importance would be associated with Transco's modifications to Compressor Stations 605 and 610 (built as part of the ASP Project) and therefore no permanent incremental impacts would occur. Most of the impacts on soils are not likely to overlap in temporal scope given that the soils in the areas where the ASP Project abuts or overlaps the Leidy South Project are mainly stable and restored to pre-construction conditions. Impacts on paleontological and mineral resources, including mining and oil and gas production, would also be limited to the area disturbed by the Projects. As such, construction and operation of the Projects would have little to no cumulative effect on soil and geologic resources in conjunction with current and future oil and gas development in the region. National Fuel and Transco, who are also the proponents of the other projects identified in the geographic scope area (see table B.11.1-1), would each implement measures to avoid damaging existing oil and gas production facilities, and we expect that future oil and gas wells would be sited to avoid operational rights-of-way of these projects. Construction and operation of the Projects, combined with the Transco Atlantic Sunrise Project, National Fuel YM28 and FM120 Modernization Project, and National Fuel Northern Access 2016 Project, would not prevent or reduce future oil and gas production in the region.

We note that National Fuel, Transco, and other FERC-regulated projects would implement FERC's Plan and Procedures to protect soil resources and minimize incremental impacts on soils. This would include applying measures to control erosion and sedimentation during construction and ensuring proper restoration and revegetation of disturbed areas. As a result, most project-related impacts on soils due to construction of the proposed Projects and other FERC-regulated projects would be temporary to short term and minor. While the proponents of these projects would be responsible for restoration of an area, the restoration timeframe could be extended because of ground disturbance associated with the next project in any given area. Further, the proposed new aboveground facilities would occupy relatively small footprints at various locations, as discussed above. However, as mentioned above, if the impact on a previous project has been resolved/restored, it is likely that there would be no cumulative impact, which is the case with some of the projects.

In general, the proposed Projects and other projects in the cumulative impacts area would not materially impact (i.e., permanently curtail or preclude the extraction of) marketable mineral resources or soils in the area of the Projects. As such, construction and operation of the Projects, when considered with the other projects in the cumulative impacts area, would not contribute significantly to cumulative impacts on geologic and soil resources.

B.11.3.2 Surface Water

Projects from table B.11.1-1 that are within the cumulative impacts area for surface waters include the Transco Atlantic Sunrise Project, National Fuel YM28 and FM120 Modernization Project, National Fuel Northern Access 2016 Project, ongoing natural gas development in the region (i.e., natural gas wells), and PennDOT road improvement projects. Based on the scope of the Transco Atlantic Sunrise Project, National Fuel YM28 and FM120 Modernization Project, and National Fuel Northern Access 2016 Project, the specific shared geographic scope areas with the proposed Projects are similar to those described in section B.11.3.1. While there are no known wells or road improvement projects that directly overlap with the proposed Projects, they share the same geographic scope area (i.e., HUC-12 watershed) and are discussed generally. Cumulative impacts on surface waters from projects and actions identified in table B.11.1-1 would dissipate the farther they occur from the Projects.

Construction of the Projects and other projects in the cumulative impacts area could have direct and indirect impacts on surface water quality and flow, as well as on fish and other organisms that inhabit affected waters. These impacts could include increased sedimentation, turbidity, decreased dissolved oxygen, impaired flow, releases of chemicals and nutrient pollutants, reduced riparian cover, thermal changes, modification of habitat, and fish injury or mortality. Potato Creek and the Allegheny River would be crossed multiple times by the FM100 Project and Northern Access Project.

These impacts, such as increased turbidity, would individually result in temporary to short-term impacts because they would return to baseline levels over a period of days or weeks following construction. The Projects and other FERC-regulated pipeline projects would, for the most part, cross waterbodies with dry-ditch crossing methods in compliance with the FERC Procedures, including installation of erosion controls to prevent sedimentation and elevated turbidity. Increased sedimentation and turbidity resulting from potential run-off from the adjacent construction workspace and use of access roads would be mitigated through implementation of erosion control measures at the edges of the workspace and access roads. Most of the impacts on waterbodies have already ceased to exist with projects that are in restoration, preventing most cumulative impacts on waterbodies. Other projects (e.g., wells, road improvement) would likely be required to install and maintain BMPs required by federal, state, and local permitting authorities to minimize impacts on waterbodies. Other projects crossing Waters of the United States would also need to comply with USACE requirements, although it is anticipated that the majority of the other projects would have indirect, not direct, impacts on waterbodies. Therefore, most of the impacts on waterbodies are expected to be of short duration and/or permittable under regulations implemented by the USACE. Long-term indirect impacts could also occur until adjacent disturbed areas are stabilized through revegetation.

Hydrostatic testing of the pipeline facilities and at the compressor stations would require the use of approximately 6.3 million gallons of water, which would be obtained from both municipal sources and surface waters. The applicants would follow federal, state, and local permit requirements with regard to water withdrawal and discharge, and ensure that adequate flows are maintained. It is our assumption that other projects would also need to follow federal, state, and local permit requirements, including maintenance of adequate flows, preventing a significant cumulative impact.

Given that only two waterbodies in the geographic scope would be crossed multiple times, and most impacts from the other projects would either be mitigated via state and federal permitting requirements, such as the installation of BMPs, or cease to continue to impact the waterbodies (impacts are not within the same temporal scope) we conclude that construction and operation of the Projects and other projects in the area would not result in significant cumulative impacts on surface water resources, fish, and other aquatic resources in the area.

B.11.3.3 Groundwater and Wetlands

Projects from table B.11.1-1 that are within the cumulative impacts area for groundwater and wetlands include the Transco Atlantic Sunrise Project, National Fuel YM28 and FM120 Modernization Project, National Fuel Northern Access 2016 Project, ongoing natural gas development in the region (i.e., natural gas wells), and PennDOT road improvement projects. Based on the scope of the Transco Atlantic Sunrise Project, National Fuel YM28 and FM120 Modernization Project, and National Fuel Northern Access 2016 Project, the specific shared geographic scope areas with the proposed Projects are similar to those described in section B.11.3.1. While there are no known wells or road improvement projects that directly overlap with the proposed Projects, they share the same geographic scope area (i.e., HUC-12 watershed) and are discussed generally. Cumulative impacts on groundwater and wetlands from the projects and actions identified in table B.11.1-1 would dissipate the farther they occur from the Projects. Also, for projects that have been recently constructed and are undergoing restoration, we anticipate that groundwater impacts would have mostly dissipated by the time the construction of the Projects begins, resulting in minimal to no cumulative impact on groundwater.

The cumulative impacts on groundwater resources are expected to be temporary and limited to areas that are affected by other actions near the Project facilities. Construction and operation of these projects could cumulatively impact groundwater resources similarly to that described in section B.3.1, with the greatest risk being too shallow groundwater that might occur within excavation depths along pipeline alignments or at aboveground facilities. The Projects' impact on groundwater resources would likely be much more localized due to the limited horizontal and vertical extent of construction, the limited use of blasting, and implementation of various plans by each company to limit erosion and sedimentation, reduce compaction, restore pre-existing grades and vegetation, protect nearby water supply wells and springs, and prevent and minimize fuel and hazardous materials spills. The impacts from the Projects would be further reduced by implementing measures in National Fuel's ESCAMP and Transco's ECP that minimize erosion and sedimentation, reduce compaction, and restore pre-existing grades and vegetation; as well as by measures in National Fuel's SPRP and Transco's Spill Plan that each company would implement to prevent and respond to spills.

All of the other major actions included in table B.11.1-1 that are near the Projects, including other FERC-regulated projects, natural gas wells and, and nonjurisdictional project-related actions, either have or would be required to obtain water use and discharge permits, implement erosion and sediment controls, and adhere to various Spill Plans as mandated by federal and state agencies, as appropriate. Natural gas wells in Pennsylvania must also be sited at least 500 feet from water wells, 1,000 feet from a water supply extraction point, and 300 feet from a spring. These setbacks provide an increased degree of protection for public and private water supplies. All FERC-regulated projects would mitigate for potential contamination of wells due to accidental spills or leaks of hazardous materials associated with vehicle refueling, vehicle maintenance, and storage of construction materials by adhering to FERC's Plan and Procedures and project-specific plans, which include spill prevention and containment measures to minimize potential impacts on groundwater resources. Also, with the exception of the Northern Access Project, most of these impacts have already occurred and are trending to a restored state, and therefore would have minimal residual impact overlapping in temporal scope.

For these reasons, we anticipate that the Projects would only contribute to minor and temporary cumulative impacts on groundwater.

Cumulative impacts on wetlands affected by the Projects would be limited primarily to locations where the Projects overlap with the actions identified in table B.11.1-1 as described in section B.11.3-1. The Projects would result in temporary impacts on 20.9 acres of wetlands; 16.9 acres of palustrine emergent wetland, 2.3 acres of palustrine scrub-shrub wetlands, and 1.5 acres of palustrine forested wetlands; however, operational impacts on wetlands would be long term, such as the conversion of 0.6 acre of forested and scrub-shrub wetlands to non-forested or emergent wetlands.

We estimate that the projects in table B.11.1-1 would cross a number of wetlands within the same watersheds as the proposed Projects. Based on our estimates, the following FERC-regulated projects have identified wetland impacts:

- Transco's ASP Project temporarily impacted 46.3 acres of wetlands and permanently impacted 8.3 acres of wetlands;
- National Fuel's YM28 and FM120 Modernization Project temporarily impacted 5.2 acres of wetlands and permanently impacted 0.7 acre of wetlands; and
- National Fuel's Northern Access 2016 Project, if constructed, would temporarily impact 89.4 acres of wetlands and permanently impact 6.8 acres of wetlands.

Based on available information, operation of the Projects and other FERC-regulated actions in the cumulative impacts area would permanently affect at least 16.4 acres of wetlands (see tables B.3.3-1 and B.11.2-1). The overall magnitude of this impact on wetlands relative to the total amount of wetlands within the affected counties equates to less than 0.01 percent, which is considered minor. While we note that overall the projects would affect this number of acres and this percent of wetlands in the counties where these projects overlap, we acknowledge this analysis includes all areas that would be impacted by the projects and is not limited to the areas within the geographic scope we considered (i.e., HUC-12 watershed). Therefore, the acreage of impacts would be considerably less than what is presented here. We were unable to find quantitative data for the extent of impacts on wetlands from non-FERC regulated projects (e.g., wells, road improvement projects). As of 2015, it is estimated that about 1,500 natural gas wells exist in the counties crossed by the Projects (StateImpact Pennsylvania, 2015) and that each well typically occupies a 3.5-acre site (Shale Gas Information Platform, 2019). We assume that wetlands would be avoided by future well placement or, if some level of impacts would occur, mitigation would be required by the USACE or state for projects requiring agency authorization.

The greatest impact on wetlands from the Projects and other projects in the cumulative impacts area would be due to construction within or adjacent to wetlands and storm runoff from disturbed areas during construction. Most construction-related impacts on wetlands range from temporary to permanent, depending on the proposed action/facility and type of wetland impacted. For example, impacts on palustrine emergent wetlands from pipeline construction would be temporary because they would return to original emergent function and value shortly after construction; impacts on palustrine scrub-shrub wetlands from pipeline construction would be short to long term because they would take 3 to 5 years to return to original scrub-shrub function and value; and impacts on palustrine forested wetlands from pipeline construction would be long term because trees would take from 3 to 50 years or longer to become reestablished, and trees would not be allowed to become reestablished directly over the pipeline. There would also be a permanent loss of some wetland habitat where aboveground facilities or roads would be placed and operated.

While within the same HUC-12 watershed, most other non-FERC jurisdictional projects are expected to avoid direct impacts on wetlands because their facilities are at discrete locations (versus long linear features) and relatively flexible in placement (not dependent on connecting to another existing facility). Each project proponent would be responsible for restoration of its workspace, and the restoration timeframe could be extended because of ground disturbance associated with the next project in any given area.

Wetlands are broadly regulated under the CWA, and avoidance, minimization, compensation, and/or replacement would be required by the USACE for most impacts. National Fuel and Transco, as well as the proponents of the other projects in the cumulative impacts area, would need to obtain or have already obtained applicable permits from the USACE. Accordingly, as part of the permitting and approval process, National Fuel, Transco, and the other project proponents would prepare wetland mitigation plans and provide compensatory mitigation for certain wetland impacts. These plans promote no net loss of wetlands and, therefore, no significant cumulative effects would result. The USACE and PADEP oversee permitting of wetland impacts in the state of Pennsylvania, and Transco has proposed wetland enhancement and preservation at one site in Pennsylvania to mitigate for wetland impacts (see section B.3.3.1). National Fuel is coordinating with the USACE and PADEP to determine compensation for wetland impacts associated with the FM100 Project. Lastly, each of the FERC-regulated projects would minimize impacts on wetlands by implementing the measures in our Plan and Procedures (or variations that provide equal or greater protection) and each project proponent's own best management practices during construction and operation. Similar to groundwater, we anticipate that the majority of the FERC-jurisdictional projects' wetland impacts within the same watershed as the Projects are either no longer ongoing (i.e., the wetland has already been restored) or have been appropriately mitigated.

We conclude that there would be no significant cumulative impacts on groundwater because of the small aggregate size of actions within the watersheds and because each action would be required to obtain permits, such as storm and waste water discharge permits, that are designed to reduce impacts on groundwater and to ensure that the resource is managed in a sustainable manner. Further, Transco and National Fuel, who are also the proponents of the other pipeline projects in the geographic scope, would implement the measures in their respective construction and restoration plans, which includes the Commission's Plan and Procedures, to avoid or minimize cumulative impacts on groundwater. The majority of impacts from FERC-jurisdictional projects would also have already occurred and been restored to baseline, preventing cumulative impacts. Further, with respect to wetlands, based on the expected wetland mitigation, compliance with the ESCAMP and ECP, the proposed Projects' mitigation for wetland losses, and the fact that other FERC-jurisdictional project impacts on wetlands have already occurred and those impacts are trending back towards a restored status, the Projects when combined with other projects in the cumulative impacts area would not have substantial or long-term impacts on sensitive wetlands and the contribution to cumulative effects would be limited and minor.

B.11.3.4 Vegetation and Wildlife

Projects from table B.11.1-1 that are within the cumulative impacts area for vegetation and wildlife include the Transco Atlantic Sunrise Project, National Fuel YM28 and FM120 Modernization Project, National Fuel Northern Access 2016 Project, ongoing natural gas development in the region (i.e., natural gas wells), and PennDOT road improvement projects. Based on the scope of the Transco Atlantic Sunrise Project, National Fuel YM28 and FM120 Modernization Project, and National Fuel Northern Access 2016 Project, the specific shared geographic scope areas with the proposed Projects are similar to those described in section B.11.3.1. While there are no known wells or road improvement projects that directly overlap with the proposed Projects, they share the same geographic scope area (i.e., HUC-12 watershed) and are discussed generally. Cumulative impacts on vegetation and wildlife from the projects and actions identified in table B.11.1-1 would dissipate the farther they occur from the Projects.

Project activities such as clearing, grading, and installation of impervious surfaces (e.g., compression station pads, access roads) would remove vegetation, alter wildlife habitat, displace wildlife, and result in other potential secondary effects, such as increased population stress, predation, and the establishment or spread of invasive species. These effects would be greatest where the other projects are constructed within the same timeframe and areas as the proposed Projects, as described in section B.11.3.1. However, even construction that does not overlap temporally can have cumulative effects, as it takes time for vegetation/habitat to return to a preconstruction state, especially forested habitats that could take up to 50 years or longer to become reestablished and would not be allowed to become reestablished directly over the pipeline. If areas that were previously disturbed by the FERC-jurisdictional projects were or are restored to preconstruction vegetation type/habitat before construction begins on the Projects, we would not anticipate any additive cumulative impacts. Construction or modification of the Projects' aboveground facilities that results in permanent loss of vegetation and habitat would contribute to cumulative impacts where adjacent to other projects; however, this overlap would be minimal.

The addition of new linear rights-of-way or the widening of existing rights-of-way would increase habitat fragmentation and edge effects, which are permanent effects that result from vegetation maintenance along utility rights-of-way. A number of existing utility rights-of-way, along with other planned projects, would contribute to these cumulative impacts. This would reduce habitat available to species that prefer deep forests, while increasing habitat for species that prefer open areas and edge habitat. Other projects in the cumulative impacts area such as well development and road improvements also would increase vegetation removal and have cumulative direct and secondary impacts on wildlife. Conversely, for the abandonment portions of the Projects, in areas where the previously maintained right-of-way would be allowed to revegetate to forest (consistent with the surrounding vegetation), there would be a reduction in edge effect; however, the transition to mature forest could take 30 to 50 years, depending on the forest type.

Based on available information, operation of the Projects and other FERC-regulated actions in the cumulative impacts area would permanently affect 2,267 acres of vegetation (see table B.11.2-1). The overall magnitude of this impact on vegetation and wildlife habitat relative to the total amount of vegetated land within the affected counties equates to approximately 0.04 percent, which is considered minor. As mentioned previously, the greatest long-term to permanent cumulative impact would be where permanent tree removal occurs. The Transco Atlantic Sunrise Project, National Fuel YM28 and FM120 Modernization Project, and National Fuel Northern Access 2016 Project, combined with the proposed Projects, would permanently affect 929.0 acres of forest land as a result of maintaining the operational pipeline rights-of-way and/or installing aboveground facilities. This impact represents about 0.02 percent of the available forest land in the affected counties. While we note that overall the projects would affect this amount of forest land and this percent of forest land in the counties where these projects overlap, we acknowledge this analysis includes all areas that would be impacted by the projects and is not limited to the areas within the geographic scope we considered (i.e., HUC-12 watershed). Therefore, the acreage of impacts would be considerably less than what is presented here.

As discussed previously, it is estimated that in 2015 there were about 1,500 natural gas wells in the counties within the affected counties and that each well typically occupies a 3.5-acre site. Other specific impacts on vegetation from future well development and the road improvement projects are unknown. Construction activities associated with the Projects, combined with the clearing associated with wells and other identified projects within the watershed, could result in cumulative impacts that include the removal of vegetation and alteration of wildlife habitat, displacement of wildlife, and other potential secondary effects such as increased population stress, predation, and the establishment of invasive species.

Rights-of-way can result in the spread of invasive species, because these species often flourish in areas where vegetation has been disturbed. Other linear projects that are adjacent to or cross the Projects could potentially lead to a greater spread of invasive vegetation. National Fuel and Transco have developed project-specific invasive plant species control plans in coordination with the appropriate regulatory agencies to minimize the FM100 Project's and the Leidy South Project's contribution to the cumulative impact of the other linear projects in the area. National Fuel and Transco are also the proponents of the other pipeline projects in the cumulative impacts area (i.e., Transco Atlantic Sunrise Project, National Fuel YM28 and FM120 Modernization Project, National Fuel Northern Access 2016 Project). As such, similar plans to manage the spread of invasive species have been developed for these projects as well.

The overall footprint of the Projects, in combination with the other identified projects within the defined geographic scope of influence, would result in the disturbance of thousands of acres of wildlife habitat including forested habitat that would either recover over the long-term in temporary workspaces or would be converted to herbaceous or shrub-scrub habitat in the permanent rights-of-way. Additionally**,** **i**ncremental fragmentation of upland forest habitat could occur in areas of expansion of the existing rights-of-way in forested areas and construction and operation of aboveground facilities. The loss of forest habitat and the expansion of existing corridors from construction and operation of projects in the region of influence could also decrease the quality of habitat for forest wildlife.

Most projects would presumably be required to restore areas temporarily disturbed by construction, thereby minimizing some permanent impacts on wildlife and wildlife habitat. Similarly, mitigation measures implemented by the other projects would also be expected to reduce potential impacts associated with habitat fragmentation and the spread of noxious weeds. As described above, the greatest impacts would occur where forest land is permanently removed to accommodate the operational pipeline right-of-way and at aboveground facility sites, affecting 929.0 acres of forest land in the cumulative impacts area. As mentioned previously, we acknowledge this analysis includes all areas that would be impacted by the projects and is not limited to the areas within the geographic scope we considered (i.e., HUC-12 watershed). Therefore, the acreage of impacts would be considerably less than what is presented here. Given the large amount of wildlife habitat that would remain undisturbed within the geographic area and the measures that National Fuel and Transco (who are also the proponents of the other major projects in the analysis area) would use to minimize impacts associated with vegetation and habitat removal and re-establish the rights-of-way, we conclude that the Projects, combined with the other identified projects, would not have a significant cumulative impact on wildlife or their habitats.

B.11.3.5 Special Status Species

Projects from table B.11.1-1 that are within the cumulative impacts area for special status or protected species include all those within the same HUC-12 watershed(s) crossed by the proposed Projects. Cumulative impacts from these projects would be minor and would dissipate the farther they occur from the Projects. Potential cumulative impacts on special status species could be greater at the same locations as those discussed for wildlife resources (section B.4.3) or aquatic resources (section B.4.1).

The ESA prohibits the take of any threatened and endangered species except under federal permit or take statement. A federal permit or take statement is issued only if individual and cumulative impacts on a listed species are not significant. A such, the other federal projects in the cumulative impacts area are required to comply with section 7 of the ESA to ensure construction and operation of the facility would not jeopardize the continued existence of federally listed species. Non-federal projects are also required to adhere to section 10 of the ESA, although the USFWS has a different mechanism for evaluating and minimizing impacts.

As discussed in section B.4.4.3, we have determined that the Projects would have *no effect* on one federally listed species or their critical habitat, and *would not adversely affect* three federally listed species and/or their designated critical habitats. These determinations are based on consultations with the USFWS and commitments from National Fuel and Transco to adopt species-specific avoidance or conservation measures recommended by the USFWS. As such, no additional mitigation is proposed, and the Projects would not contribute to cumulative impacts on these species. Similar ESA consultations and conservation have been completed for the other FERC-regulated pipeline projects in the cumulative impacts area (i.e., Transco Atlantic Sunrise Project, National Fuel YM28 and FM120 Modernization Project, National Fuel Northern Access 2016 Project).

Protection of threatened, endangered, and other special status species is part of the various state permitting processes or resource reviews for projects, such as well development and road improvements. As such, cumulative impacts on such species have been specifically considered and reduced or eliminated through conservation and mitigation measures identified during those relevant processes and consultations.

B.11.3.6 Land Use, Visual Resources, and Recreation

Projects from table B.11.1-1 that are within the cumulative impacts area for land use, visual resources, and recreation include the Transco Atlantic Sunrise Project, National Fuel YM28 and FM120 Modernization Project, National Fuel Northern Access 2016 Project, ongoing natural gas development in the region (i.e., natural gas wells), and PennDOT road improvement projects. Based on the scope of the Transco Atlantic Sunrise Project, National Fuel YM28 and FM120 Modernization Project, and National Fuel Northern Access 2016 Project, the specific shared geographic scope areas with the proposed Projects are similar to those described in section B.11.3.1. While there are no known wells or road improvement projects that directly overlap with the proposed Projects, they share the same geographic scope area (i.e., HUC-12 watershed) and are discussed generally. Cumulative impacts on land use, visual resources, and recreation from the projects and actions identified in table B.11.1-1 would dissipate the farther they occur from the Projects.

The construction and operation of the Projects and other past, present, and reasonably foreseeable actions would require the temporary and permanent use of land, which would result in temporary and permanent impact/conversion of land use. Similar to vegetation (see section B.11.3.4), cumulative impacts on land uses from the Projects and other actions in the cumulative impacts area could occur from construction activities such as clearing, grading, and construction of buildings, structures, and/or impervious surfaces (e.g., building pads, access roads). The duration of impacts on land use would depend on the type of land cover affected and the rate at which the land can be restored to its preconstruction use and condition after construction. Pipeline project impacts on agricultural land, residential land, commercial/industrial land, and open water would be temporary because they would return to their preconstruction uses and conditions almost immediately after construction. Pipeline project impacts on open lands and wetlands would be short to long term because those areas likely would require 1 to 5 years to regain preconstruction use and composition. Pipeline project impacts on forest/woodland and forested wetlands would be long term or permanent because trees could take up to 50 years or longer to become reestablished and would not be allowed to become reestablished in directly over the pipeline. Impacts where new buildings, structures, and/or impervious surfaces are installed would also be permanent because they would permanently change the underlying land use. The greatest impact on land use would occur where forest land is removed from the operational right-of-way (as discussed in section B.11.3.4), and where a land use is converted to commercial/industrial at aboveground facilities. The Transco Atlantic Sunrise Project, National Fuel YM28 and FM120 Modernization Project, and National Fuel Northern Access 2016 Project, combined with the proposed Projects, would permanently affect 929.0 acres of forest land as a result of maintaining the operational pipeline rights-of-way. Further,

aboveground facilities associated with these projects combined with the proposed Projects would convert 2,115 acres total of agricultural, open, and forest land to commercial/industrial land for aboveground facilities. This impact represents about 0.04 percent of the non-developed land in the affected counties. While we note that overall the projects would affect this amount of non-developed land and this percent of non-developed land in the counties where these projects overlap, we acknowledge this analysis includes all areas that would be impacted by the projects and is not limited to the areas within the geographic scope we considered (i.e., construction workspaces (land use), within 0.25 mile of the Projects (recreation and visual impacts associated with pipeline construction) and within 0.5 mile (visual impacts associated with aboveground facilities). Therefore, the acreage of impacts would be considerably less than what is presented here.

It is estimated that in 2015 there were about 1,500 natural gas wells in the counties within the affected counties and that each well typically occupies a 3.5-acre site. Other specific impacts on land uses from future well development and the road improvement projects are unknown; however, it is assumed that avoidance would be difficult and non-developed land uses would be affected to some extent during construction and operation of these actions.

The Projects' facilities would add incrementally to the cumulative visual impacts through the clearing of vegetation and installation of aboveground facilities, but the overall contribution would be relatively minor given the majority of the Projects' facilities as well as the other FERC-regulated pipeline projects in the cumulative impacts area would be buried (i.e., the pipeline) and adjacent to existing rights-of-way. About 77 percent of the FM100 Project and 97.5 percent of the Leidy South Project would be within or adjacent to existing rights-of-way. Additionally, the Projects abut areas where other FERC-jurisdictional projects have previously expanded existing rights-of-ways. Collocation with existing utility or transportation corridors would contribute to widening existing corridors but would have fewer visual impacts than creating a new corridor. The corridors would be revegetated, thereby limiting the duration of many of the visual impacts associated with construction.

The primary long-term cumulative visual effects of the Projects and other projects in the cumulative impacts area would be the new aboveground facilities and the new permanent access roads through forest/woodland areas. Most of the new aboveground facilities would be screened by existing mature vegetation or by stockpiling, fencing, and planted trees. There are no other existing, recently constructed, or planned compressor stations or other similar major aboveground facilities associated with the projects listed in table B.11.1-1 that would add to the cumulative visual impact of the new compressor stations. Additionally, the visual effect of these would be reduced by National Fuel's and Transco's implementation of site-specific mitigation measures for the proposed Projects as well as for the Transco Atlantic Sunrise Project, National Fuel YM28 and FM120 Modernization Project, and National Fuel Northern Access 2016 Project, of which National Fuel and Transco are also project proponents.

The Projects have the potential to temporarily impact 195.6 acres of recreational and special interest areas that would be crossed during construction (refer to table B.5.4-1). In addition, construction of the other FERC-regulated actions in the cumulative impacts area have or would affect recreational and special interest areas. The FM100 Project, the National Fuel YM28 and FM120 Modernization Project, and National Fuel Northern Access 2016 Project each cross the Pennsylvania Bicycle Route Y. The FM100 Project and the National Fuel YM28 and FM120 Modernization Project both cross the Elk State Forest. The Leidy South Project and the ASP Project both cross the Sproul State Forest. The overall magnitude of these impacts is related to the land use and vegetation types affected, but overall the impacts would be minor as most land use and vegetation types would be allowed to revert to preconstruction conditions, with the exception of forest land within the operational right-of-way or at aboveground facilities, as discussed in sections B.11.3.4 and above. Access to recreational and special interest areas could temporarily be restricted to the public during active construction of the Projects. No permanent

impacts from aboveground facilities would occur on recreational or special interest areas. Most recreational impacts from projects that have already be constructed and are undergoing restoration or have been restored would be expected to have returned to preconstruction conditions by the time construction of the Projects begins, resulting in minimal to no cumulative impacts. Therefore, any contribution to cumulative impacts on recreation would be negligible as a result of construction and operation of the proposed Projects when combined with other projects and actions in the cumulative impacts area.

B.11.3.7 Cultural Resources

The projects on table B.11.1-1 that are within the cumulative impacts area for cultural resources include those that overlap the Projects' workspace or, for indirect effects, are closely adjacent. Those that are defined as federal actions (e.g., all FERC-regulated projects) would have to adhere to section 106 of the NHPA and include mitigation measures designed to avoid or minimize additional impacts on cultural resources. Where impacts on significant cultural resources are unavoidable, mitigation (e.g., recovery of data, curation of materials, etc.) would take place before construction. Non-federal actions would need to comply with any mitigation measures required by the state.

Cultural resources surveys have been completed and survey reports prepared for the Projects. The SHPO concurred that no historic properties would be affected by the FM100 Project, and we also concur. Some information is outstanding for the Leidy South Project. National Fuel and Transco have developed project-specific plans to address unanticipated discoveries of cultural resources and human remains during construction for the proposed Projects as well as for the Transco Atlantic Sunrise Project, National Fuel YM28 and FM120 Modernization Project, and National Fuel Northern Access 2016 Project, of which National Fuel and Transco are also project proponents. Given the state and federal laws and regulations that protect cultural resources mentioned previously, it is not likely that there would be significant cumulative impacts on historic properties resulting from the Projects when considering the other projects in the cumulative impacts area.

B.11.3.8 Socioeconomics

All of the projects listed in table B.11.1-1 would occur within counties overlapping the Projects and cumulative impacts could occur where the timing of those other effects overlap the Projects' effects. Although the timing of many of these projects is unknown, impacts from the Projects on population and employment, demand for housing and public services, transportation, and government revenue from sales and payroll taxes would be temporary because these impacts would be primarily limited to the period of construction.

The other projects considered in table B.11.1-1 would have the greatest cumulative effects on employment during construction if more than one project is built at the same time. Due to the relatively low populations in the counties crossed by the Projects, if multiple similar projects are built at the same time, the influx of non-local workers resulting from the Projects, when combined with other projects in the cumulative impact area, could in turn lead to an influx of non-local workers, which would impact temporary housing in the Projects' geographic scope area, and could increase the demands on some public services, such as police, fire, and medical services. Additionally, most of the projects considered have already been constructed and any workers that temporarily relocated to the area have left. The Projects when combined with the other projects considered, would also result in a spike in employment levels (assuming a percentage of the local population is utilized) and the local economy, and would have a beneficial, short-term impact on employment, local goods and service providers, and state and local governments in the form of sales tax revenues.

Construction of the Projects could result in temporary impacts on road traffic in some areas and could contribute to cumulative traffic impacts if other projects are scheduled to take place at the same time and in the same area. As previously mentioned, the Transco Atlantic Sunrise Project has already been constructed and is undergoing restoration. The National Fuel YM28 and FM120 Modernization Project is currently being constructed and would likely be completed prior to the start of the proposed Projects. The construction schedule of the National Fuel Northern Access 2016 Project is currently unknown but could occur at the same time as the proposed Projects. If both projects occur at the same time, road use near the projects in McKean County would be cumulatively affected for the duration of construction.

The local road and highway systems near the Projects are readily accessible by interstate highways, U.S. highways, state highways, secondary state highways, county roads, and private roads. National Fuel and Transco would use major highways and the construction right-of-way, to the extent practicable, to reduce impacts on local roadways. It is likely the other projects listed in table B.11.1-1 would also use existing public roads. In addition, increased use of local roadways from multiple projects could accelerate degradation of roadways and require early replacement of road surfaces. However, National Fuel, Transco, and the other project sponsors in the geographic scope of influence would be required to adhere to local road permit requirements (which may have provisions for road damage repairs or compensation) and road weight restrictions. We also believe that when the other actions and projects have been restored or are undergoing restoration, most socioeconomic impacts would return to baseline, such as the majority of FERC-jurisdictional projects. Therefore, the Projects when combined with the other projects in the cumulative impacts area 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 Projects.

B.11.3.9 Air Quality

Construction

Construction emissions from the Projects and the other projects in table B.11.1-1 would be temporary and relatively isolated from each other geographically and temporally.

Construction of the Projects would temporarily increase air quality impacts surrounding the construction workspaces due to emissions from the combustion engines used to power construction equipment, vehicle emissions traveling to and from the construction sites, and fugitive emission dust resulting from equipment movement on dirt roads and earth-disturbing activities. Construction emissions would cease with the end of construction; thus, the period of influence for cumulative air quality impacts during construction of the Projects and other FERC-regulated projects in the cumulative impacts area would be temporary (weeks to months at each location). In addition, construction emissions would also disperse within the airshed and diminish in concentration with distance from active construction areas.

The potential for cumulative construction emissions impacts would be greatest during site preparation when fugitive dust production would likely be at its peak. Emissions from equipment engines and vehicles operating concurrently for the different projects would also result in cumulative air quality impacts in the local area. National Fuel and Transco, who are also the proponents of the other FERC-regulated projects in the cumulative impacts area, would implement mitigation measures to minimize construction impacts on air quality such as applying water or dust control chemicals to minimize fugitive dust and by complying with applicable EPA mobile source emission performance standards, including use of equipment manufactured to meet these standards.

Based on the short-term nature of construction and the implementation of appropriate mitigation measures, the cumulative impacts on air quality due to construction of these facilities would not be significant. Local residents near the compressor sites and/or pipeline projects and within the impact area may experience localized, minorly to moderately elevated levels of fugitive dust and tailpipe emissions near the construction areas.

Due to the limited amount of combustion engines required to construct the Projects, the short duration of construction activities, and minimal concurrent projects associated with construction, we determined that cumulative impacts on air quality due to construction would be negligible.

Operation

Cumulative impacts associated with the operation of the Projects aboveground facilities were evaluated within the significant impact area, as determined through a significant impact modeling assessment, for each of the proposed facilities.

Compressor Stations 605 and 610 were installed as part of the Transco Atlantic Sunrise Project. The proposed Leidy South Project would uprate the two existing electric motor-driven units at Compressor Station 605 which would not contribute to additional air emissions. The Leidy South Project would add one gas turbine-driven compressor unit at Compressor Station 610. The addition of natural gas fired compression at Compressor Station 610 was evaluated in section B.8.4 and shown that it would not cause a violation of the NAAQS. Therefore, there is would be no significant cumulative impacts on air quality from the modifications to Compressor Stations 605 and 610.

The Carpenter Hollow Station and Marvindale Compressor Station on the FM100 Project are within the geographic scope for operational air quality of the Big Level Wind Project, National Fuel YM28 and FM120 Modernization Project, National Fuel Northern Access 2016 Project, and various road resurfacing projects. However, these actions do not include any stationary sources of operational emissions within the cumulative impact area; therefore, no cumulative impacts on operational air quality would occur.

The Tamarack Compressor Station on the FM100 Project has the potential to impact air quality during operation and is within the geographic scope of the Renovo Energy Project and various road resurfacing projects. There would be no air quality impacts associated with road resurfacing after construction. The Renovo Energy Project could have air quality impacts associated with operation; however, both facilities would be required to comply with all applicable federal air quality permitting programs; therefore, no significant cumulative impacts on air quality would be expected.

No actions were identified within 50 kilometers of the Leidy South Compressor Stations 607 and 620.

As discussed above, the Projects would contribute to additional operational air quality impacts; however, all facilities would be required to be in compliance with all applicable federal air quality permitting programs. Therefore, we do not anticipate any cumulative air impacts from construction of the FM100 Project or the Leidy South Project.

B.11.3.10 Noise

Construction

Construction of the Projects and other projects and actions in table B.11.1-1 could require the use of heavy equipment, HDD drilling rigs, pile driving equipment, and other equipment and vehicles, all of which would generate noise. Cumulative impacts on noise could occur where the location and timing of those noise effects overlap the Projects' noise effects; however, no such projects overlapping in time were identified, although it is possible that the National Fuel Northern Access 2016 Project could be in construction concurrent with the proposed Projects. The Projects' construction noise would attenuate quickly as the distance from the construction site increases.

The greatest potential for cumulative construction-related noise impacts would be from internal combustion engines and construction of aboveground facilities for the Projects, if constructed concurrent with any of the other pending projects in table B.11.1-1 . Construction would generally not affect nighttime noise levels as it would be limited to 7 a.m. to 7 p.m., except for HDD activities and specific limited construction activities such as tie-ins and hydrostatic testing. The estimated noise generated from the FM100 Project could exceed our recommended 55 dBA L_{dn} at the NSA near the HDD entry sites, which are all residences, even with the use of noise mitigation measures. National Fuel would commit to completing all HDD activities during daytime hours or would offer temporary relocation and/or compensation to all NSAs identified as being above 55 dBA L_{dn}. Transco is not planning any HDD activities.

Concurrent construction and operation of the Projects and other actions in the vicinity of the same NSAs could result in cumulative sound level impacts. Noise impacts from pipeline construction associated with the Projects as well as the other projects listed in table B.11.1-1 above, and existing Compressor Stations 605 and 610, which were installed as part of the Transco ASP Project, would be temporary and only occur during construction activities.

Temporary cumulative impacts on noise could occur if an action is being actively constructed within the immediate vicinity and at the same time as construction of the Projects. However, our cumulative analysis did not identify circumstances where another project would be under construction simultaneously in the same geographic scope with the Projects

Operation

The estimated operational noise levels of the Projects are below our recommended level of 55 dBA $L_{dn.}$ Noise decreases logarithmically with increasing distance from a noise source; therefore, cumulative operational noise impacts would only occur where other facilities or activities would occur very close to the Projects' noise-emitting facilities (i.e., compressor stations). We did not identify any projects that would contribute to operational noise impacts in the cumulative impact area for the FM100 Project and Leidy South Project compressor stations. As such, we conclude that operation of the Projects would not contribute significantly to existing noise in the area.

B.11.3.11 Climate Change

Climate change is the change in climate (including temperature, precipitation, humidity, wind, and other meteorological variables) over time, and cannot be characterized by an individual meteorological event or anomalous weather pattern. For example, a severe drought or abnormally hot summer in a particular region is not a certain indication of climate change. However, a series of severe droughts or hot summers that statistically alter the trend in average precipitation or temperature over

decades may indicate climate change. Recent research has begun to attribute certain extreme weather events to climate change (USGCRP 2018).

The leading U.S. scientific body on climate change is the U.S. Global Change Research Program (USGCRP), composed of representatives from 13 federal departments and agencies.[26] The Global Change Research Act of 1990 requires the USGCRP to submit a report to the President and Congress no less than every four years that "1) integrates, evaluates, and interprets the findings of the USGCRP; 2) analyzes the effects of global change on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity; and 3) analyzes current trends in global change, both human-induced and natural, and projects major trends for the subsequent 25 to 100 years." These reports describe the state of the science relating to climate change and the effects of climate change on different regions of the U.S. and on various societal and environmental sectors, such as water resources, agriculture, energy use, and human health.

In 2017 and 2018, the USGCRP issued its Climate Science Special Report: Fourth National Climate Assessment, Volumes I and II (Fourth Assessment Report) (USGCRP, 2017; and USGCRP, 2018, respectively). The Fourth Assessment Report states that climate change has resulted in a wide range of impacts across every region of the country. Those impacts extend beyond atmospheric climate change alone and include changes to water resources, transportation, agriculture, ecosystems, and human health. The U.S. and the world are warming; global sea level is rising and acidifying; and certain weather events are becoming more frequent and more severe. These changes are driven by accumulation of GHG in the atmosphere through combustion of fossil fuels (coal, petroleum, and natural gas), combined with agriculture, clearing of forests, and other natural sources. These impacts have accelerated throughout the end 20th and into the 21st century (USGCRP 2018).

GHGs were identified by the EPA as pollutants in the context of climate change. GHG emission do not cause local impacts, it is the combined concentration in the atmosphere that causes global climate and these are fundamentally global impacts that feedback to localized climate change impacts. Thus, the geographic scope for cumulative analysis of GHG emissions is global rather than local or regional. For example, a project 1 mile away emitting 1 ton of GHGs would contribute to climate change in a similar manner as a project 2,000 miles distant also emitting 1 ton of GHGs.

Climate change is a global concern; however, for this analysis, we focus on the potential cumulative climate change impacts on the area of the Projects. The USGCRP's Fourth Assessment Report notes the following observations of environmental impacts are attributed to climate change in the Northeast region of the United States (USGCRP, 2017; USGCRP 2018):

- annual average temperatures from 1901 to 2016 in the Northeast increased about 3 °F;
- temperatures are projected to increase by 4.2 to 8.5 °F by the 2090s under the worst-case scenario (continually increasing emissions) and would increase by 1.7 °F to 4.4 °F if emissions were decreased;

[26] The USGCRP member agencies are: Department of Agriculture, Department of Commerce, Department of Defense, Department of Energy, Department of Health and Human Services, Department of the Interior, Department of State, Department of Transportation, Environmental Protection Agency, National Aeronautics and Space Administration, National Science Foundation, Smithsonian Institution, and U.S. Agency for International Development.

- the number of days above 90 °F are projected to increase, resulting in major human health implications;

- from 1958 to 2010 the Northeast experienced a 70 percent increase in the amount of precipitation falling in heavy events (the greatest increase in the nation) and 5 to 20 percent increase in average winter precipitation; and

- the global sea level has risen by about 8 inches since reliable record keeping began in 1880 and is projected to rise another 1 to 4 feet by 2100.

The USGCRP's Fourth Assessment Report notes the following projections of climate change impacts in the Northeast region with a high or very high level of confidence[27] (USGCRP, 2018):

- higher than average sea level rise along the Northeastern coast will occur due to land subsidence;

- severe flooding due to sea level rise and heavy downpours are likely to occur more frequently;

- increased fall and winter precipitation could damage crops, and wetter springs would result in delayed planting of grain and vegetables; and

- coastal water temperature in several regions are likely to continue warming as much as 4 to 8 °F by 2100.

It should be noted that while the impacts described above taken individually may be manageable for certain communities, the impacts of compound extreme events (such as simultaneous heat and drought, wildfires associated with hot and dry conditions, or flooding associated with high precipitation on top of saturated soils) can be greater than the sum of the parts (USGCRP 2018).

The GHG emissions from construction and operation of the Projects are presented in section B.8. There are no PSD major sources of emissions associated with the Projects; therefore, they are not subject to GHG Best Available Control Technology requirements. However, the installation of new turbines and internal combustion engines would be designed for energy efficient operations.

Currently, there is no universally accepted methodology to attribute discrete, quantifiable, physical effects on the environment to the Projects' incremental contribution to GHGs. We have looked at atmospheric modeling used by the EPA, National Aeronautics and Space Administration, the Intergovernmental Panel on Climate Change, and others, and we found that these models are not reasonable for project-level analysis for a number of reasons. For example, these global models are not suited to determine the incremental impact of individual projects, due to both scale and overwhelming complexity. We also reviewed simpler models and mathematical techniques to determine global physical

[27] The report authors assessed current scientific understanding of climate change based on available scientific literature. Each "Key Finding" listed in the report is accompanied by a confidence statement indicating the consistency of evidence or the consistency of model projections. A high level of confidence results from "moderate evidence (several sources, some consistency, methods vary and/or documentation limited, etc.), medium consensus." A very high level of confidence results from "strong evidence (established theory, multiple sources, consistent results, well documented and accepted methods, etc.), high consensus." https://science2017.globalchange.gov/chapter/front-matter-guide/

effects caused by GHG emissions, such as increases in global atmospheric CO_2 concentrations, atmospheric forcing, or ocean CO_2 absorption. We could not identify a reliable, less complex model for this task, and we are not aware of a tool to meaningfully attribute specific increases in global CO_2 concentrations, heat forcing, or similar global impacts to project-specific GHG emissions. Similarly, it is not currently possible to determine localized or regional impacts from GHG emissions from the Projects.

We have not been able to find any GHG emission reduction goals established at the federal level.[28] The Commonwealth of Pennsylvania has set a goal to achieve a 26 percent reduction of net GHG emissions statewide by 2025 from 2005 levels, and an 80 percent reduction of net GHG emissions by 2050 from 2005 levels.[29]

Construction and operation emissions from the Projects would increase the atmospheric concentration of GHGs, in combination with past and future emissions from all other sources, and contribute incrementally to future climate change impacts. However, absent a method for relating GHG emissions to specific resource impacts, we are not able to assess potential GHG-related impacts attributable to the Projects. Without the ability to determine discrete resource impacts, or a widely accepted standard to determine the significance of the Project's GHG emissions, we are unable to determine the significance of the Projects' contribution to climate change.

B.11.4 Conclusions on Cumulative Impacts

Impacts associated with the Projects would be relatively minor. The impacts from other past projects (e.g., Transco Atlantic Sunrise Project), existing projects and actions (e.g., the YM28 and FM120 Modernization Project, natural gas wells), and reasonably foreseeable projects and actions (e.g., Northern Access 2016 Project, future wells, road improvements) within the geographic scope of analysis are also expected to be minor based on the various construction, mitigation, and restoration plans, and permitting requirements.

Most cumulative impacts would be temporary and minor when considered in combination with past, present, and reasonably foreseeable activities. Cumulative impacts could result from forest clearing and operational air emissions, which may be long term or permanent. Short-term cumulative benefits could also be realized through increased employment and government revenues from the Projects and other actions. Our project-specific and resource-specific (based on appropriate geographic scope) analysis leads us to conclude that the Projects would contribute to a negligible cumulative impact when the effects of other projects are added to past, present, and reasonably foreseeable actions. Therefore, we conclude that cumulative impacts would not be significant.

Finally, there is no widely accepted standard, per international, federal, or state policy, or as a matter of physical science, to determine the significance of the Project's GHG emissions on climate change.

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[28] The national emissions reduction targets expressed in the EPA's Clean Power Plan were repealed, Greenhouse Gas Emissions From Existing Electric Utility Generating Units; Revisions to Emissions Guidelines Implementing Regulations, 84 Fed. Reg. 32,250, 32,522-32, 532 (July 8, 2019). In November 2019, formal notification was sent to the United Nations of the U.S.'s withdrawal from the Paris climate accord.

[29] We reviewed the U.S. State Greenhouse Emission Targets site for individual state requirements located at:https://www.c2es.org/document/greenhouse-gas-emissions-targets/.

SECTION C – ALTERNATIVES

C.1 INTRODUCTION

In accordance with NEPA and FERC policy, we evaluated alternatives to the Projects to determine whether they would be reasonable and environmentally preferable to the proposed action. These alternatives included the no-action alternative, system alternatives, pipeline route alternatives, and aboveground facility site alternatives. The evaluation criteria used for developing and reviewing alternatives were:

- the ability to meet the stated objectives of the Projects;
- technical and economic feasibility and practicality; and
- offering a significant environmental advantage over the proposed actions.

With regard to the first criteria and for the purposes of NEPA, National Fuel's stated objectives for the FM100 Project are to modernize a portion of its existing pipeline system through abandonment and replacement of existing aging facilities identified in National Fuel's risk analysis and, additionally, by expanding the diameter of the replacement pipeline and by making modifications to certain other facilities, to provide 330,000 Dth/d of firm natural gas transportation capacity from the Sergeant Township areas to Transco at Leidy, Pennsylvania by December 2021. Transco's stated objectives for the Leidy South Project are to provide 582,000 Dth/d of firm natural gas transportation capacity from the Marcellus and Utica Shale production areas in northern and western Pennsylvania to Transco's mainline in Lancaster County, Pennsylvania by December 2021.

It is important to note that not all conceivable alternatives are technically feasible or practical. Some alternatives may be limited by the extent of existing technologies or by system capacities, while others may not be practical because sites are unavailable or cannot be developed for the proposed use. Also, it is important to consider the environmental advantages and disadvantages of the proposed action, as some alternatives may reduce impacts on certain resources but increase impacts on others. Generally, 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.

We considered a range of alternatives in light of the Projects' objectives, feasibility, and environmental consequences. Through environmental comparison and application of our professional judgment, each alternative is considered to a point where it becomes clear whether the alternative could or could not meet the three evaluation criteria. Our analysis that follows is based on review of area maps, comments and suggestions from regulatory agencies, comments from the public, data provided by National Fuel and Transco in their applications, and our independent research. Unless otherwise noted, we used the same sources of information to standardize comparisons between the Projects and corresponding alternatives. Therefore, data presented in our analysis may differ slightly from that presented elsewhere in this environmental assessment, which included desktop analysis, Projects-specific data collected during field surveys, and engineering drawings.

If the Projects are approved, that does not preclude the Projects' sponsors from making route or site adjustments if conditions warrant. For example, minor alignment shifts may be required prior to and during construction to accommodate currently unforeseeable site-specific constraints related to engineering or environmental concerns, or landowner preferences. All such alignment shifts that occur

outside of the Certificated right-of-way would be subject to review and approval by FERC, and compliance with conditions of the Commission's Certificate.

The EPA provided general comments recommending alternatives that avoid interior forests and large wetland complexes. As discussed in section B of this EA, National Fuel's and Transco's new pipeline alignments would be collocated with existing rights-of-way for about 75 percent and 98 percent of the total length, respectively, and overlap existing rights-of-way where feasible. This minimizes the impact on interior forests and also prevents new corridors from being established. The aboveground facilities also generally avoid wetland impacts and forest impacts, and we did not find any portion of the Projects that we believe would need to be realigned or relocated due to the extent of forested or wetland impacts.

C.2 NO-ACTION ALTERNATIVE

Under the no-action alternative, the Projects would not be built and the environmental impacts identified in this EA would not occur. In the absence of the Projects, National Fuel would continue to operate its existing, aged, and deteriorating pipeline facilities with risks to long-term reliability and safety, or could potentially stop using the pipeline, negatively affecting National Fuel's existing customers. Regarding Transco's proposal, other natural gas transmission companies could propose to construct facilities to supply Transco with additional capacity; however, such actions would likely result in at least the same impacts or possibly larger environmental impacts, as we assume more facilities would be required to be constructed by other companies as compared to Transco's proposed facilities. The no-action alternative would not meet the stated objective for either project. For these reasons, we do not recommend the no-action alternative.

C.3 SYSTEM ALTERNATIVES

System alternatives would use existing, modified, or proposed pipeline systems to meet the purpose and need of the Projects. Although modifications or additions to existing or proposed pipeline systems may be required, implementation of a system alternative would deem it unnecessary to construct all or part of the Projects; for example, if adding pipeline on one part of the system could negate the need for new compression, or if in-trench replacement could be used instead of looping. Such modifications or additions could result in environmental impacts that are less than, similar to, or greater than those associated with construction and operation of the Projects.

FM100 Project

National Fuel has no other pipeline systems in the area that would meet the FM100 Project's purpose and need. We evaluated direct replacement of the entire 44.9 miles of the existing Line FM100 pipeline with a new, like-kind 12-inch-diamter pipeline, including both take-up and relaying the new pipe in the same trench, and looping the new pipeline parallel to the existing pipeline. However, the take-up and relay alternative is not viable because it would interrupt National Fuel's existing gas delivery commitments. In addition, the looping alternative would require approximately 13.6 more miles of pipeline and subsequently impact more land and environmental resources; therefore, we conclude the direct replacement system alternative would not be feasible or provide a significant environmental advantage. No other companies' systems were identified that could meet (or be feasibly adjusted to meet) the purpose and need for the FM100 Project.

Leidy South Project

Transco stated that its existing system does not have any available unsubscribed capacity to service the volume of gas that would be provided for the Leidy South Project. There are four other existing interstate natural gas pipeline systems in the Leidy South Project area, including those operated by Columbia Gas Transmission, LLC; Dominion Energy Transmission, Inc.; Tennessee Gas Pipeline; and Texas Eastern Transmission, LP. However, these systems are not capable of transporting the proposed volume of natural gas without expanding their systems or building new facilities, which could result in environmental impacts that are at least equal to or likely greater than the proposed Leidy South Project, and which would not likely be constructed to meet Transco's schedule. No other companies have proposed facilities that they contend could meet the volumes contracted for the Leidy South Project. Therefore, we conclude that use of other pipeline systems is not a practicable alternative for the Leidy South Project.

C.4 PIPELINE ROUTE ALTERNATIVES

We considered route alternatives to determine whether their implementation would be preferable to the proposed pipeline routing for the Projects. Route alternatives typically deviate from the proposed pipeline alignment to avoid or reduce construction impacts on an identified landowner, land-management agency, and/or environmental resources, but the origination and end points generally remain the same as the proposed pipeline alignment.

FM100 Project

We did not identify or evaluate any route alternatives specific to National Fuel's Project because our review indicated that the proposed routes abut or only deviate slightly from existing cleared rights-of-way and involve a minimal amount of new (greenfield) right-of-way, and minimal environmental impact. In addition, no site-specific environmental comments were received or issues discovered during scoping that would lead us to consider or evaluate other route alternatives.

Leidy South Project

We received comments requesting that the Hensel Replacement avoid impacts on the Tamarack Swamp Natural Area. Based on input received during the pre-filing process, Transco's proposed route addressed concerns with routing the Hensel Replacement to avoid direct impacts on the Tamarack Swamp Natural Area (see additional discussion in Section B.4.2). Additionally, Transco addressed PADCNR's request to regrade portions of the Leidy Line A and Leidy Line B rights-of-way to return the area to a more natural grade. As proposed, the Hensel Replacement pipeline route addresses all of the environmental comments received. No other site-specific environmental comments were received or issues discovered during scoping that would lead us to consider or evaluate other route alternatives.

We did not identify or evaluate any route alternatives specific to the Hilltop or Benton Loops because the proposed routes are both entirely collocated with Transco's existing pipeline system, which minimizes environmental impacts, and no site-specific comments were received or issues discovered during scoping that would lead us to conduct an alternatives analysis for these Leidy South Project components.

C.5 ABOVEGROUND FACILITY SITE ALTERNATIVES

Based on our analysis in this EA, we have determined that the proposed sites for National Fuel's Marvindale and Tamarack Compressor Stations are in acceptable locations, and that construction would

not result in significant environmental impacts. We did not receive any comments on or objections to the proposed sites, and National Fuel has possessory interests for each of these sites. As such, we did not further investigate site alternatives for the National Fuel compressor stations.

Compressor station and aboveground facility siting is often constrained by several factors, including pipeline hydraulics and DOT regulations. That is, an otherwise seemingly ideal site based on land use or other environmental factors might not be located within the necessary engineering and hydraulic parameters of the pipeline system. Also, any compressor station constructed to increase pressure or deliverability on an existing pipeline system would need to be sited along (or nearby) the existing pipeline facilities to avoid the need for additional connecting (suction/discharge) pipelines. Our discussion below takes these factors into consideration.

Transco's Compressor Stations 605 and 610 are existing sites that would be expanded primarily within existing Transco-owned parcels, thus minimizing environmental impacts and impacts on new landowners. Based on our analysis in this EA, we have determined that the proposed expansions of these compressor stations would not result in ground disturbance at Compressor Station 605 and would involve minor ground disturbance within the area previously disturbed during construction of Compressor Station 610, which would not result in significant environmental impacts. We did not receive any comments on Compressor Station 605 or objections to the proposed expansion; thus, additional site alternatives were not assessed for Compressor Station 605. We did receive comments on the use of electric-driven compression instead of natural-gas driven compression at Compressor Station 610. The electric motor-driven alternative is discussed below in section C.5.4.

We received comments on various environmental issues pertaining to the proposed locations for Compressor Stations 607 and 620, prompting us to look at looping, electric motor-driven compressors, and site alternatives. We examined alternative sites along Transco's pipeline system in proximity to the proposed locations for Compressor Stations 607 and 620 to determine whether environmental impacts could be reduced or mitigated. We limited these sites to locations on or immediately adjacent to Transco's pipeline to minimize the need for suction/discharge pipeline to connect the compressor station to Transco's system, as well as the additional environmental impact associated with pipeline construction (see also section C.5.1). The siting of each facility was limited to specific segments along Transco's pipeline system to minimize hydraulic issues of coordinating operations with existing compressor stations, minimize compressor power requirements, and to meet delivery pressure requirements at existing delivery points. Regarding site selection, although section 7(h) of the NGA grants the Certificate holder the right to exercise eminent domain, we believe it is generally preferable for a site to be reasonably obtained from the current landowners (e.g., by purchase, lease, or restrictive easement) in order to minimize the use of eminent domain to secure land for aboveground facilities where possible, as such facilities are permanent and would restrict future aboveground land uses for landowners.

In addition to the above factors, consideration was given to environmental impacts associated with accessing each site, construction requirements, noise sensitive areas, sensitive resources, contamination, and the reasonable availability of sites sufficiently large (i.e., greater than 40 acres) to provide a buffer from adjoining properties. Our analysis of alternatives for Compressor Stations 607 and 620 are provided in the following subsections.

C.5.1 Loop-Intensive Alternative

In considering comments on the proposed locations for Compressor Stations 607 and 620, one possible alternative to adding compression is adding additional looping segments to a pipeline. No commentor mentioned this alternative, but we evaluated the construction of pipeline looping as an alternative to the proposed increases in compression and new compression for the Leidy South Project to

assess whether this could provide an environmental advantage. Because we received comments on the fuel source for Compressor Station 610, we also evaluated the looping alternative for this compression addition. We assumed the looping would be constructed along Transco's existing system, generally collocated with existing rights-of-way; hydraulically feasible; and meet the Leidy South Project objective to deliver 582,000 Dth/d of firm natural gas transportation capacity. As indicated in table C.5.1-1, the loop-intensive alternatives for each of the proposed individual compression facilities, and for all compression facilities combined, requires a significant increase in total pipeline mileage compared to the proposed Projects. The table also shows additional anticipated resource impacts for each compressor station if looping were to replace each of the compressor stations.

TABLE C.5.1-1

Analysis of Loop-Intensive System Alternative

		Incremental Additional Impact for Looping in Lieu of Compression [a]			
Comparative Factor	Proposed Leidy South Project	Compressor Station 607	Compressor Station 620	Compressor Station 610	All Compression Facilities Replaced with Looping [b]
Total Pipeline Length (miles)	12.2	16.9	37.0	42.4	95.7
Construction Workspace (acres)	431.2	186.5	403.2	480.1	1,063.0
Forest Land Impacted (acres)	61.1	106.6	82.9	115.5	288.7
Stream Crossings (no.)	19	29	128	148	269
Landowners Crossed by Construction Right-of-way (no.)	39	105	245	280	431
Residences within 0.5 mile of compressor station(s)	112	NA	NA	17	40 [c]

[a] The amounts shown are the additional impacts that would result for each loop to be built compared to the proposed new or modified compressor station(s). The impacts for each proposed compressor station have been subtracted out from the total of each looping alternative to show the difference in impact, all of which are greater for the looping.

[b] The mileage for replacing Compressor Station 605 capacity was not estimated individually because no ground-disturbing work would be required at that facility and no comments were received on that facility; however, it was considered for all compression facilities combined.

[c] The number of residences within 0.5 mile of existing compressor stations would not change; existing Compressor Stations 610 and 605 have 17 and 26 residences within 0.5 mile, respectively.

The looping alternatives, in lieu of compression, would impact more land for construction, impact more forest, cross more streams, and have temporary and permanent effects on a greater number of landowners, including landowners who are not currently affected. Conversely, they would result in less air quality and noise impact on residences (i.e., impacts within a 0.5-mile radius, as no compressors would be built with these alternatives). Visual impacts would also differ, as no new permanent compressor facilities would be constructed on the new compressor station sites, but the visual impact along the loops would be altered where vegetation type changes or minor aboveground facilities (such as MLVs) are required. Based on the greater resource impacts (mainly, that the looping alternative would result in over 500 additional acres of ground disturbance, almost 5 times as much forested land impacted, 250 additional stream crossings, and almost 400 additional landowners crossed), we do not find that the loop-intensive alternatives offer any clear significant environmental advantages over the proposed Leidy South Project compression. Therefore, we eliminated the loop-intensive alternative from further consideration.

C.5.2 Compressor Station 607 Alternatives

We examined one option (Option B) to the proposed site for Compressor Station 607. Option B is considered available and within the defined suitable hydraulic range along Transco's Central Pennsylvania Line North system, between approximate mileposts 7.0 and 21.0 which was confirmed by FERC staff's hydraulic review. The general location of the alternative site in relation to the proposed compressor station location is shown on figure C.5.2-1, and a summary of comparative factors for Option B and the proposed site is provided in table C.5.2-1.

TABLE C.5.2-1

Analysis of Compressor Station 607 Alternatives

Comparative Factor	Proposed Site (Option A)	Option B
Parcel area (acres) [a]	93.0	210.8
Temporary Construction workspace (acres) [a]	18.0	77.4
Permanent footprint (acres) [a]	12.3	31.8
Length of permanent access road (feet) [a]	765	1,127
Length of suction and discharge piping (feet) [b]	297	268
Current zoning classification [c]	Agriculture / Conservation	Agriculture / Conservation
Current land use [d]	Hay/Agriculture	Shrub/Scrub / Forest/Woodland
Land ownership	Private	Private
Land availability [e]	Available	Available
Permanent impact on forested lands (acres) [d]	2.5	30.4
Permanent impacts on prime farmland (acres) [f]	12.1	0.0
Field delineated streams (stream length in feet impacted)	0.0	164
Field delineated wetlands impacted (acres)	0.3	5.6
Number of residences within 0.5 mile [g]	46	33
Distance to nearest residence (feet) [g]	364	116
Highly erodible soils (acres) [f]	<0.1	35.7
Presence of threatened and endangered species	No	No
Presence of cultural or recreational resources	No	No
Visual screening	Yes	Yes
Site topography	Flat	Sloped

[a] Temporary construction workspace and permanent footprint are based on conceptual layout plans.
[b] Suction and discharge piping is required to connect a new compressor station to the existing pipeline.
[c] Current zoning designation received from Luzerne County (Weber, 2019).
[d] Land use calculations based on USGS NLCD 2011 database and adjusted based on field findings.
[e] Land availability is defined as parcels that were available for purchase.
[f] Based on SSURGO dataset.
[g] Residence and distances based on aerial photography, measured from the edge of the workspace.

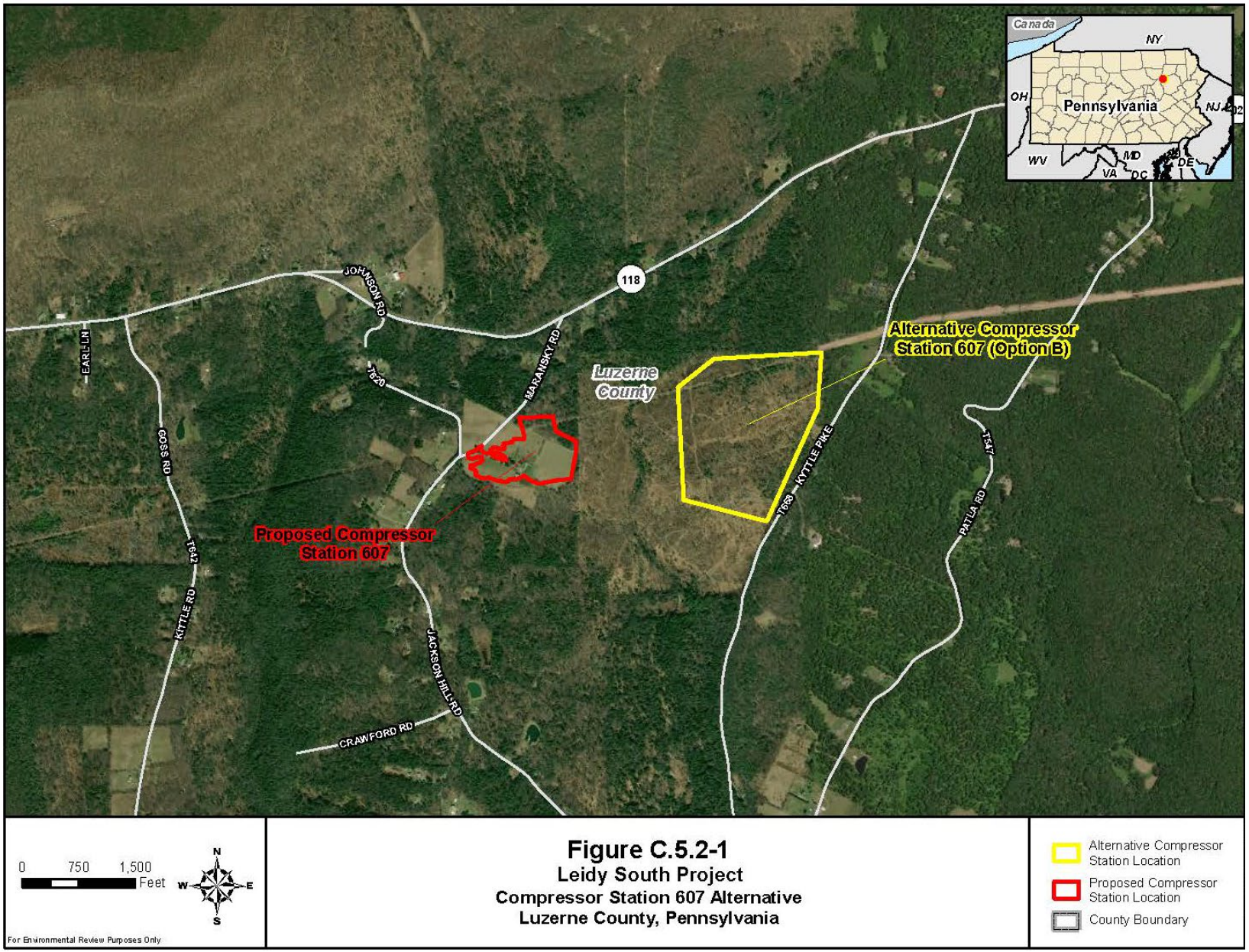


Figure C.5.2-1
Leidy South Project
Compressor Station 607 Alternative
Luzerne County, Pennsylvania

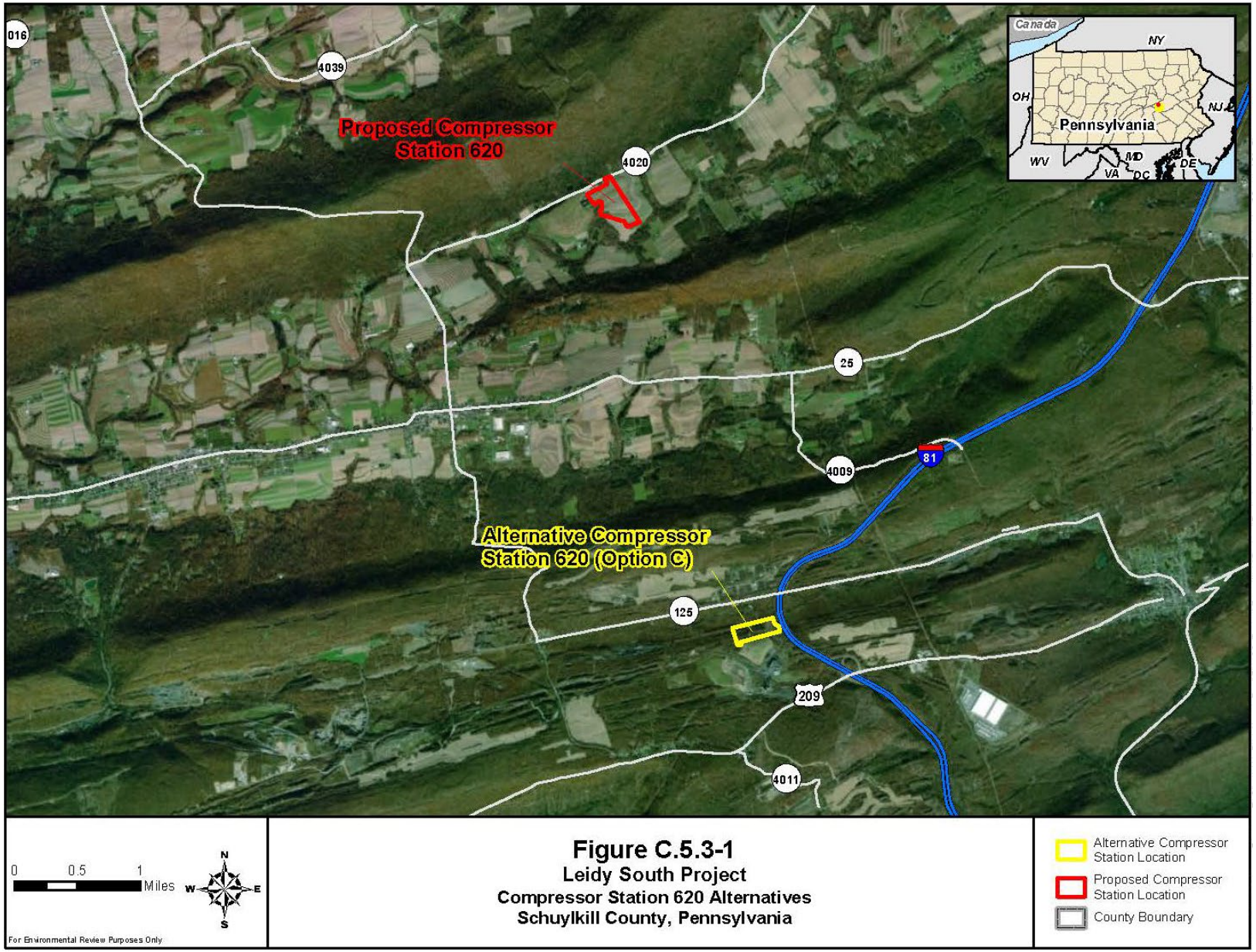
As indicated in table C.5.2-1, Option B would disturb considerably more land for construction and operation than the proposed site, principally due to the existing sloped topography, which would either need imported fill or extensive grading to create a level surface for the new facility. Option B would also require an access road that is approximately 362 feet longer than that needed for the proposed site; directly impact about 164 feet of an existing high-quality trout stream, which is avoided by the proposed site; and impact about 5.3 more acres of wetland, 35.7 more acres of highly erodible soils, and 27.9 more acres of forested land than the proposed site. Option B would require slightly less suction and discharge piping (about 29 feet) and has 13 fewer residences within 0.5 mile, but it is closer to the nearest residence (about 116 feet away) than the proposed site (about 364 feet away). Based on these factors, Option B does not provide a significant environmental advantage over the proposed site; therefore, we eliminated Option B from further consideration.

C.5.3 Compressor Station 620 Alternatives

We received numerous comments expressing concern about the proposed site for Transco's Compressor Station 620, and many recommended moving the site to a more remote location in Frailey Township near an existing cogeneration plant, which would avoid the proposed site's impacts on agricultural land, be farther from residences, and avoid other expressed concerns relating to noise, air quality, visibility, health, safety, wildlife, water quality, flooding, and impacts on nearby businesses. Based on these comments, we required Transco to investigate other potential sites including sites both north and south of the proposed site, which would include the requested site near the cogeneration plant. According to FERC staff's hydraulic review, we agree with Transco's assessment that the proposed site is at the northernmost end of the defined hydraulic range; therefore, no sites to the north could be considered viable alternatives. Accordingly, Transco completed additional screening for multiple other parcels to the south of the proposed site that could meet the hydraulic siting criteria, and identified one option (Option C), which is in the Frailey Township area, adjacent to the existing cogeneration plant referenced above as well as a compost facility. We did not identify any other alternative sites.[30]

Option C is considered available and within the defined suitable hydraulic range along Transco's Central Pennsylvania Line South system, between approximate mileposts 70.0 and 80.0. It should be noted that we also received numerous comments during scoping concerning Option C, recommending the site *not* be utilized for various environmental reasons. These commentors noted that the site was rejected for development by other parties, possibly due to contamination from old mining operations and disposal of fly ash on site. They also mentioned concerns about impacts on groundwater, sinkholes due to historic mining activities, closed landfills, gas tank storage, and potential for health risks, groundwater contamination, and cumulative impacts on air quality due to the adjacent cogeneration plant and compost facility. The general location of Option C in relation to the proposed compressor station is shown on figure C.5.3-1, and a summary of comparative factors for Option C and the proposed site is provided in table C.5.3-1.

[30] An "Option B," directly adjacent to the proposed site, was briefly considered. This site would have very similar impacts as compared to the proposed site; however, it was not available for purchase or use and did not convey any clear environmental advantages; therefore, it was eliminated from further consideration.


016
4039
Proposed Compressor Station 620
4020
25
4009
81
Alternative Compressor Station 620 (Option C)
125
209
4011
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For Environmental Review Purposes Only
Figure C.5.3-1
Leidy South Project
Compressor Station 620 Alternatives
Schuylkill County, Pennsylvania
Alternative Compressor Station Location
Proposed Compressor Station Location
County Boundary

TABLE C.5.3-1

Analysis of Compressor Station 620 Alternatives

Comparative Factor	Proposed Site (Option A)	Option C
Parcel area (acres) [a]	105.5	63.9
Temporary Construction workspace (acres) [a]	45.4	29.1
Permanent footprint (acres) [a]	24.3	26.1
Length of permanent access road (feet) [a]	764	1,056
Length of suction and discharge piping [b]	278	575
Current zoning classification [c]	Agriculture	Industrial
Current land use [d]	Cultivated cropland	Industrial/Open/Deciduous Forest
Land ownership	Private	Private
Land availability [e]	Available	Available
Permanent impact on forested lands (acres) [d]	0.0	0.6
Permanent impacts on prime farmland (acres) [f]	41.3	<0.1
Field delineated streams (stream length in feet)	0.0	163
Field delineated wetlands impacted (acres)	0.0	1.3
Number of residences within 0.5 mile [g]	23	0
Distance to nearest residence (feet) [g]	75	1,400
Highly erodible soils (acres) [f]	4.5	20.4
Presence of threatened and endangered species	No	No
Presence of cultural or recreational resources	No	No
Visibility from Public Roadways and Nearby Residences	Yes	No
Site topography	Nearly Level	Sloped
Site contamination	No	Yes
Electric power available	No	No

[a] Parcel area, temporary construction workspace, and permanent footprint and access are based on conceptual layout plans.
[b] Suction and discharge piping is required to connect a new compressor station to the existing pipeline.
[c] Current zoning designation received from Schuylkill County (2010a; 2010b).
[d] Land use calculations based on USGS NLCD 2011 database and adjusted based on field findings.
[e] Land availability is defined as parcels that were available for purchase.
[f] Based on SSURGO dataset.
[g] Residence and distances based on aerial photography, measured from the edge of the workspace.

Option C is located in an industrial area where it is surrounded by other industrial and forested land, including Interstate 81 and Transco's existing pipeline system to the east; an existing cogeneration facility (formally a coal-fired power plant) and compost facility to the southeast; and a railroad to the north, and is within an approximately 300-acre area that has been previously impacted by surface mining activities between 1939 and 1977. The mining operations on the site were abandoned and not reclaimed, and have resulted in the development of acid mine drainage (AMD) discharges offsite, which have been mapped by the PADEP eMapPA web application (PADEP, 2019g). The AMD discharges present an environmental liability for the site and are a recognized environmental condition (REC). In addition, surface mining cuts throughout the mining site were reportedly filled with fly-ash and municipal sludge from the adjacent coal-fired power plant. The fly-ash and municipal sludge can potentially be hazardous materials, present a liability for the site, and are a REC (WHM, 2019). Fly-ash has also been noted as migrating onto the property from adjacent sites.

The comparative data in table C.5.3-1 identifies a number of environmental advantages for Option C compared to the proposed site, including its industrial setting, reduced impacts on prime farmland, greater distance to the nearest NSA, fewer residences within 0.5 mile, and fewer temporary

construction land requirements. However, Option C does not provide environmental advantages when comparing its increased access road length and greater potential impacts on streams, wetlands, and erodible soils. Further, Option C would require extensive grading of contaminated areas to level the sloped site for construction and operation.

The extensive grading that would be required to level the site could exacerbate the existing contamination, runoff discharges (i.e., AMD), and potentially interfere with existing and future treatment operations at the site. Contamination could migrate out of areas that are currently impacted and impact new areas, including surface waters, groundwater, soils, and surrounding air quality. There is also the possibility for subsidence on the property based on its historic mine usage. Additionally, due to the acidic soils and unpredictable variability of the subsurface environment underlying the site, we believe Transco might not be able to mitigate these potential risks and meet the safety and reliability requirements of the facility. We considered whether the Option C site REC could be mitigated to eliminate the risks identified (e.g., by site cleanup, disposal of potentially hazardous materials, and site stabilization). However, cleanup of the site, depending on the extent, along with the technical design requirements that would need to be incorporated into Option C because of soil acidity and extent of grading, could impact the economic feasibility of the Leidy South Project and could introduce delays that could prevent Transco from meeting the Leidy South Project purpose and need. Therefore, we conclude that because of the extent of the historic mining site issues and challenges associated with being responsible for and cleaning up the contamination, that site mitigation would not be practicable.

Although there are certain environmental advantages with Option C, based on the comparative environmental impacts of both sites and the risk of exacerbating existing contamination issues, which could have negative impacts on surface waters, ground water, and soils, we could not conclude that Option C provided a significant environmental advantage over the proposed location. As noted in section B, we have evaluated the proposed site for the numerous concerns listed above that were received about the proposed site during scoping, and found the proposed site's impacts on those resources would either not occur, be minimized, or would not be significant with Transco's proposed mitigation measures and our recommendations.

C.5.4 Electric Motor-Driven Compression Alternatives

We received comments during scoping regarding impacts from operation of Compressor Stations 607, 610, and 620 on air quality and noise, and why Transco was adding gas compression to the existing electric Compressor Station 610. Therefore, we examined whether the proposed compression facilities could be powered with electricity instead of natural gas. In general, electric compressors are quieter and produce fewer localized emissions than natural gas-driven compressors; however, grid-sourced power necessary to operate the compressors would result in emissions from the power generators supplying the regional transmission grid. Transco indicated that operational flexibility in the event of a power outage is a driving reason for the Leidy South Project to be adding natural gas-fired compression at Station 610, which is currently an electric motor-driven compressor.

Transco provided an engineering analysis of what would be required to power Compressor Stations 607, 610, and 620 with electric-driven compressors, and determined that additional aboveground power grid infrastructure, including high voltage power lines and substations, would be needed to meet the compression demands of the Leidy South Project. While the electric-driven compressors would be quieter than the proposed compressors, these power facilities would generally result in an increase in environmental impacts over the proposed facilities due to the need for additional rights-of-way and associated construction and operation footprints. The power lines and other facilities would impact landowners not currently affected by the proposed Projects and would result in greater visual impacts, among others. In addition, Transco provided an analysis based on regional emission data published by

PJM Interconnection LLC (2019) and other publicly available sources to compare the anticipated emissions from the Leidy South Project to regional emissions of three common air quality parameters: NO_2, SO_2, and CO_2. PJM Interconnection LLC calculates emission factors for all generators within 13 states, including Pennsylvania, on an annual basis.

Based on Transco's analysis, the regional air quality emissions of these parameters due to generation of electricity for the electric-driven compressors would generally be in excess of 2 orders of magnitude (100 times) greater for each compressor than Transco's proposed natural gas-driven compressors, which utilize low combustion technology. We note that comparisons between grid-sourced emissions and gas-fired emissions are complicated because grid power could be obtained from a variety of power sources (such as fossil fuel and renewable fuels). Further, there would be differences in the contributing fossil fuel-fired generating stations: they may use gas, oil, or coal for fuel; they would have different plant configurations (simple cycle or combined cycle power generation); and the plants would likely have different emission control systems. Furthermore, future emissions rates may be reduced due to changes in plant operation and fueling as a result of EPA regulatory changes. Therefore, we recognize that such comparisons are generic in nature and based on available data.

Although electric motor-driven compressor station alternatives would minimize *local* air quality impacts and noise, on a broader scale, they may result in greater overall air quality impacts from electricity generating plants. Based on the available emission data, and the additional construction impacts of powerlines and substations, we conclude that the alternative of using electric-motor-driven compression does not offer a significant environmental advantage over the proposed use of gas-fired compressors. Furthermore, considering Transco's indication that it would not meet the project objective for operational flexibility, we eliminated it from further consideration.

C.6 ALTERNATIVES CONCLUSION

We conclude that the proposed Projects, as modified by our recommended mitigation measures, are the preferred alternatives to meet the Projects' objectives.

SECTION D - CONCLUSIONS AND RECOMMENDATIONS

Based upon the analysis in this EA, we have determined that if National Fuel and Transco construct, operate, and abandon the proposed facilities in accordance with their application, supplements, and staff's recommended mitigation measures below, approval of the Projects would not constitute a major federal action significantly affecting the quality of the human environment.

We recommend that the Commission Order contain a finding of no significant impact and that the following mitigation measures be included as conditions to any Certificate the Commission may issue:

1. National Fuel and Transco shall follow the construction procedures and mitigation measures described in their respective applications and supplements, and as identified in the EA, unless modified by the Order. National Fuel and 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, or the Director's designee, has delegated authority to address any requests for approvals or authorizations necessary to carry out the conditions of the Order, and take whatever steps are necessary to ensure the protection of environmental resources during construction and operation of the Projects and activities associated with abandonment. This authority shall allow:

    a. the modification of conditions of the Order;

    b. stop-work authority; and

    c. the imposition of any additional measures deemed necessary to ensure continued compliance with the intent of the conditions of the Order as well as the avoidance or mitigation of unforeseen adverse environmental impact resulting from the Projects' construction, operation, and abandonment activities.

3. **Prior to any construction**, National Fuel and 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 EI's authority and have been or will be trained on the implementation of the environmental mitigation measures appropriate to their jobs before becoming involved with construction and restoration activities.

4. The authorized facility locations shall be as shown in the EA and as supplemented by filed alignment sheets. **As soon as they are available, and before the start of construction**, National Fuel and 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.

National Fuel's and 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. National Fuel's and Transco's right of eminent domain granted under NGA Section 7(h) does not authorize it to increase the size of its natural gas pipeline or facilities to accommodate future needs or to acquire a right-of-way for a pipeline to transport a commodity other than natural gas.

5. National Fuel and 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 the Commission's *Upland Erosion Control, Revegetation, and Maintenance Plan*, and/or minor field realignments per landowner needs and requirements which do not affect other landowners or sensitive environmental areas such as wetlands.

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

   a. implementation of cultural resources mitigation measures;

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

   c. recommendations by state regulatory authorities; and

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

6. **Within 60 days of the acceptance of the Order and before construction or abandonment activities begin**, National Fuel and Transco shall each file an Implementation Plan with the Secretary for review and written approval by the Director of OEP. National Fuel and Transco must file revisions to the plans as schedules change. The plans shall identify:

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

b. how National Fuel and 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 onsite construction and inspection personnel;

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

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

e. the location and dates of the environmental compliance training and instructions National Fuel and Transco will give to all personnel involved with construction and restoration, including initial and refresher training as the projects progress and personnel change, with the opportunity for OEP staff to participate in the training sessions;

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

g. the procedures (including use of contract penalties) National Fuel and 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:

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

(2) the environmental compliance training of onsite personnel;

(3) the start of construction; and

(4) the start and completion of restoration.

7. National Fuel and Transco shall employ at least one EI per construction spread. The EI shall be:

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

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

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

d. 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, National Fuel and Transco shall file updated status reports with the Secretary on a **weekly** basis until all construction and restoration activities are complete. On request, these status reports will also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:

a. an update on National Fuel's and Transco's efforts to obtain the necessary federal authorizations;

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

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

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

e. the effectiveness of all corrective actions implemented;

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

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

9. National Fuel and Transco shall develop and implement an environmental complaint resolution procedure, and file such procedure with the Secretary, for review and written approval by the Director of OEP. The procedure shall provide landowners with clear and simple directions for identifying and resolving their environmental mitigation problems/concerns during construction of the projects and restoration of the rights-of-way. **Prior to construction**, National Fuel and Transco shall mail the complaint procedures to each landowner whose property will be crossed by the projects.

a. In its letter to affected landowners, National Fuel and Transco shall:

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

(2) instruct the landowners that if they are not satisfied with the response, they can call National Fuel and Transco's Hotline; the letter shall indicate how soon to expect a response; and

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

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

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

(2) the location by milepost and identification number from the authorized alignment sheet(s) of the affected property;

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

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

10. National Fuel and Transco must receive written authorization from the Director of OEP **before commencing construction or abandonment of any project facilities**. To obtain such authorization, National Fuel and Transco must file with the Secretary documentation that it has received all applicable authorizations required under federal law (or evidence of waiver thereof).

11. National Fuel and Transco must receive written authorization from the Director of OEP **before placing the projects 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 projects are proceeding satisfactorily.

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

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

b. identifying which of the conditions in the Order with which National Fuel and Transco have complied or will comply. This statement shall also identify any areas affected by the projects where compliance measures were not properly implemented, if not previously identified in filed status reports, and the reason for noncompliance.

13. **Prior to construction of Line YM58,** National Fuel shall file with the Secretary, for review and written approval by the Director of OEP, a plan for implementing the recommendations of the Geohazard Report.

14. **Prior to construction**, Transco shall file with the Secretary, for review and written approval by the Director of OEP, a revised ECP that does not include that phrase "in excess of 4 inches" in section V.A.4 of Attachment 2 of the ECP.

15. **Prior to construction of Line YM58,** National Fuel shall file with the Secretary, for review and written approval by the Director of OEP, evidence of landowner concurrence with the site-specific construction plan near milepost 15.0 or file a revised site-specific construction plan near milepost 15.0 that maintains a 10 foot buffer between the aboveground structure and the construction workspace.

16. **Prior to construction of the Hilltop Loop**, Transco shall file with the Secretary, for review and written approval by the Director of OEP, evidence of landowner concurrence with removal of the garage at milepost 185.0. If Transco is unable to obtain concurrence, Transco shall file revised alignment sheets for construction in this area that avoids removal of the structure.

17. National Fuel shall abandon by removal the Line FM100 pipeline as requested by the landowner from mileposts 22.9 to 23.0 in areas where there is less than 5 feet of cover over the pipeline. If National Fuel reaches an agreement with the landowner to abandon the pipeline in place, National Fuel shall file documentation with the Secretary **prior to abandonment** indicating the landowner's change in preference for the abandonment method, and then implement the landowner preference at these locations. If National Fuel believes that there are safety or environmental concerns that have yet to be identified that would preclude the removal, National Fuel shall file supplemental information and justification with the Secretary, and request specific approval from the Director of OEP to abandon the pipeline in place.

18. National Fuel shall abandon by removal the Line FM100 pipeline as requested by the landowner from mileposts 30.7 to 31.0. If National Fuel reaches an agreement with the landowner to abandon the pipeline in place, National Fuel shall file documentation with the Secretary **prior to abandonment** indicating the landowners' change in preference for the abandonment method, and then implement the landowner preference at these locations. If National Fuel believes that there are safety or environmental concerns that have yet to be identified that would preclude the removal, National Fuel shall file supplemental information and justification with the Secretary, and request specific approval from the Director of OEP to abandon the pipeline in place.

19. Transco shall **not begin** construction of the Leidy South Project facilities and/or use of staging, storage, or temporary work areas and new or to-be-improved access roads **until**:

    a. Transco files with the Secretary:

        (1) the SHPO's comments on the architectural aspects of the survey report for Compressor Station 607;

        (2) the additional information requested by the SHPO in its October 1, 2019 letter, and the SHPO's comments on the additional information; and

        (3) any additional required report(s) or plan(s), and the SHPO's comments on the report(s) or plan(s).

b. the Advisory Council on Historic Preservation is afforded an opportunity to comment if historic properties would be adversely affected; and

c. FERC staff reviews and the Director of OEP approves the cultural resources report(s) and plan(s), and notifies Transco in writing that treatment plans/mitigation measures (including archaeological data recovery) may be implemented and/or construction may proceed.

All materials filed with the Commission containing **location, character, and ownership** information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: "**CUI//PRIV- DO NOT RELEASE**."

20. National Fuel shall make all reasonable efforts to ensure its predicted noise levels from the Marvindale and Tamarack Compressor Stations are not exceeded at nearby NSAs and file a noise survey with the Secretary **no later than 60 days** after placing the Marvindale Compressor Station and Tamarack Compressor Station into service. If full load condition noise surveys are not possible, National Fuel 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 either of these facilities at any load exceeds a L_{dn} of 55 dBA at any nearby NSAs, National Fuel shall file a report on what changes are needed and install additional noise controls to meet that level **within 1 year** of the facility's in-service date. National Fuel shall confirm compliance with the L_{dn} of 55 dBA requirements by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls.

21. Transco shall make all reasonable efforts to ensure its predicted noise levels from Compressor Stations 607 and 620 are not exceeded at nearby NSAs and file a noise survey with the Secretary **no later than 60 days** after placing the new Compressor Stations 607 and 620 into service. If full load condition noise surveys are 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 either of these facilities at any load exceeds a L_{dn} of 55 dBA at any nearby NSAs, Transco shall file a report on what changes are needed and install additional noise controls to meet that level **within 1 year** of the facility's in-service date. Transco shall confirm compliance with the L_{dn} of 55 dBA requirements by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls.

22. Transco shall make all reasonable efforts to ensure its predicted noise levels from Compressor Stations 605 and 610 are not exceeded at nearby NSAs and file noise surveys with the Secretary **no later than 60 days** after placing the authorized unit(s) at Compressor Stations 605 and 610 in service. If full load condition noise surveys are 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 operation of the modified stations at full load exceeds a L_{dn} of 55 dBA at any nearby NSAs, Transco shall file a report on what changes are needed and install additional noise controls to meet that level **within 1 year** of the in-service date. Transco shall confirm compliance with the L_{dn} of 55 dBA requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls.

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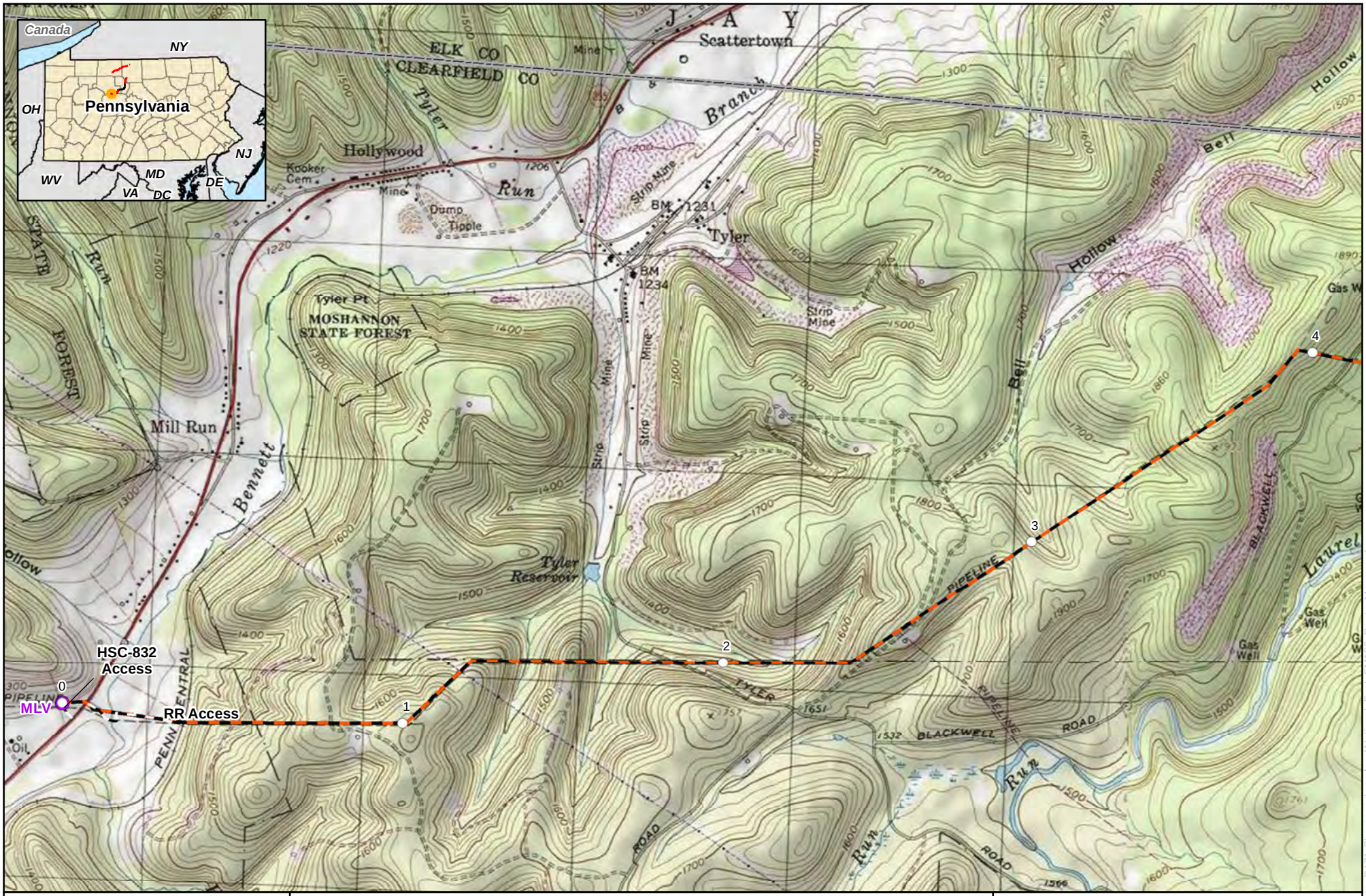
Merjent, Inc. is a third party contractor assisting the Commission staff in reviewing the environmental aspects of the project application and preparing the environmental documents required by NEPA. Third party contractors are selected by Commission staff and funded by project applicants. Per the procedures in 40 CFR 1506.5(c), third party contractors execute a disclosure statement specifying that they have no financial or other conflicting interest in the outcome of the project. Third party contractors are required to self-report any changes in financial situation and to refresh their disclosure statements annually. The Commission staff solely directs the scope, content, quality, and schedule of the contractor's work. The Commission staff independently evaluates the results of the third-party contractor's work and the Commission, through its staff, bears ultimate responsibility for full compliance with the requirements of NEPA.

Appendix A

USGS 7.5-minute Quadrangle Topographic Maps

National Fuel

FM100 Project



0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

For Environmental Review Purposes Only

Map 1 of 22

Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

Clearfield County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

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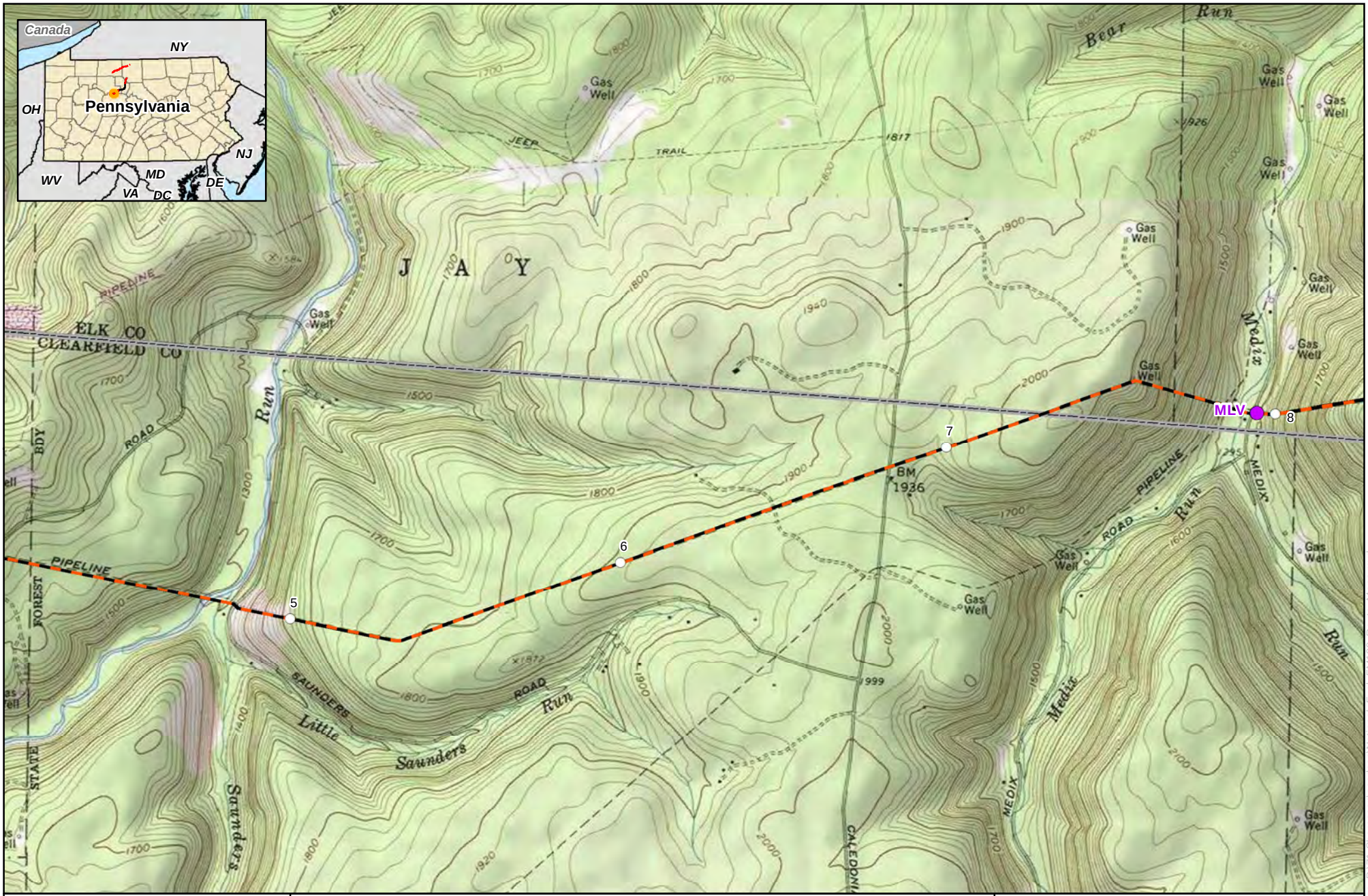

0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

For Environmental Review Purposes Only

Map 2 of 22

Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

Clearfield and Elk County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

Source: P:\21-Sharescanhecarlson\National_Fuel_FM100_Route_Maps.mxd

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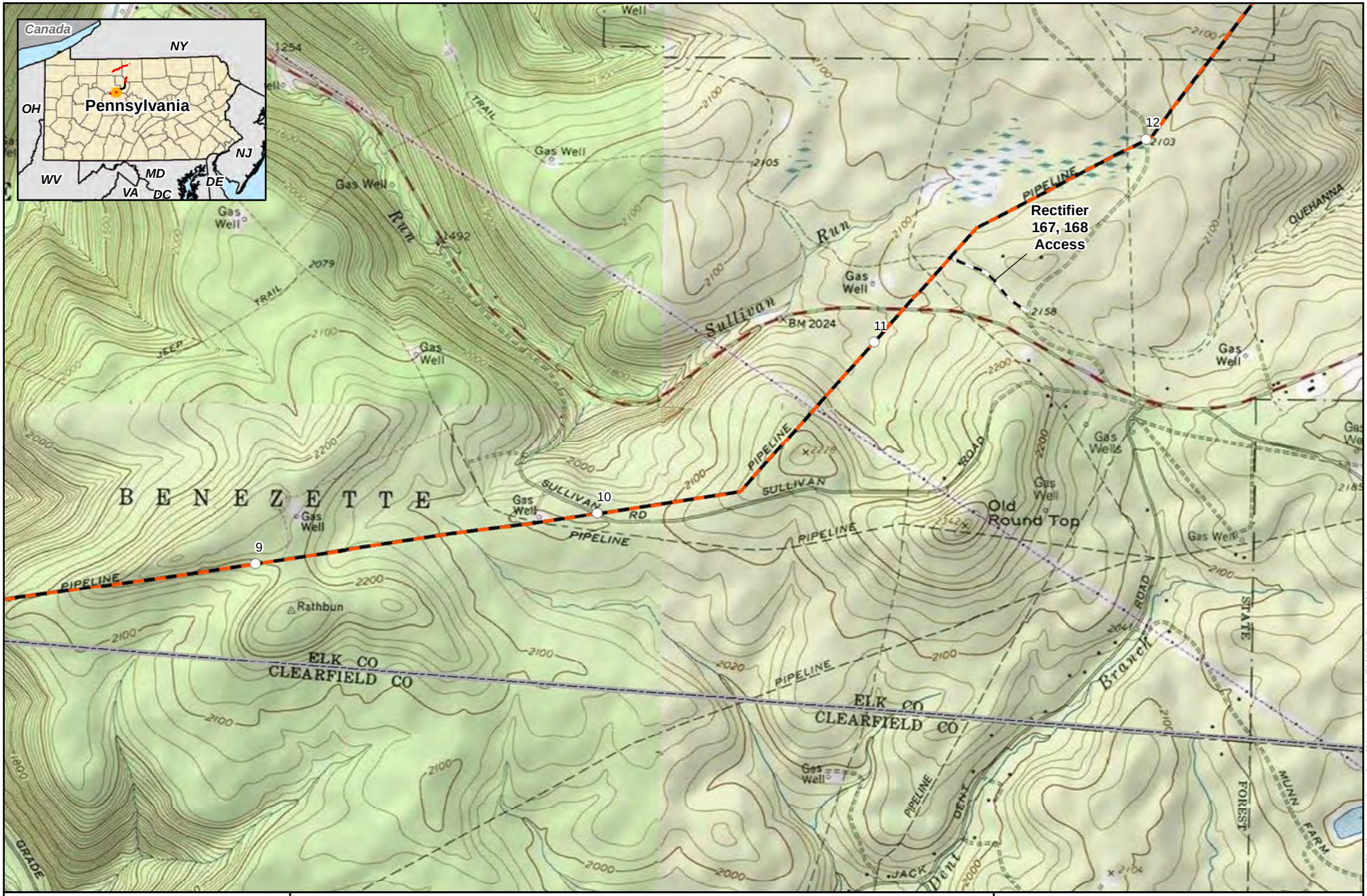

0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

For Environmental Review Purposes Only

Map 3 of 22

Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

Elk County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

Source: P:\21-Sharescan\ecarlson\National_Fuel_FM100_Route_Maps.mxd

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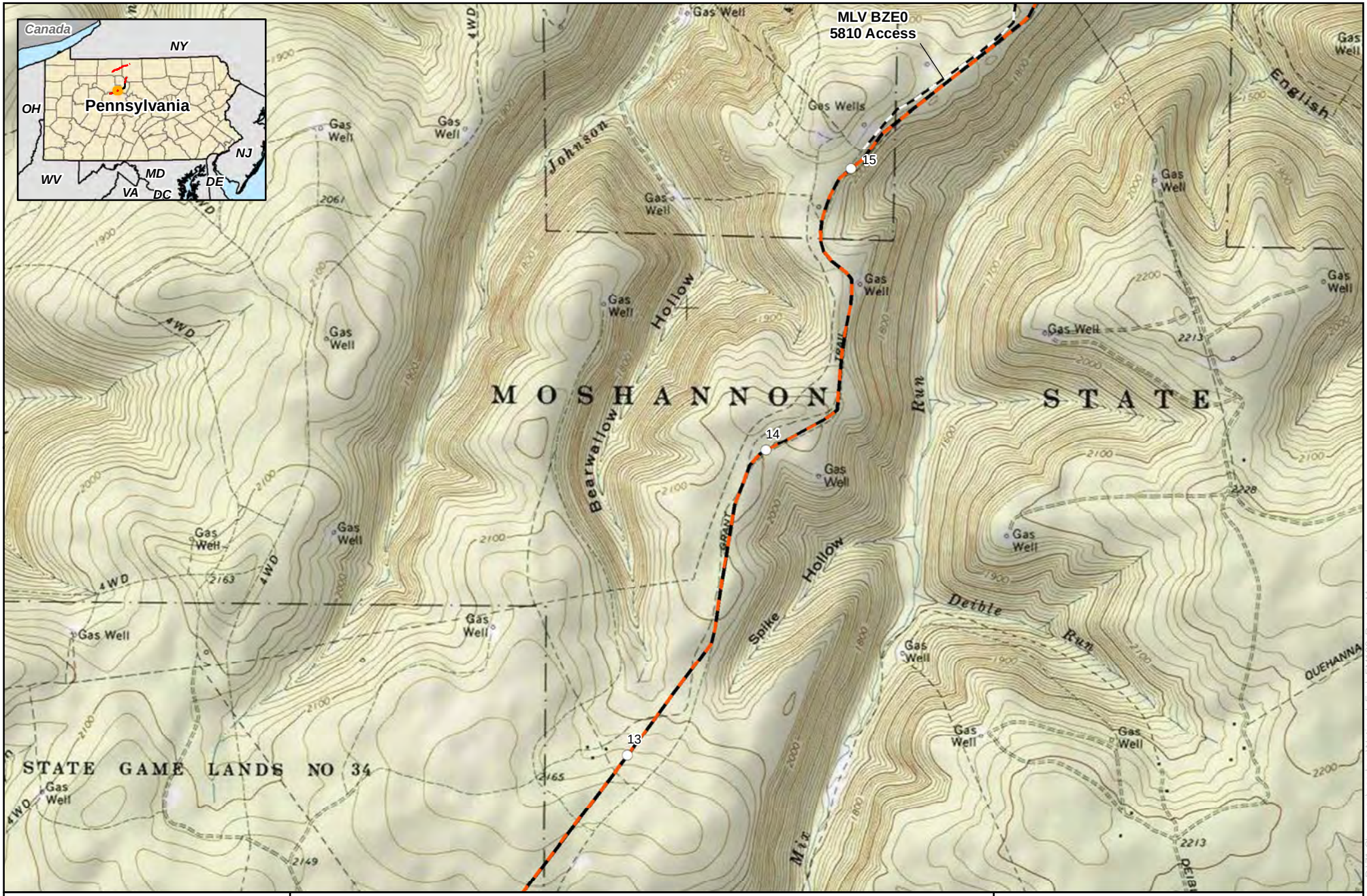


0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

For Environmental Review Purposes Only

Map 4 of 22

Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

Elk County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

Source: P:\21-Sharescan\ecarlson\National_Fuel_FM100_Route_Maps.mxd

Date: (11/26/2019)

0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

For Environmental Review Purposes Only

Map 5 of 22

Appendix A

FM100 Project

National Fuel

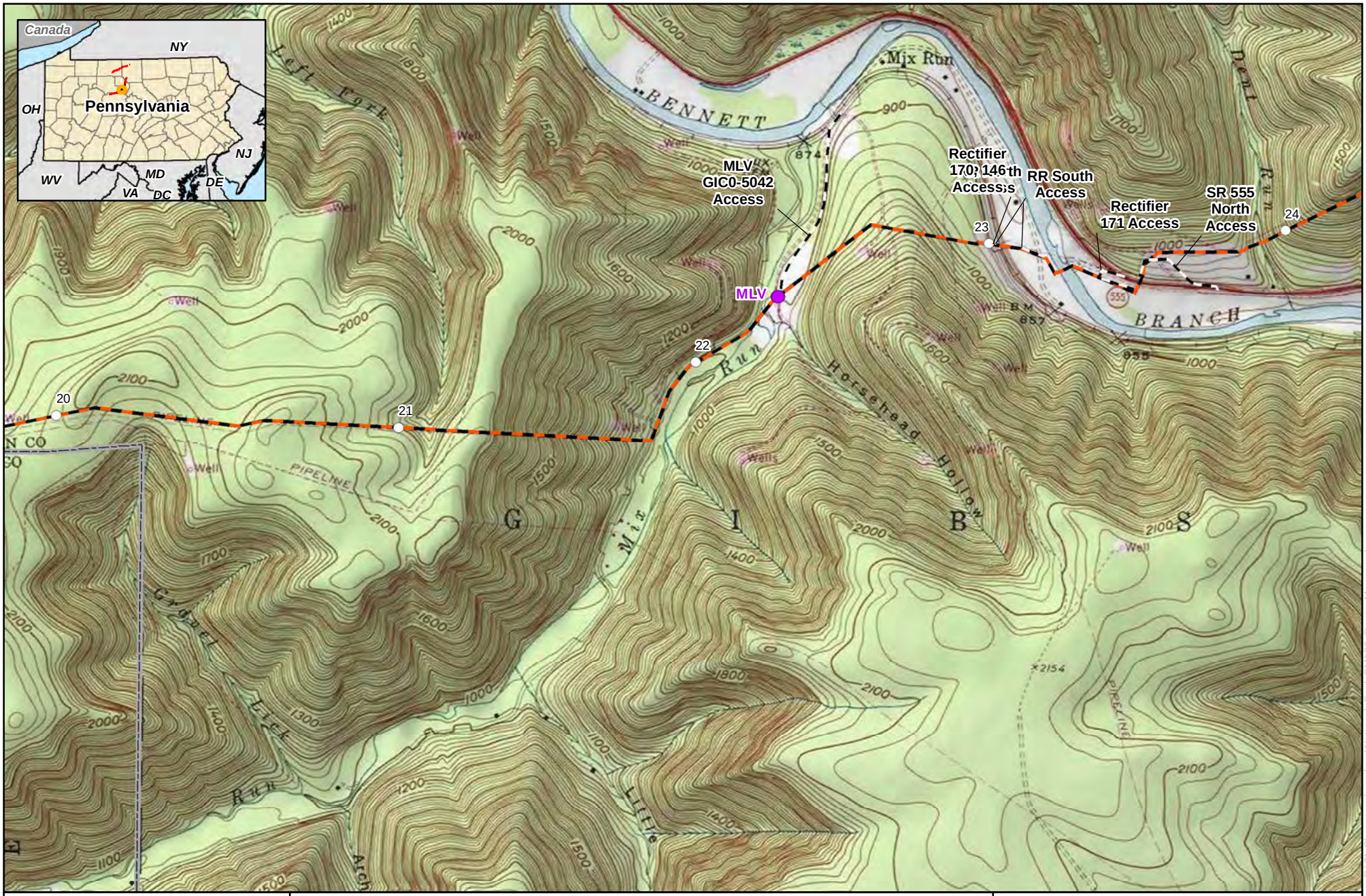
USGS 7.5-minute Quadrangle Topographic Map

Elk and Cameron County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

Source: P:\21-Sharescan\ecarlson\National_Fuel_FM100_Route_Maps.mxd

Date: (11/26/2019)



Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

Cameron County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

Source: P:\21-Sharescan\ecarlson\National_Fuel_FM100_Route_Maps.mxd

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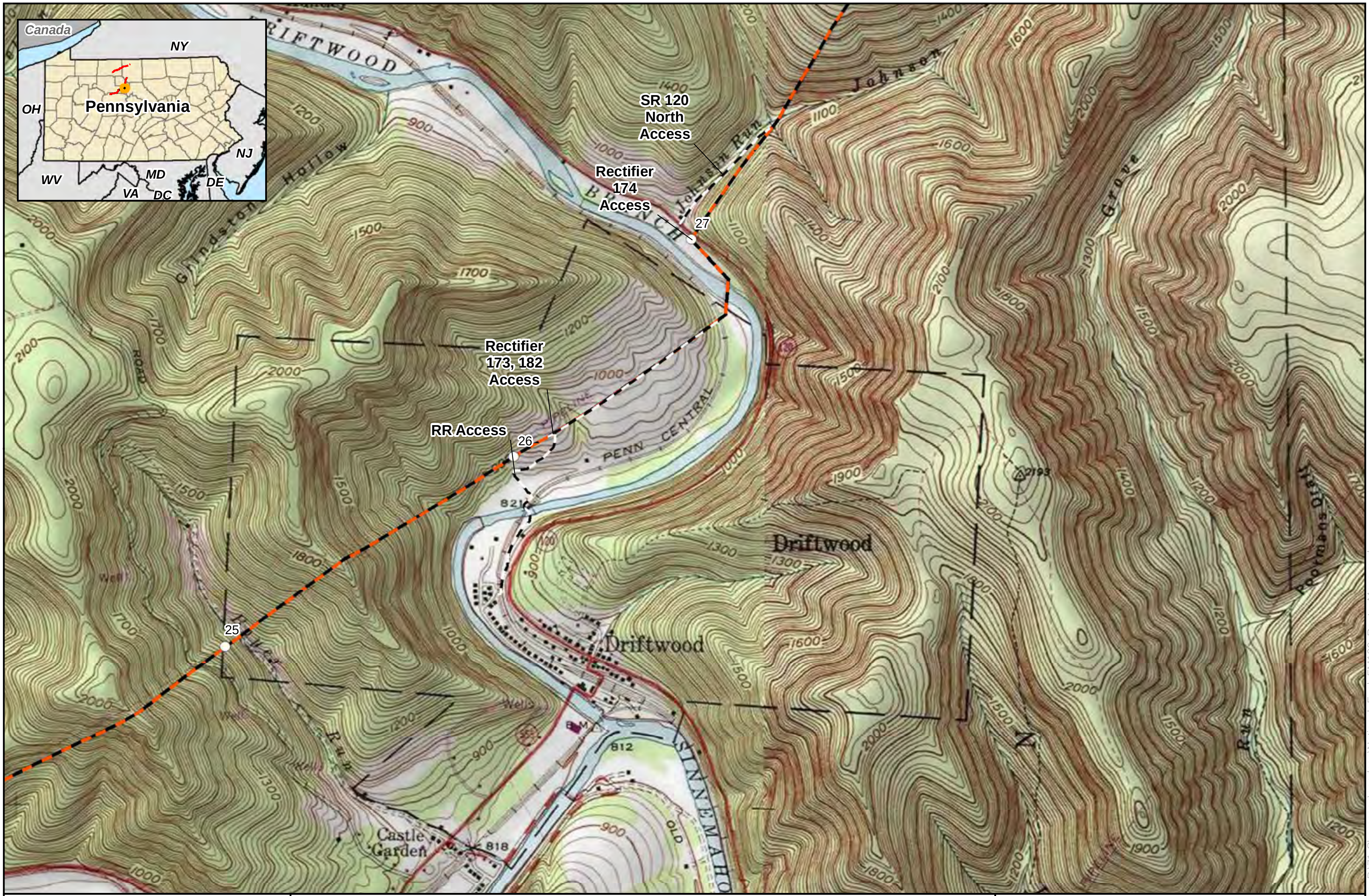

0 1,000 2,000
Feet
1 inch = 2,000 feet

N
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For Environmental Review Purposes Only

Map 7 of 22

Appendix A
FM100 Project
National Fuel
USGS 7.5-minute Quadrangle Topographic Map
Cameron County, Pennsylvania

Milepost	Access Road
Leidy Interconnect	OPP Station
MLV - Abandoned Line	Interconnect
Pipeline to be Abandoned	Proposed Compressor Station
Pipeline to be Constructed	MLV - Proposed Line
Abandoned Compressor Station	Anode Bed
County Boundary	

Source: P:\Z1-Shares\camcarlson\National_Fuel_FM100_Route_Maps.mxd
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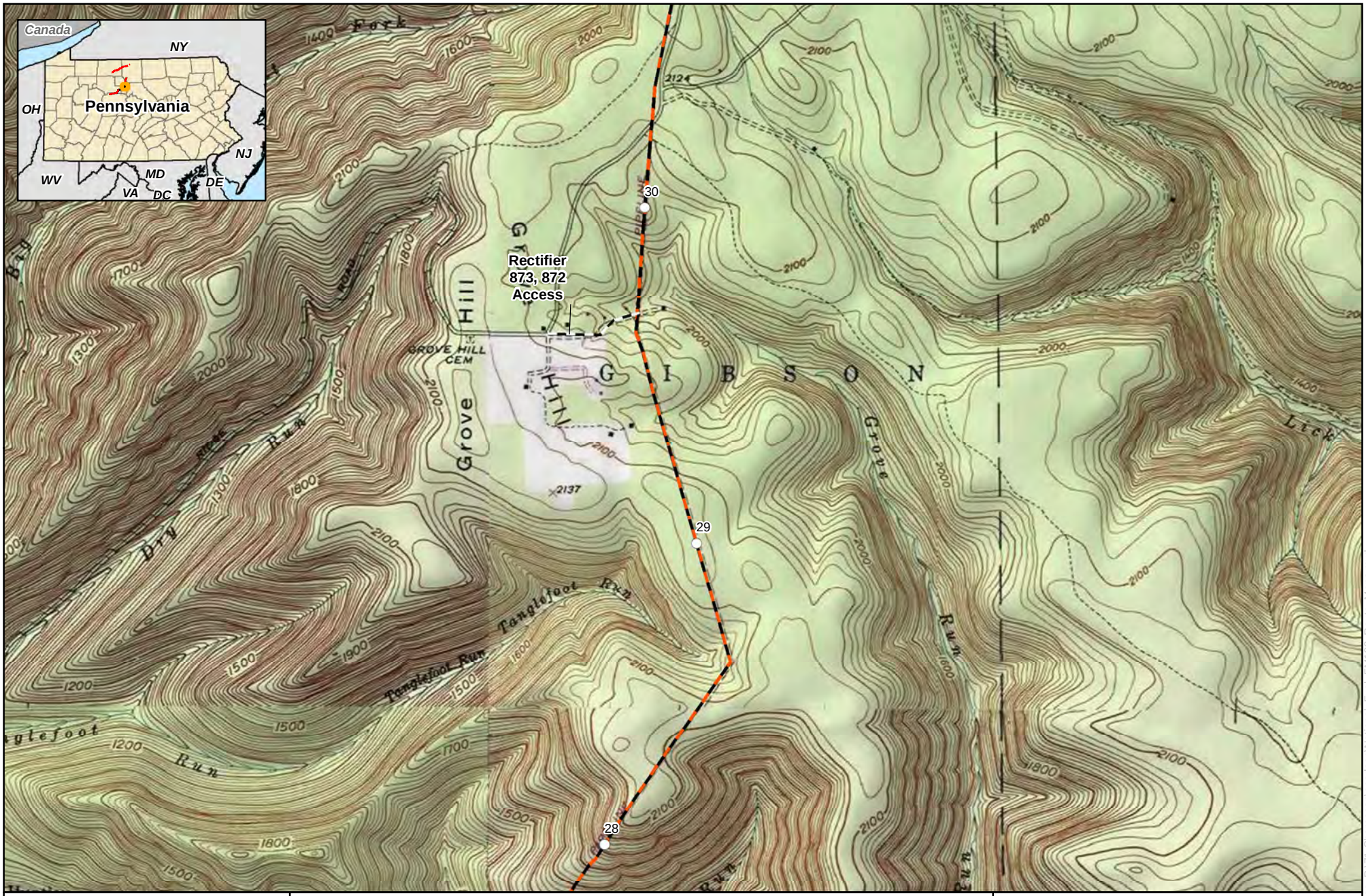

0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

For Environmental Review Purposes Only

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Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

Cameron County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

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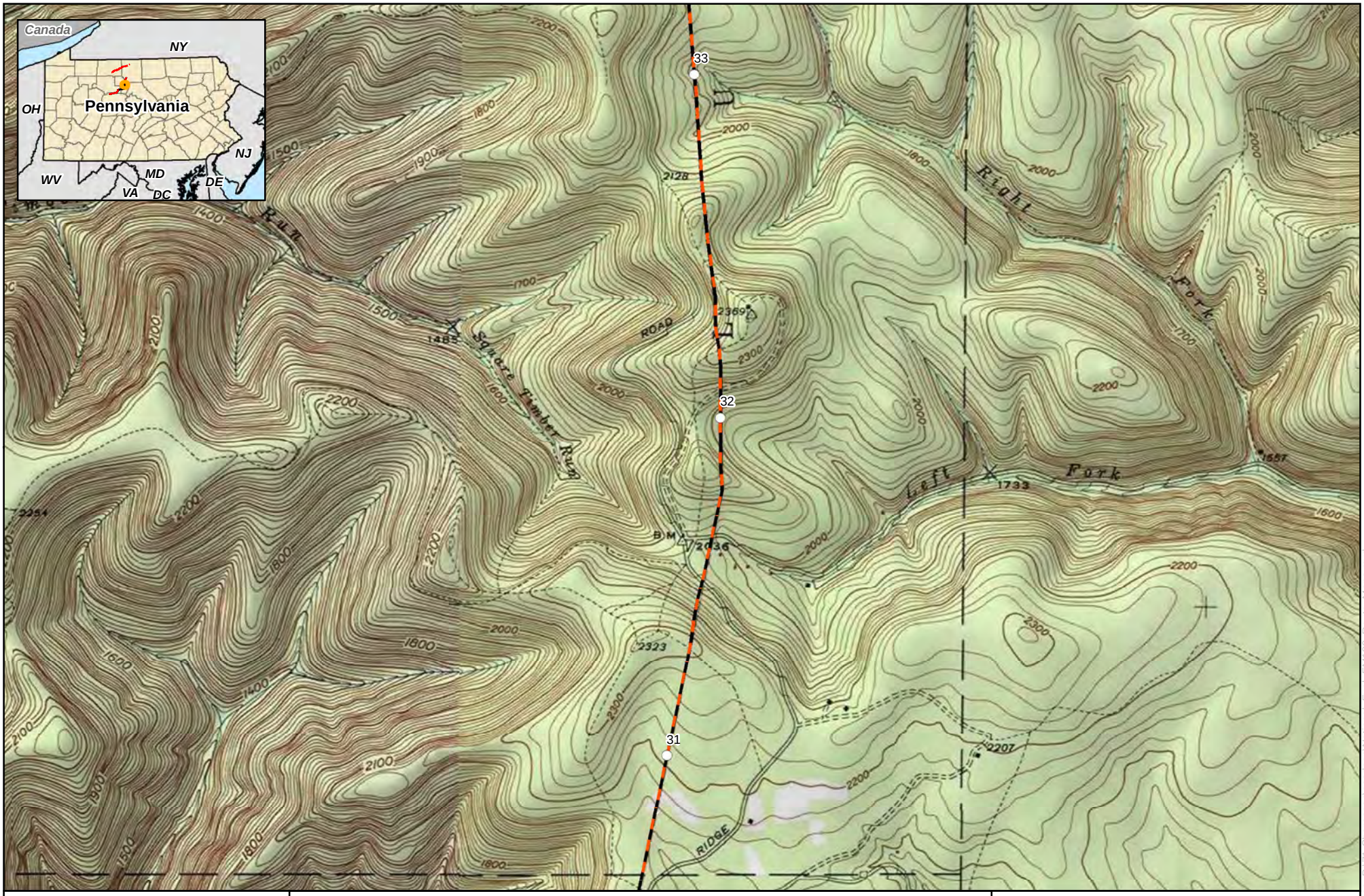

0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

For Environmental Review Purposes Only

Map 9 of 22

Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

Cameron County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

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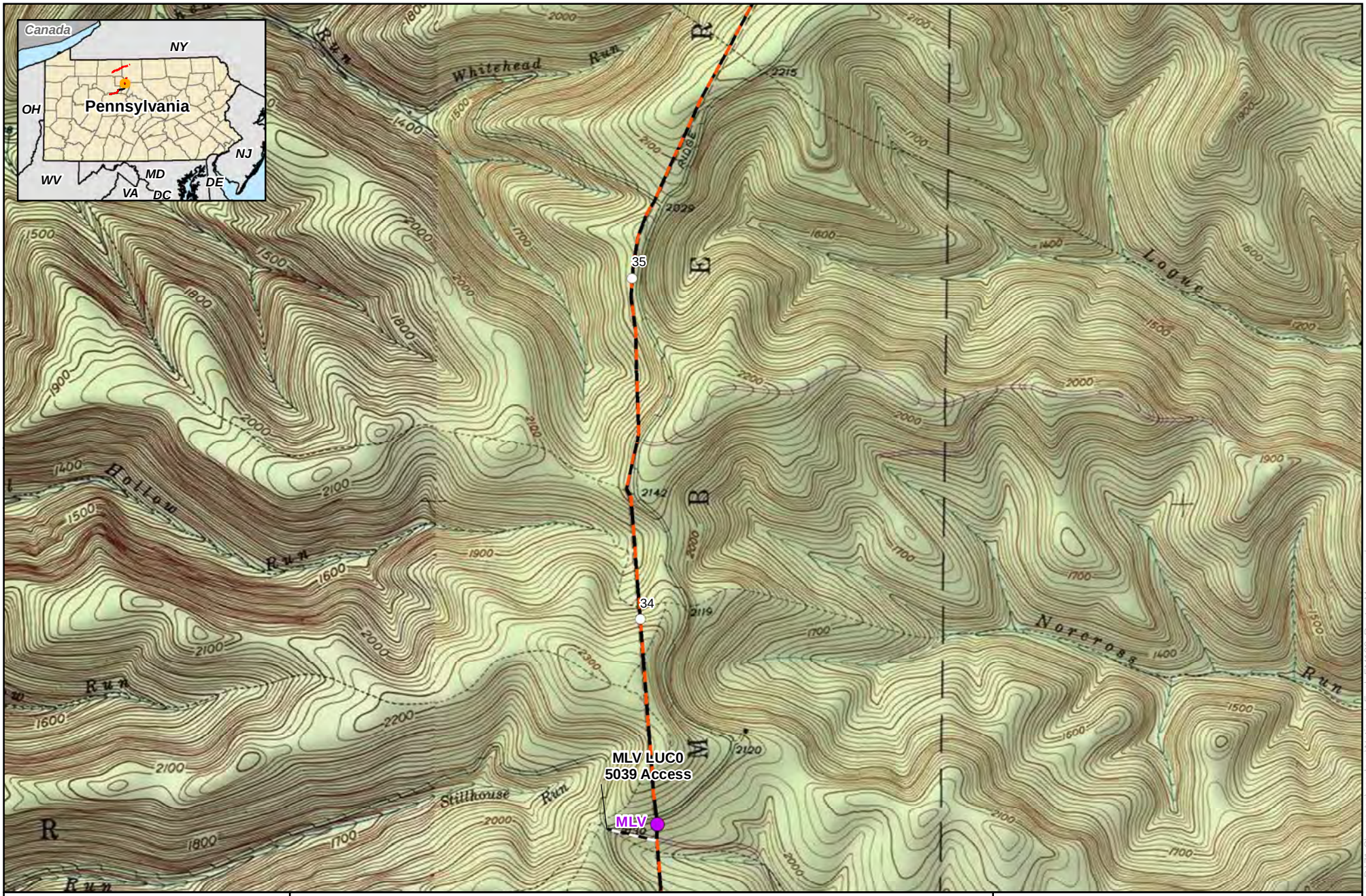

0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

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Map 10 of 22

Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

Cameron County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

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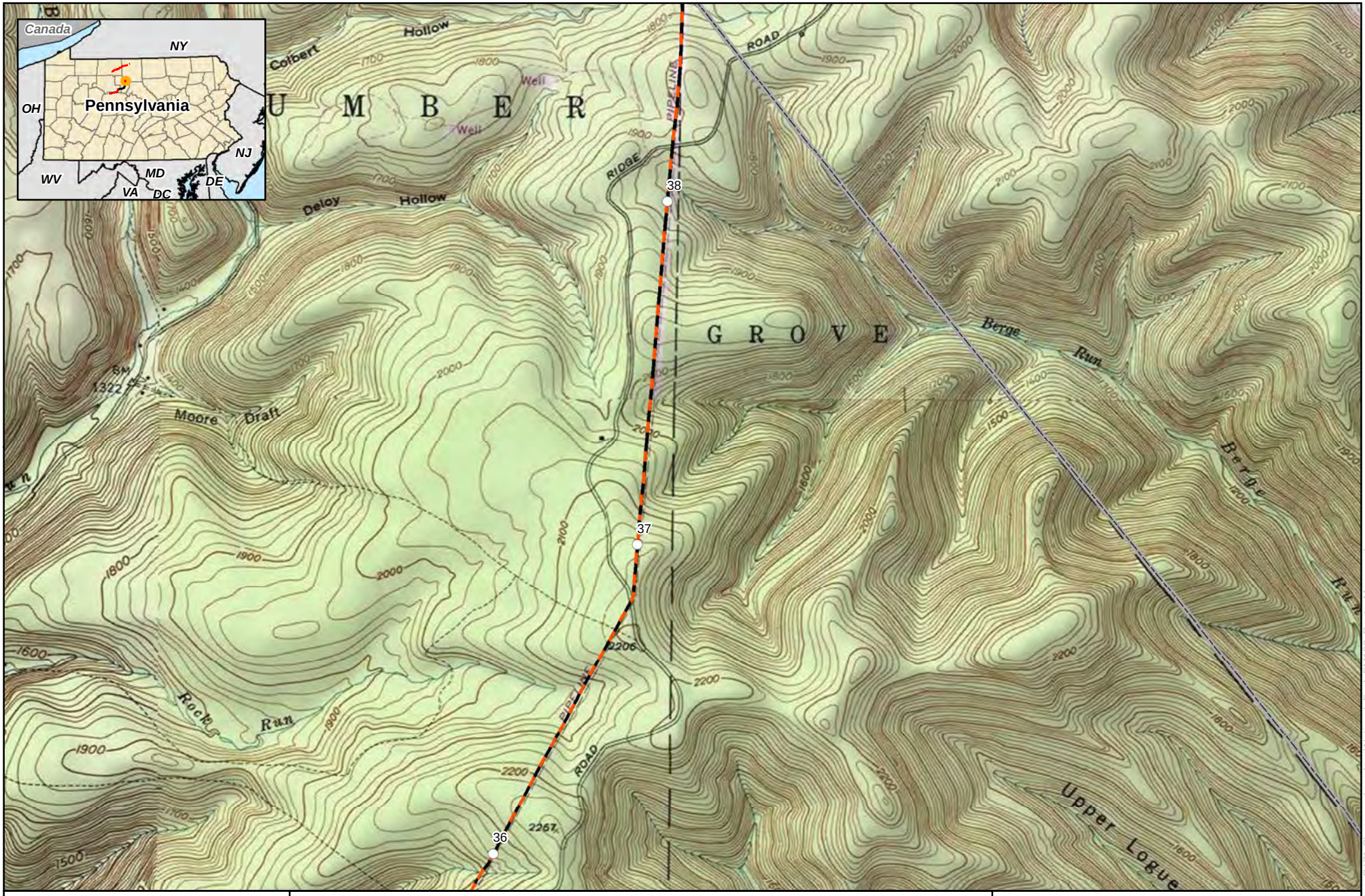

0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

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Map 11 of 22

Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

Cameron County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

Source: P:\21-Sharescan\ecarlson\National_Fuel_FM100_Route_Maps.mxd

Date: (11/26/2019)

0 1,000 2,000 Feet

1 inch = 2,000 feet

For Environmental Review Purposes Only

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Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

Cameron and Potter County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

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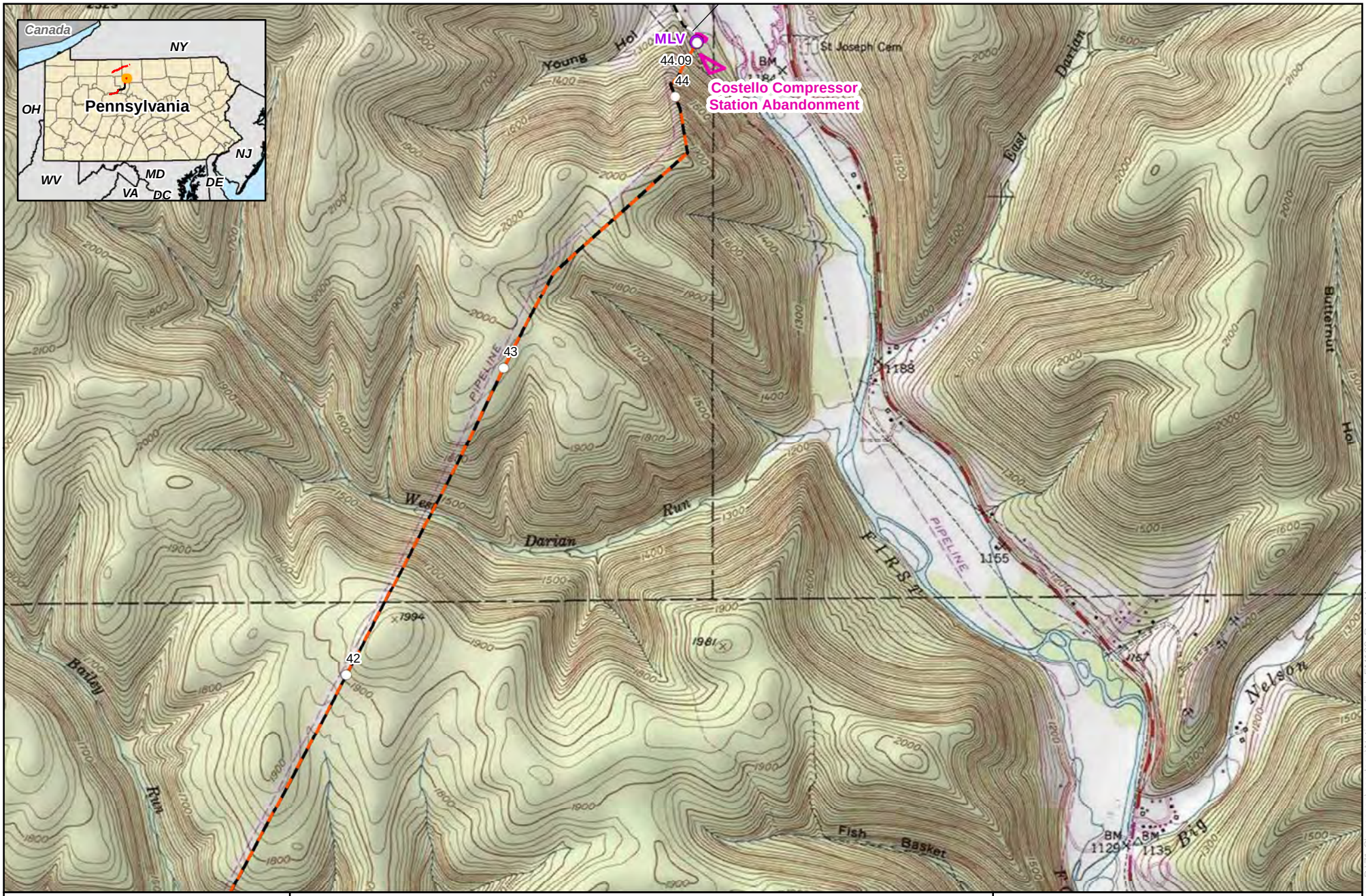

0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

For Environmental Review Purposes Only

Map 13 of 22

Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

Cameron County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

Source: P:\21-Sharescan\ecarlson\National_Fuel_FM100_Route_Maps.mxd

Date: (11/26/2019)

0 1,000 2,000 Feet

1 inch = 2,000 feet

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Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

McKean County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

Source: P:\21-Sharescanecarison\National_Fuel_FM100_Route_Maps.mxd

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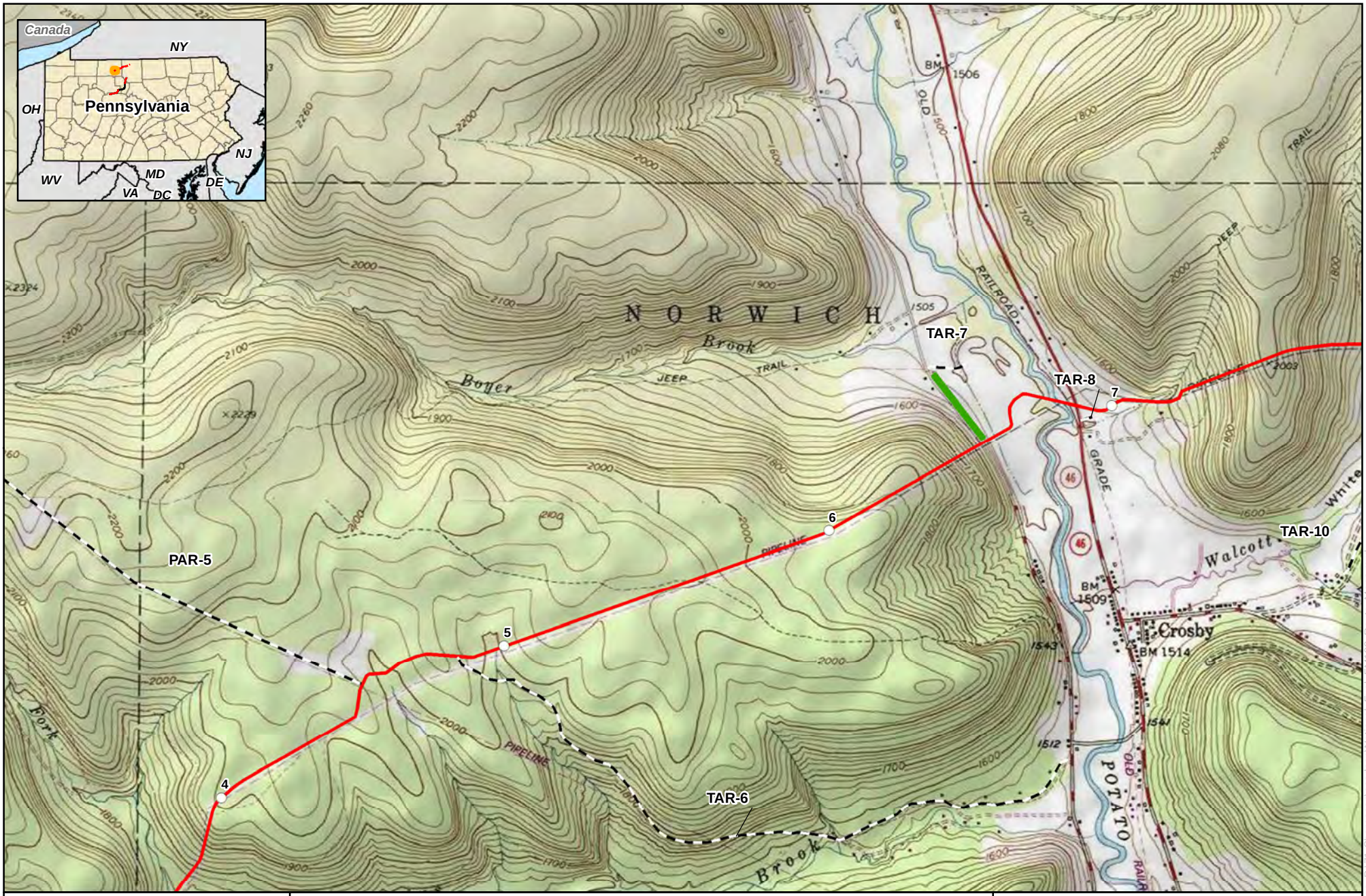

0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

For Environmental Review Purposes Only

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Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

McKean County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

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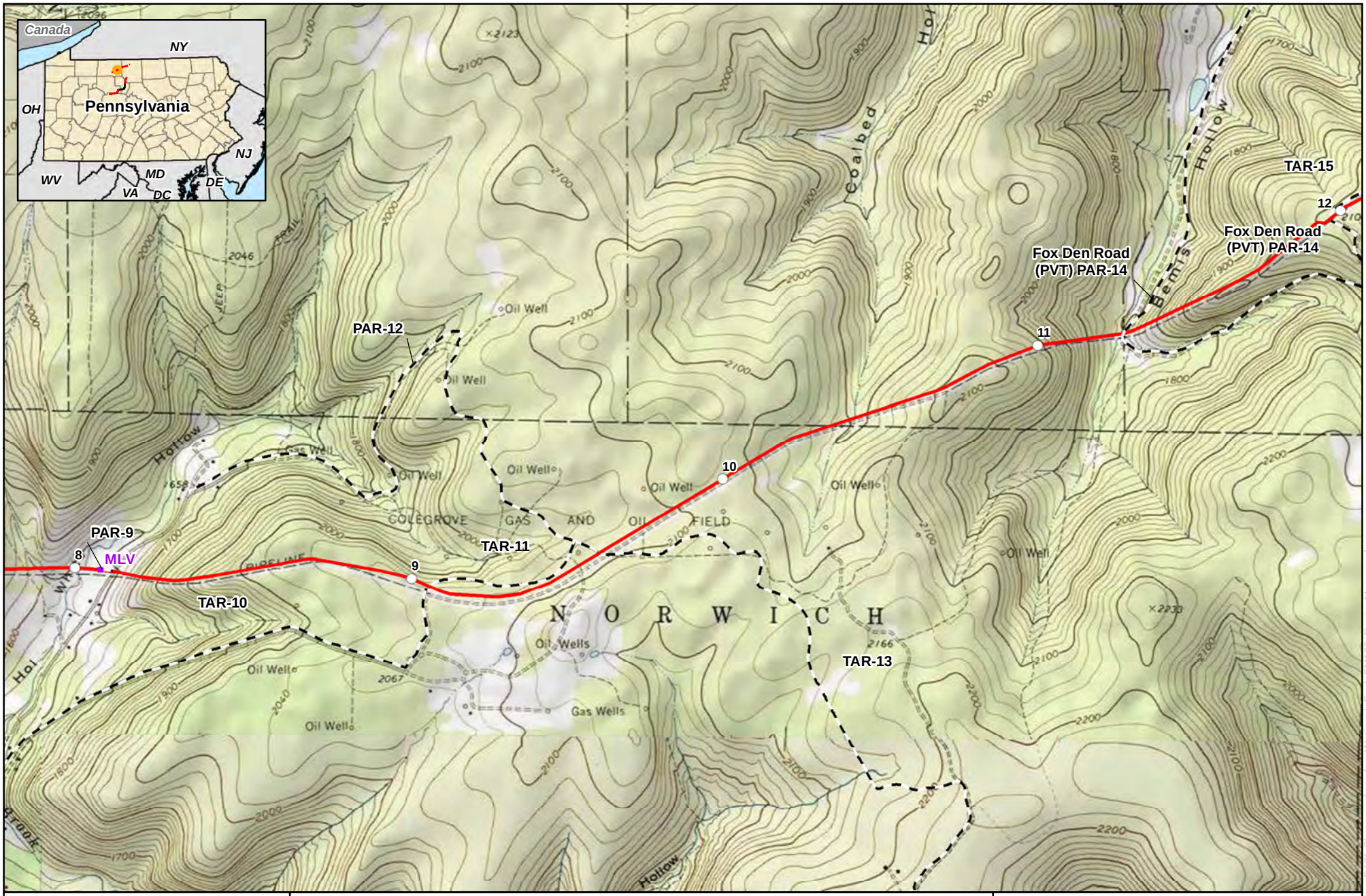

0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

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Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

McKean County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

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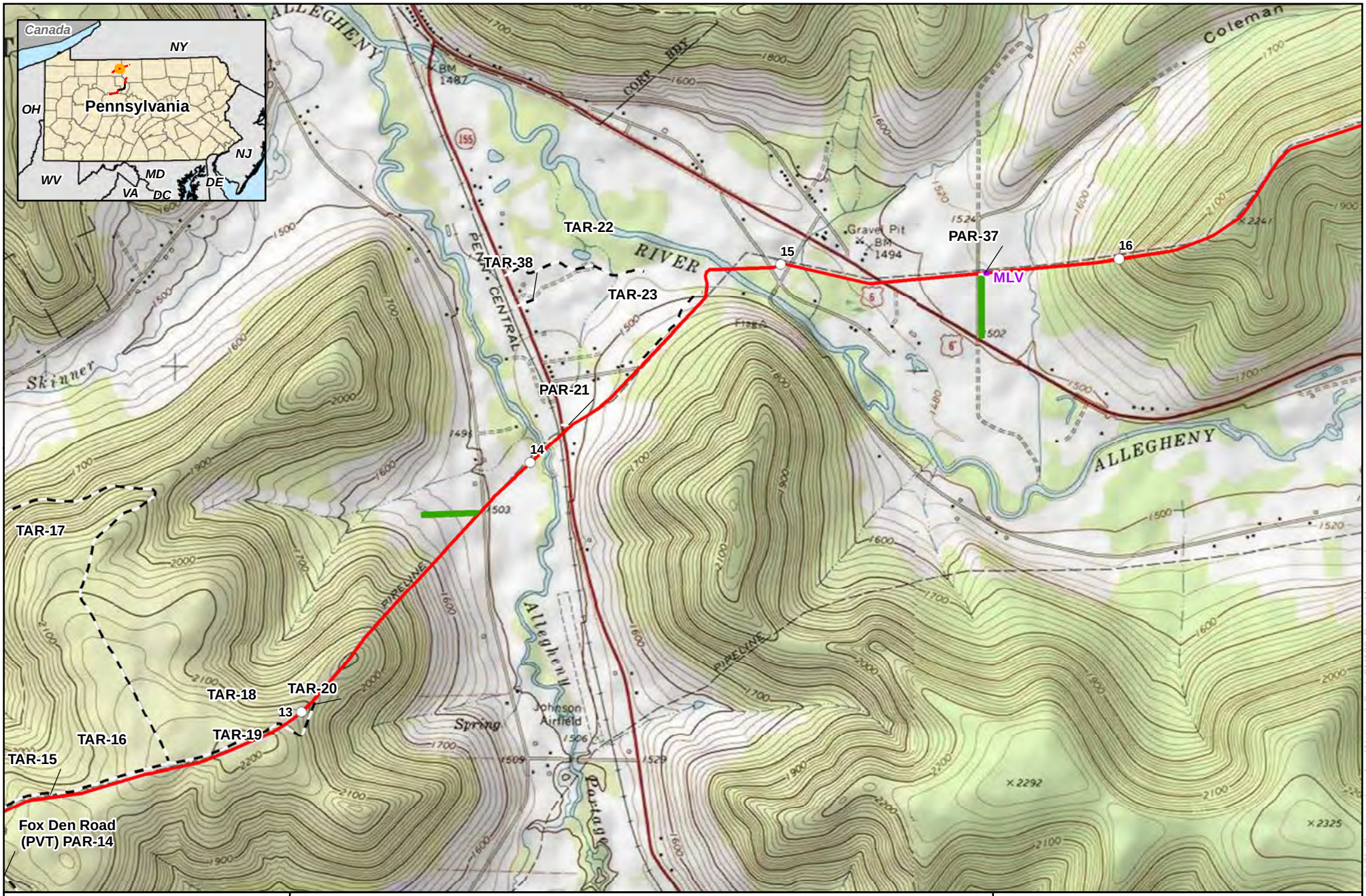

0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

For Environmental Review Purposes Only

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Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

McKean County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

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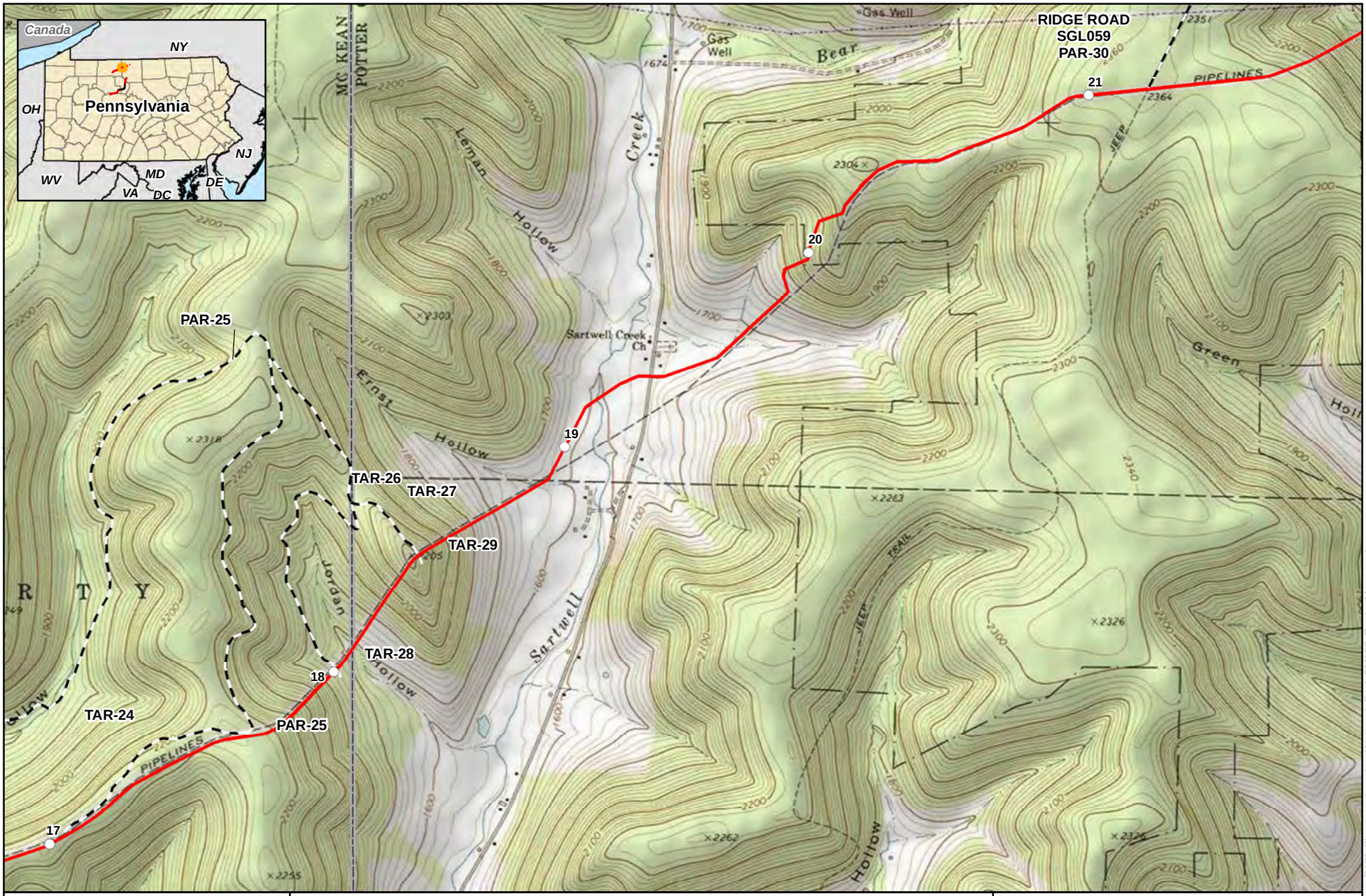

0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

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Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

McKean and Potter County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

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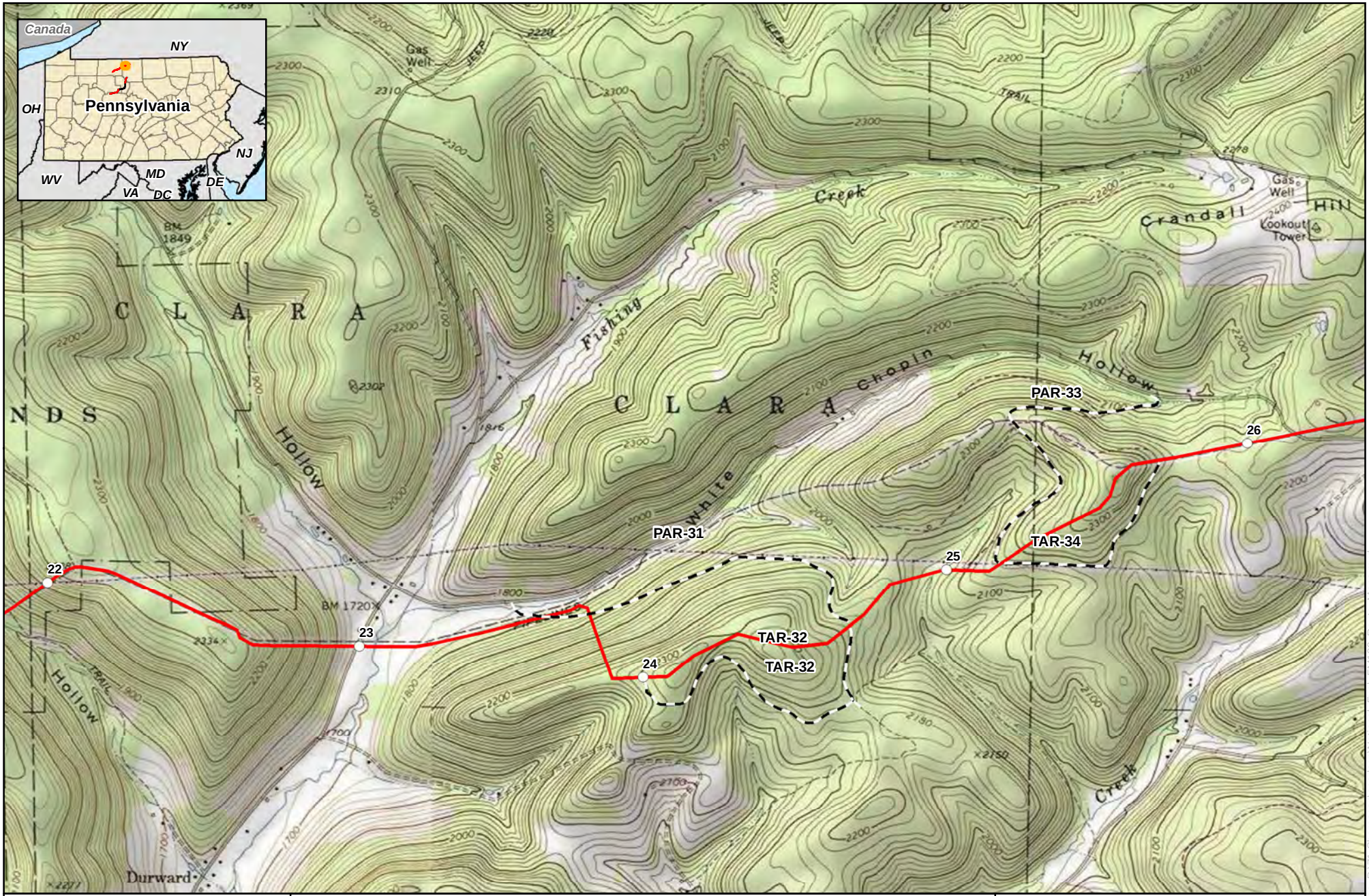

0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

For Environmental Review Purposes Only

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Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

Potter County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

Source: P:\21-Sharescan\ecarlson\National_Fuel_FM100_Route_Maps.mxd

Date: (11/26/2019)

0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

For Environmental Review Purposes Only

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Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

Potter County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

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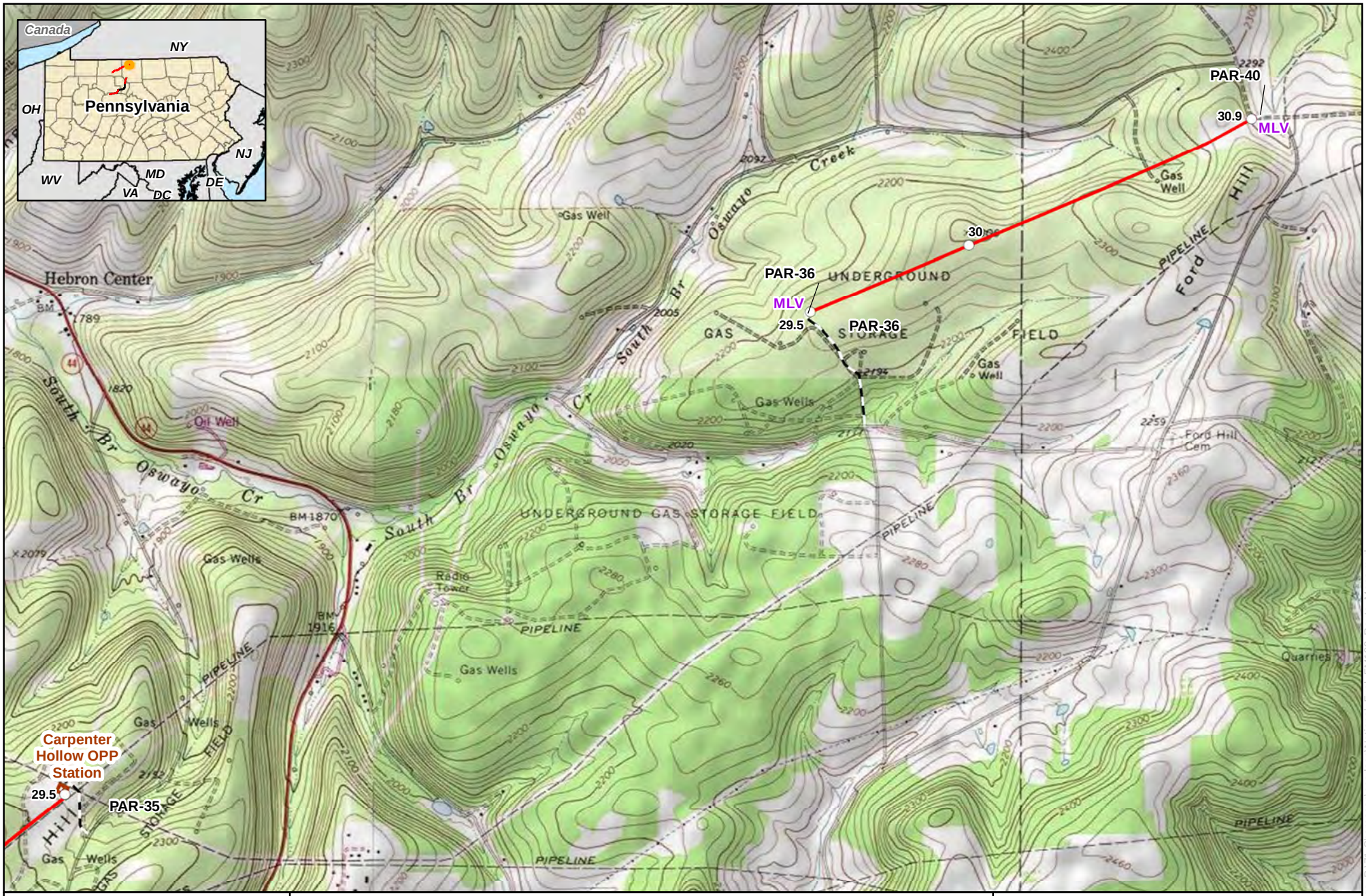

Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

Potter County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

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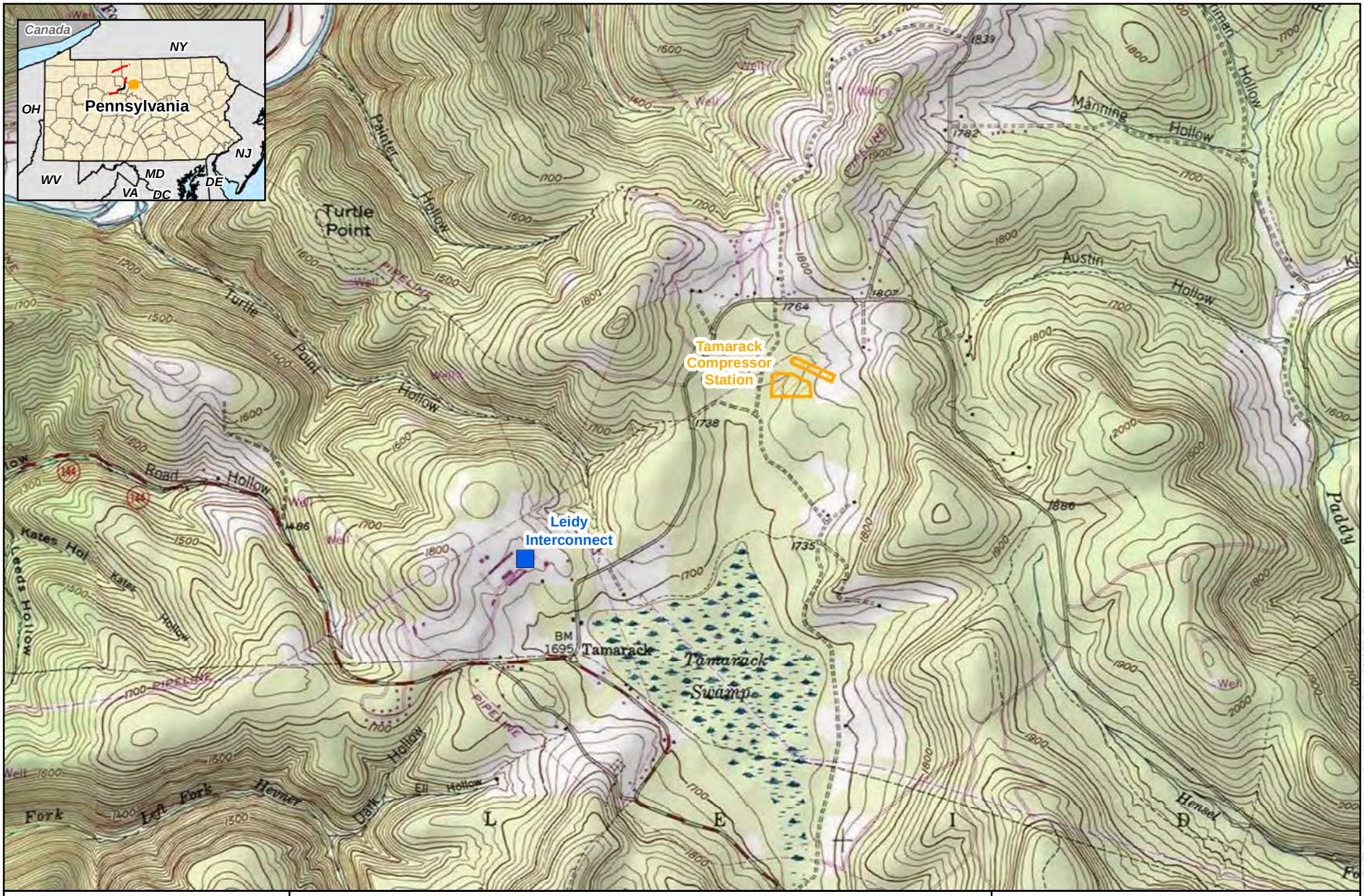

0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

For Environmental Review Purposes Only

Map 22 of 22

Appendix A

FM100 Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Map

Clinton County, Pennsylvania

- Milepost
- Leidy Interconnect
- MLV - Abandoned Line
- Pipeline to be Abandoned
- Pipeline to be Constructed
- Access Road
- OPP Station
- Interconnect
- Proposed Compressor Station
- MLV - Proposed Line
- Abandoned Compressor Station
- Anode Bed
- County Boundary

Source: P:\21-Sharescanhecarlson\National_Fuel_FM100_Route_Maps.mxd

Date: (11/26/2019)

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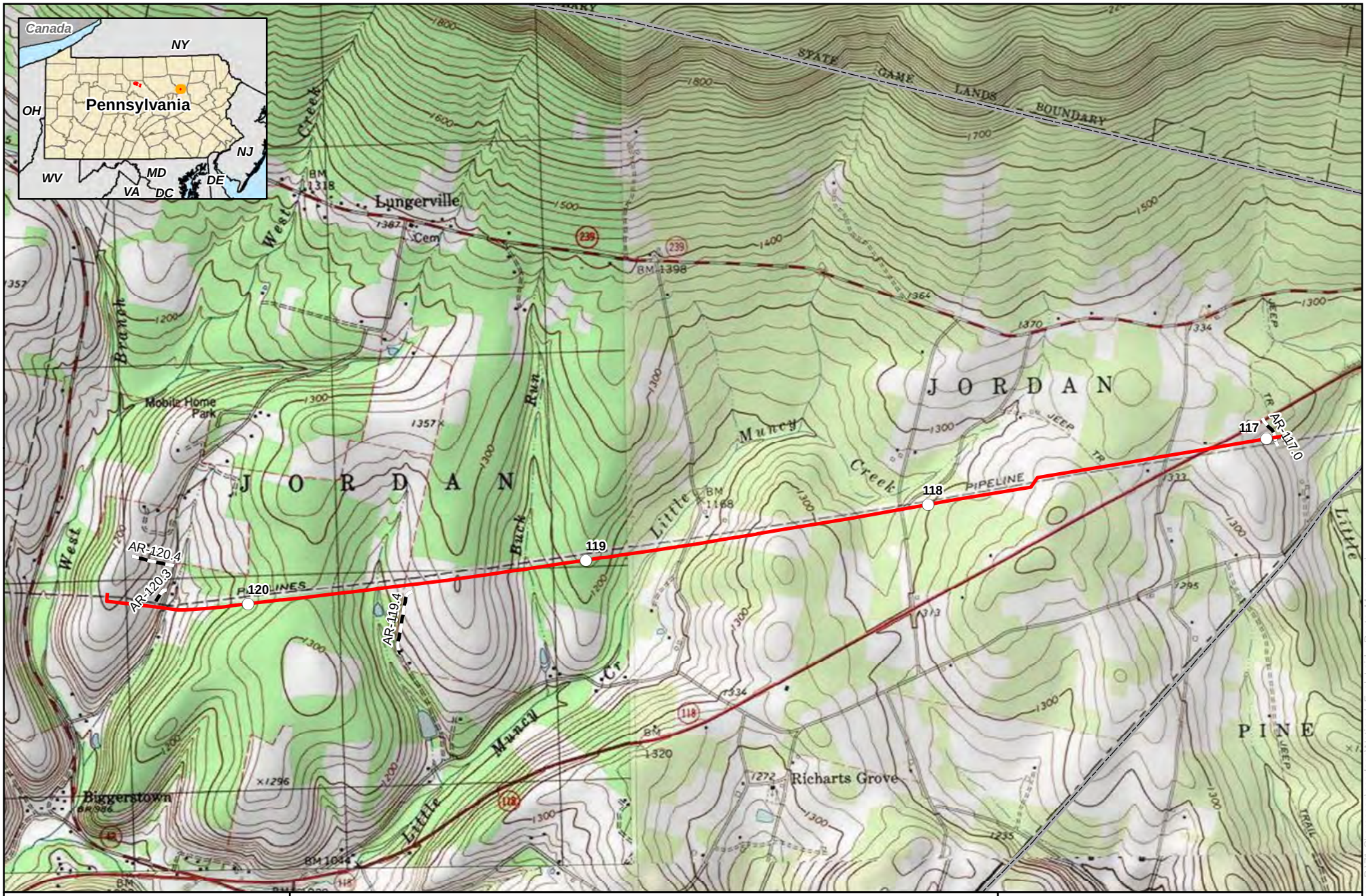
Leidy South Project



0 1,000 2,000 Feet

1 inch = 2,000 Feet

N W E S

Map 1 of 8

For Environmental Review Purposes Only

Appendix A

Leidy South Project

National Fuel

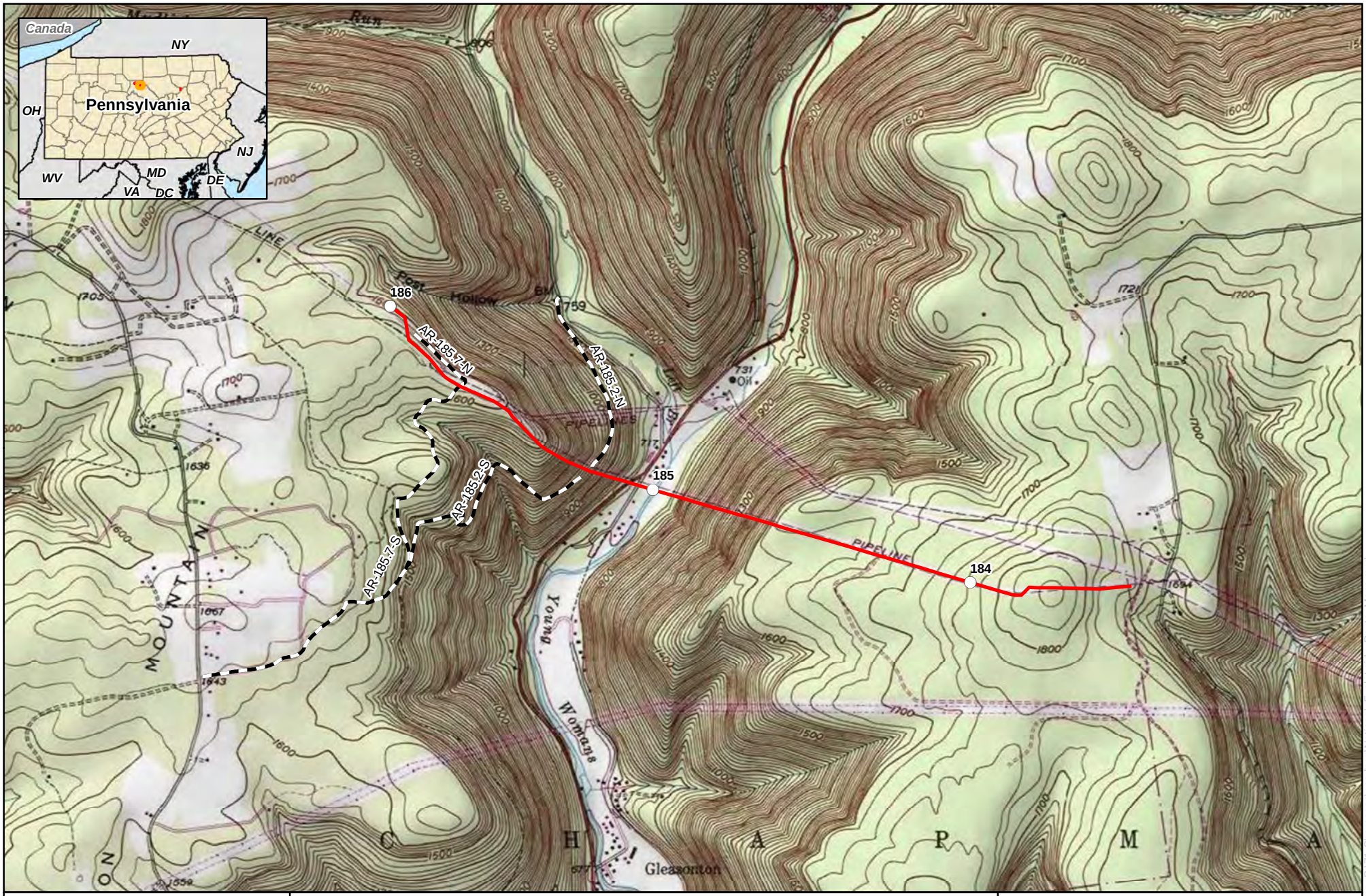
USGS 7.5-minute Quadrangle Topographic Maps

Lycoming County, Pennsylvania

- Milepost
- Pipeline to be Constructed
- Access Road
- Existing Compressor Station
- Proposed Compressor Station
- County Boundary

Source: P:\21-Sharescan\ecarlson\National_Fuel_Leidy_Route_Maps.mxd

Date: (11/25/2019)



0 1,000 2,000 Feet

1 inch = 2,000 Feet

N W E S

Map 2 of 8

For Environmental Review Purposes Only

Appendix A

Leidy South Project

National Fuel

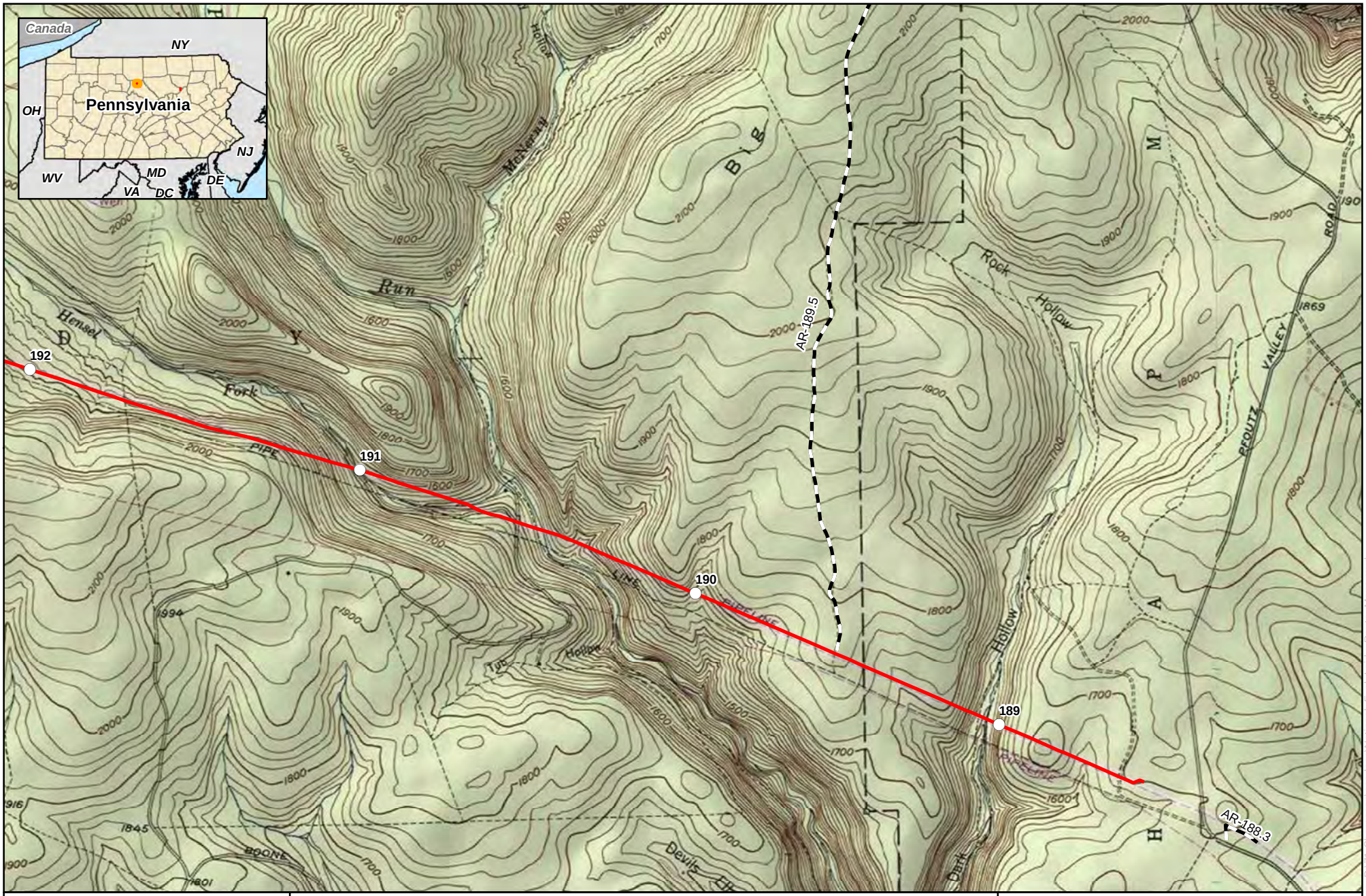
USGS 7.5-minute Quadrangle Topographic Maps

Clinton County, Pennsylvania

- Milepost
- Pipeline to be Constructed
- Access Road
- Existing Compressor Station
- Proposed Compressor Station
- County Boundary

Source: P:\21-Sharescanhecarlson\National_Fuel_Leidy_Route_Maps.mxd

Date: (11/25/2019)



0 1,000 2,000 Feet

1 inch = 2,000 Feet

N W E S

Map 3 of 8

For Environmental Review Purposes Only

Appendix A

Leidy South Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Maps

Clinton County, Pennsylvania

- Milepost
- Pipeline to be Constructed
- Access Road
- Existing Compressor Station
- Proposed Compressor Station
- County Boundary

Source: P:\21-Sharescan\ecarlson\National_Fuel_Leidy_Route_Maps.mxd

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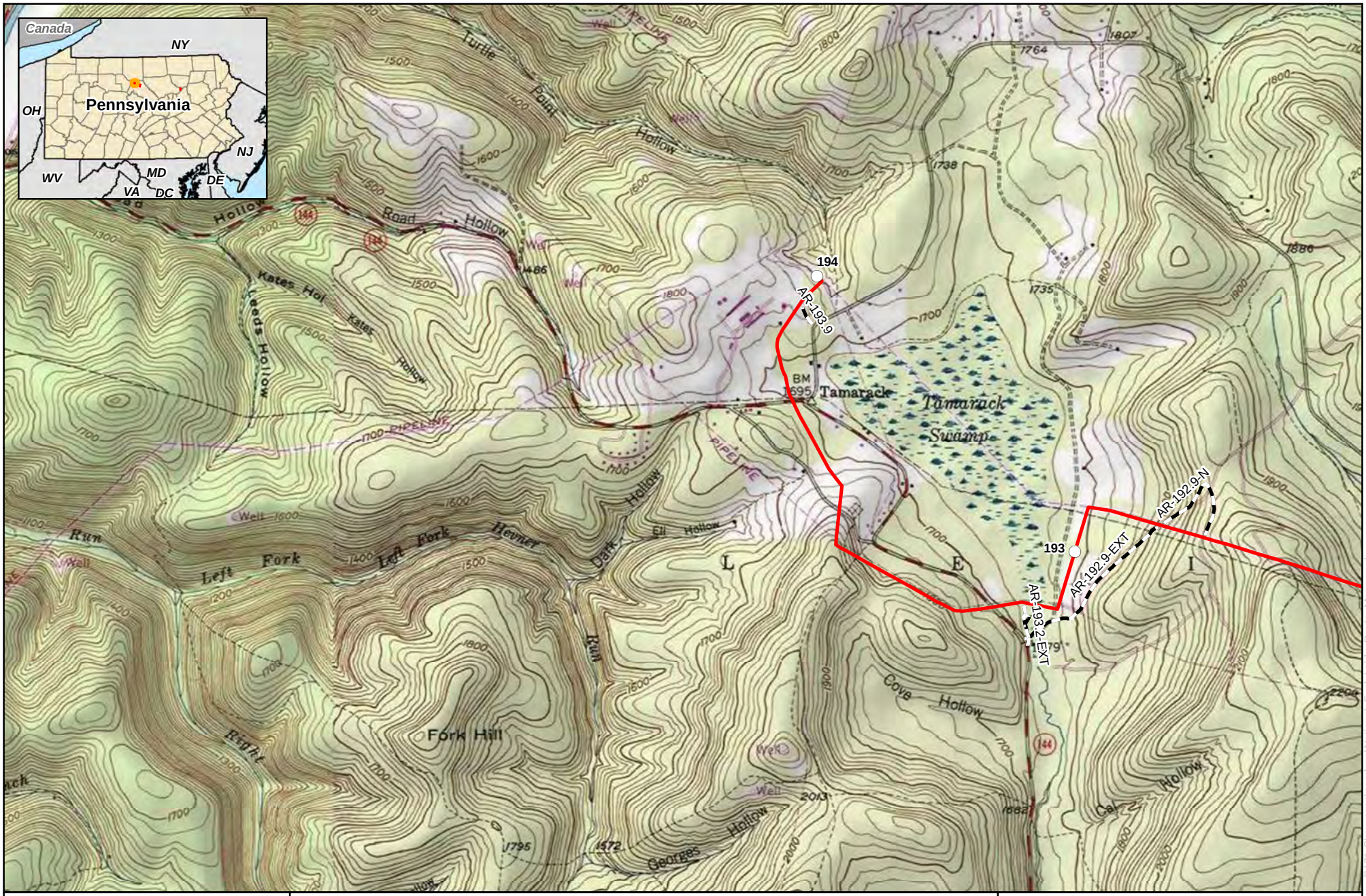

0 1,000 2,000 Feet

1 inch = 2,000 Feet

N W E S

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For Environmental Review Purposes Only

Appendix A

Leidy South Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Maps

Clinton County, Pennsylvania

- Milepost
- Pipeline to be Constructed
- Access Road
- Existing Compressor Station
- Proposed Compressor Station
- County Boundary

Source: P:\21-Shares\anecarlson\National_Fuel_Leidy_Route_Maps.mxd

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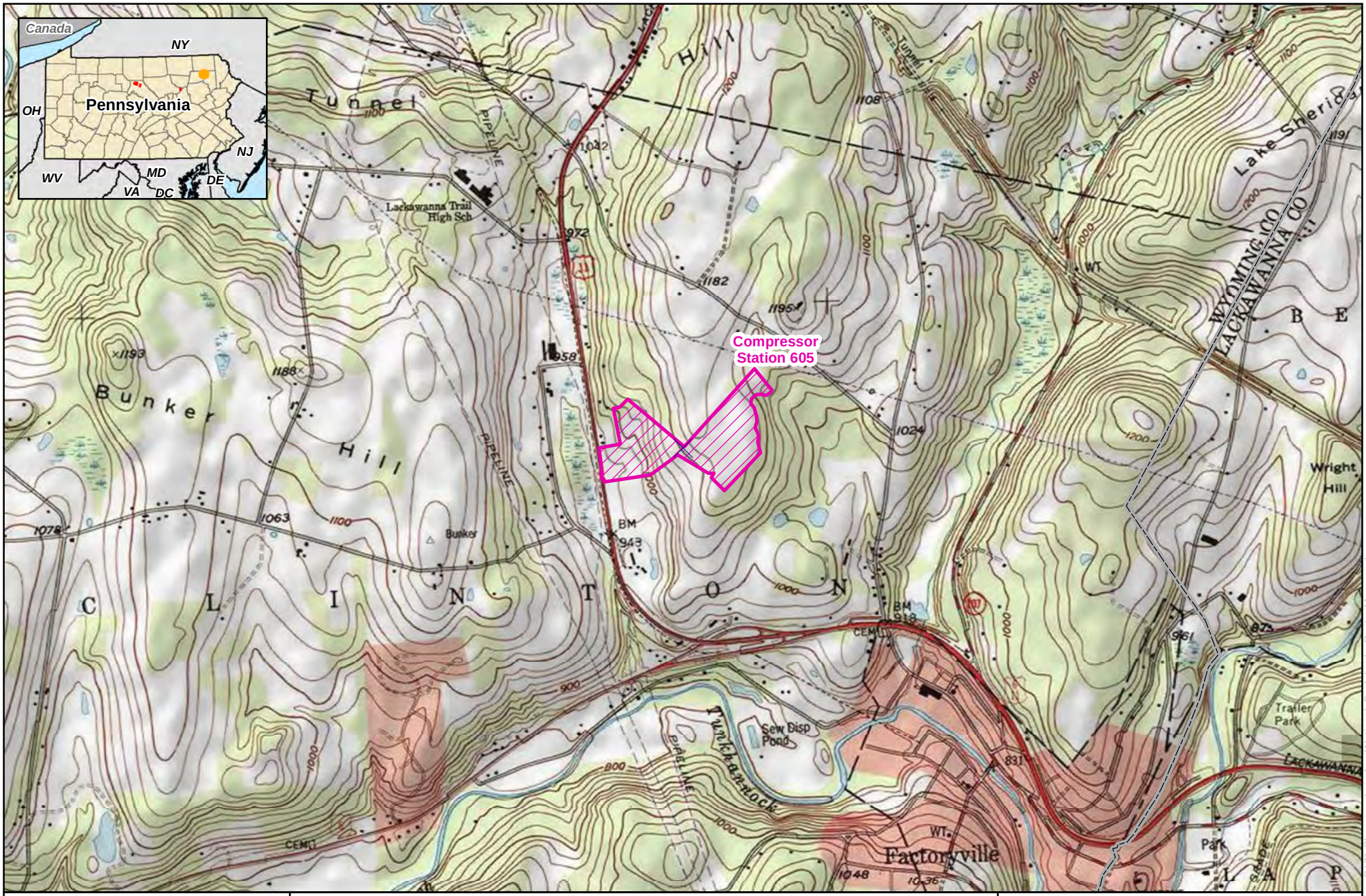


0 1,000 2,000 Feet

1 inch = 2,000 Feet

N W E S

Map 5 of 8

For Environmental Review Purposes Only

Appendix A

Leidy South Project

National Fuel

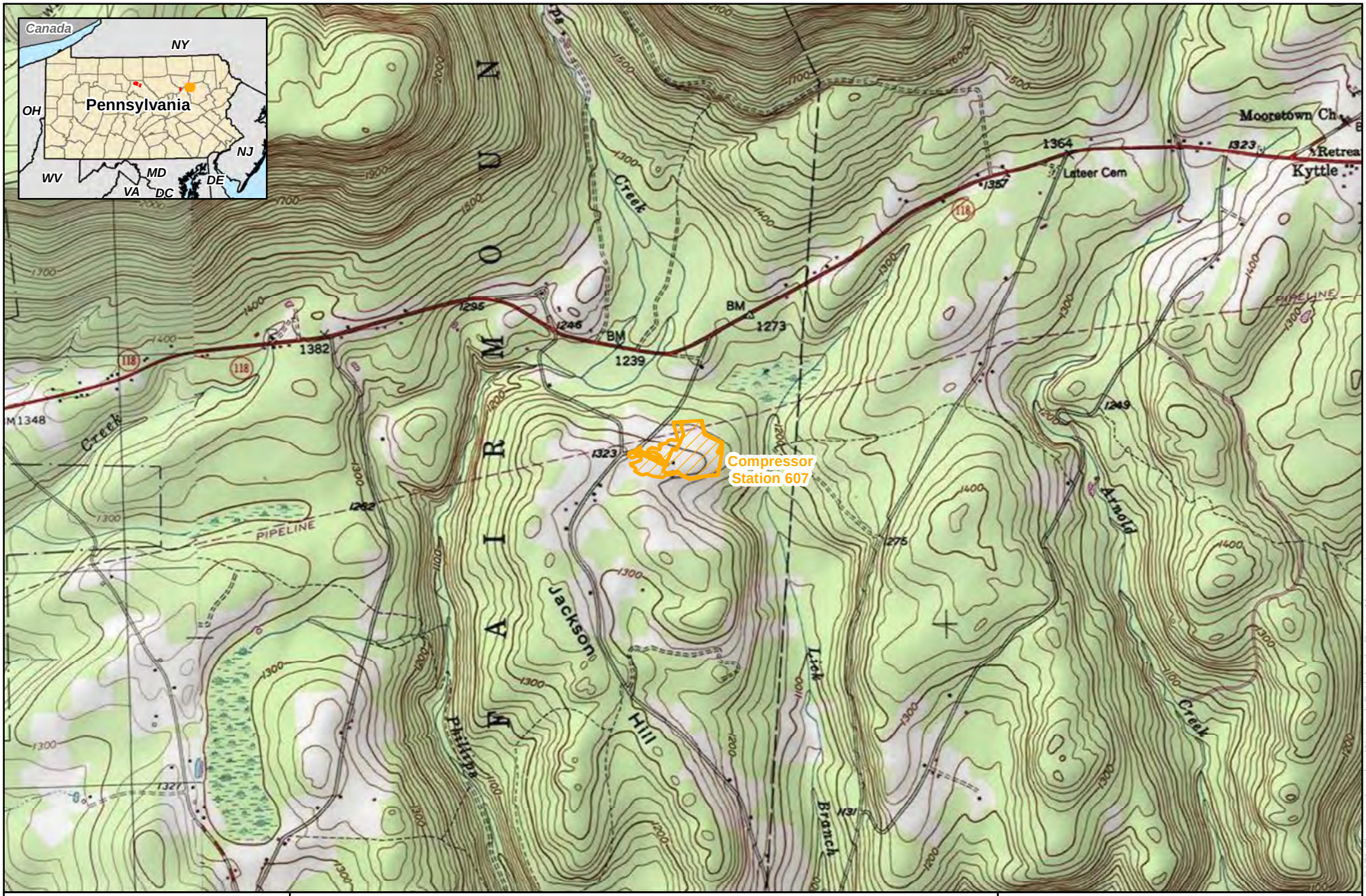
USGS 7.5-minute Quadrangle Topographic Maps

Wyoming County, Pennsylvania

- Milepost
- Pipeline to be Constructed
- Access Road
- Existing Compressor Station
- Proposed Compressor Station
- County Boundary

Source: P:\21-Sharescanhecarlson\National_Fuel_Leidy_Route_Maps.mxd

Date: (11/25/2019)



0 1,000 2,000 Feet

1 inch = 2,000 Feet

N W E S

For Environmental Review Purposes Only

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Appendix A

Leidy South Project

National Fuel

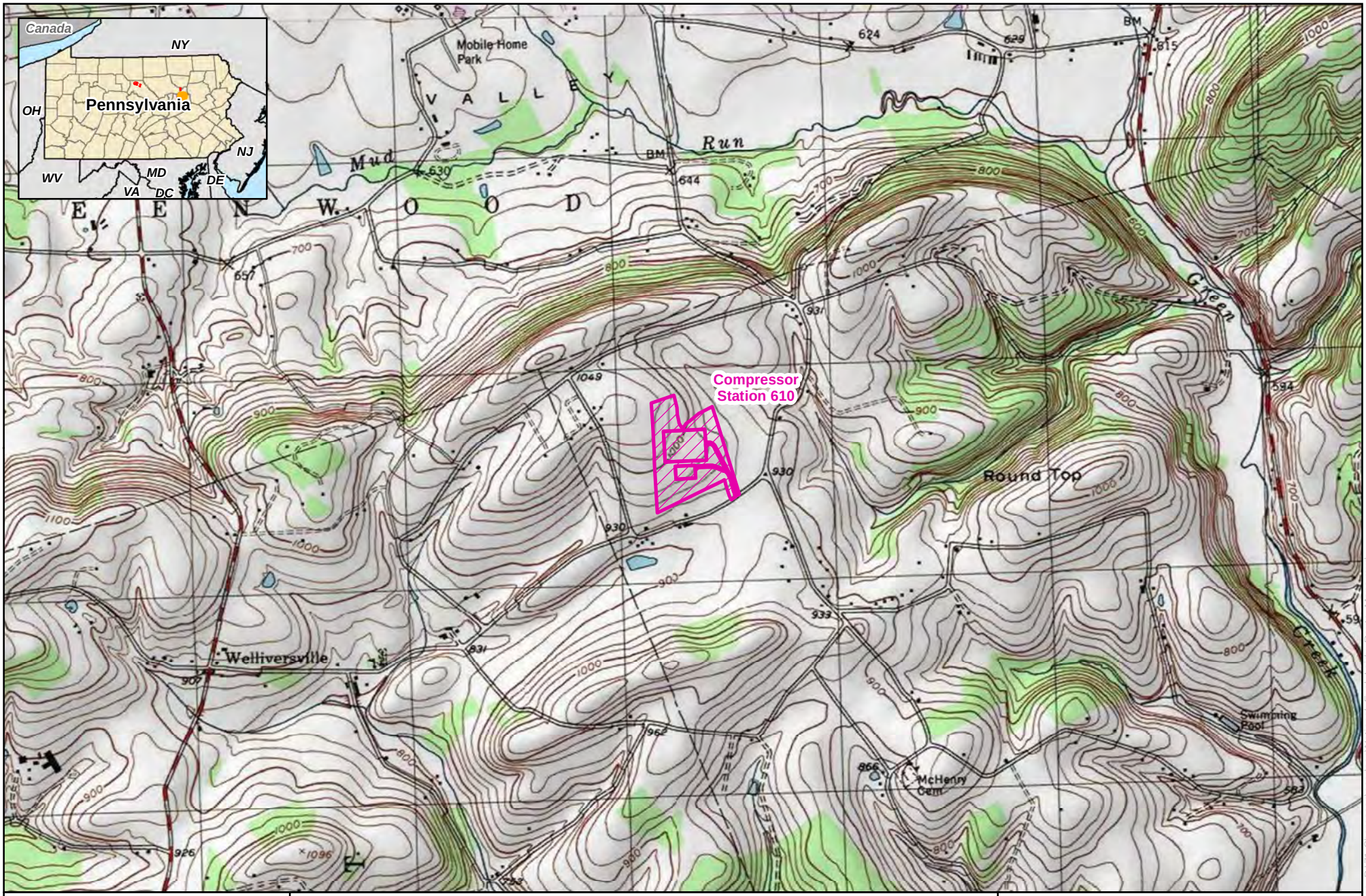
USGS 7.5-minute Quadrangle Topographic Maps

Luzerne County, Pennsylvania

- Milepost
- Pipeline to be Constructed
- Access Road
- Existing Compressor Station
- Proposed Compressor Station
- County Boundary

Source: P:\21-Sharescan\ecarlson\National_Fuel_Leidy_Route_Maps.mxd

Date: (11/25/2019)



0 1,000 2,000 Feet

1 inch = 2,000 Feet

N W E S

Map 7 of 8

For Environmental Review Purposes Only

Appendix A

Leidy South Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Maps

Montour County, Pennsylvania

- Milepost
- Pipeline to be Constructed
- Access Road
- Existing Compressor Station
- Proposed Compressor Station
- County Boundary

Source: P:\21-Sharescan\ecarlson\National_Fuel_Leidy_Route_Maps.mxd

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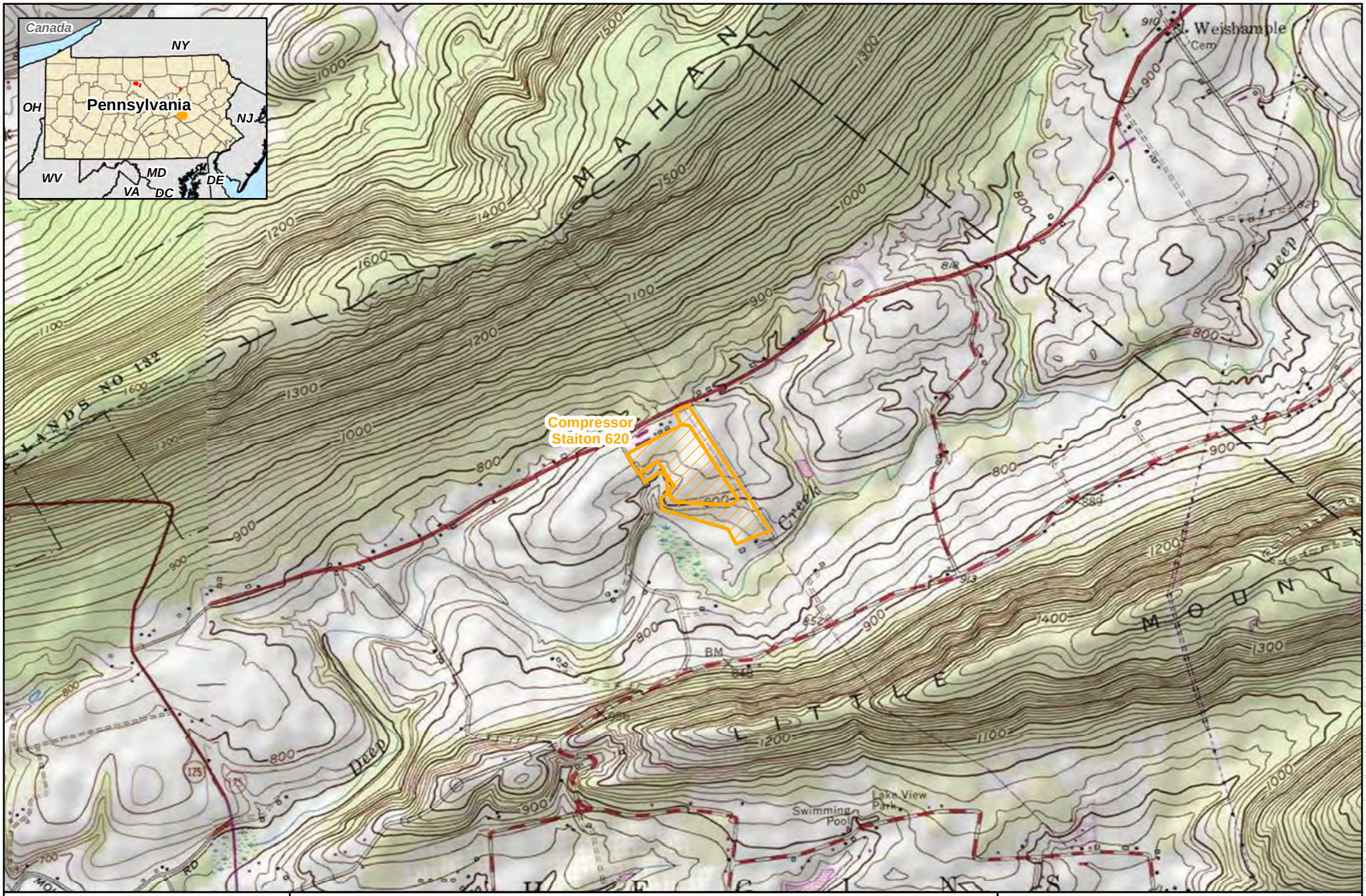


0 1,000 2,000 Feet

1 inch = 2,000 Feet

N W E S

Map 8 of 8

For Environmental Review Purposes Only

Appendix A

Leidy South Project

National Fuel

USGS 7.5-minute Quadrangle Topographic Maps

Schuylkill County, Pennsylvania

- Milepost
- Pipeline to be Constructed
- Access Road
- Existing Compressor Station
- Proposed Compressor Station
- County Boundary

Source: P:\Z1-Sharescan\ecarlson\National_Fuel_Leidy_Route_Maps.mxd

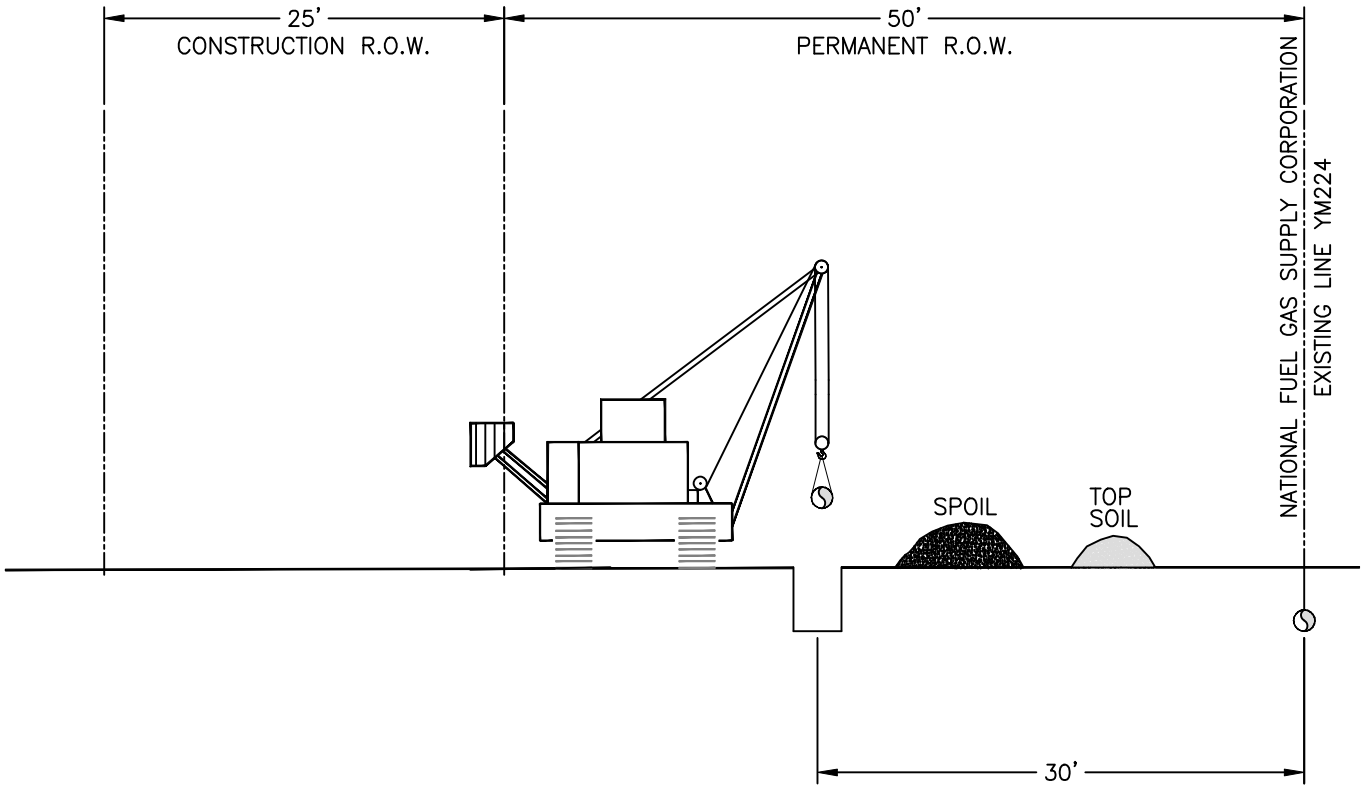
Date: (12/2/2019)

Appendix B

Typical Right-of-way Construction Diagrams

National Fuel
FM100 Project

YM224 LOOP TYPICAL FIGURE #1



NOTE:
DRAWING IS NOT TO SCALE

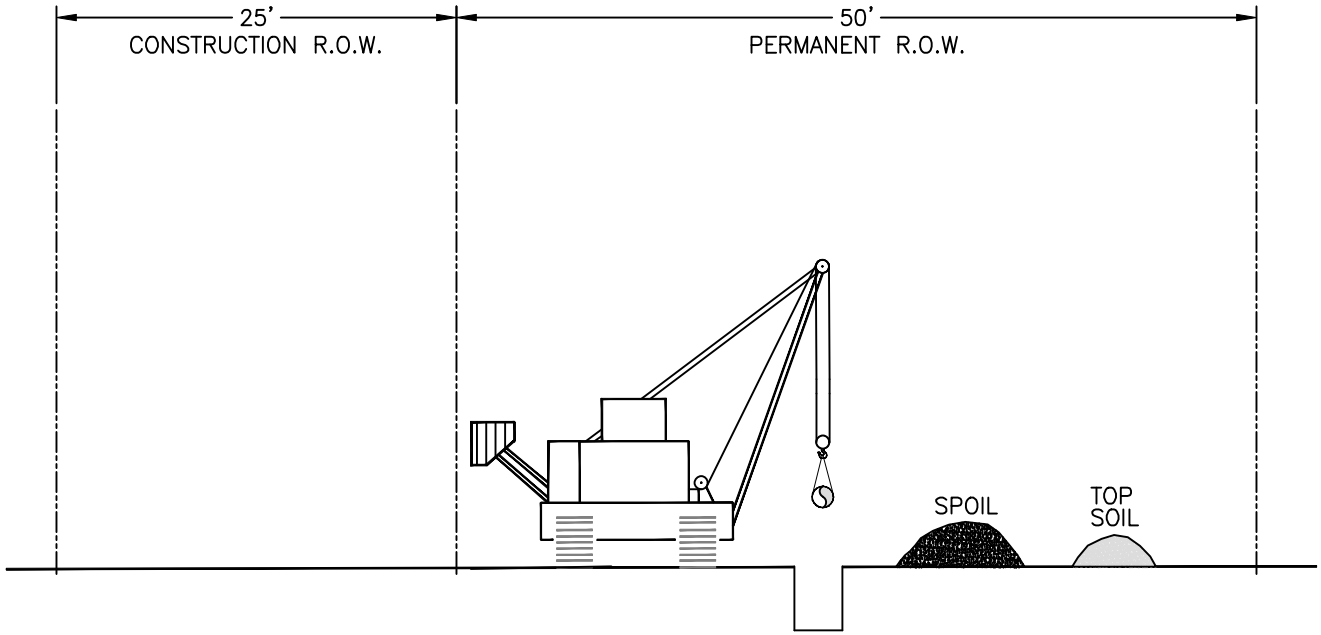
National Fuel

NATIONAL FUEL GAS SUPPLY CORPORATION
YM224 LOOPE CONSTRUCTION RIGHT-OF-WAY
TYPICAL DRAWING
FIGURE 1

YM224 LOOP FIG 1.DWG

06/05/2019

YM58 TYPICAL FIGURE #1



NOTE:
DRAWING IS NOT TO SCALE

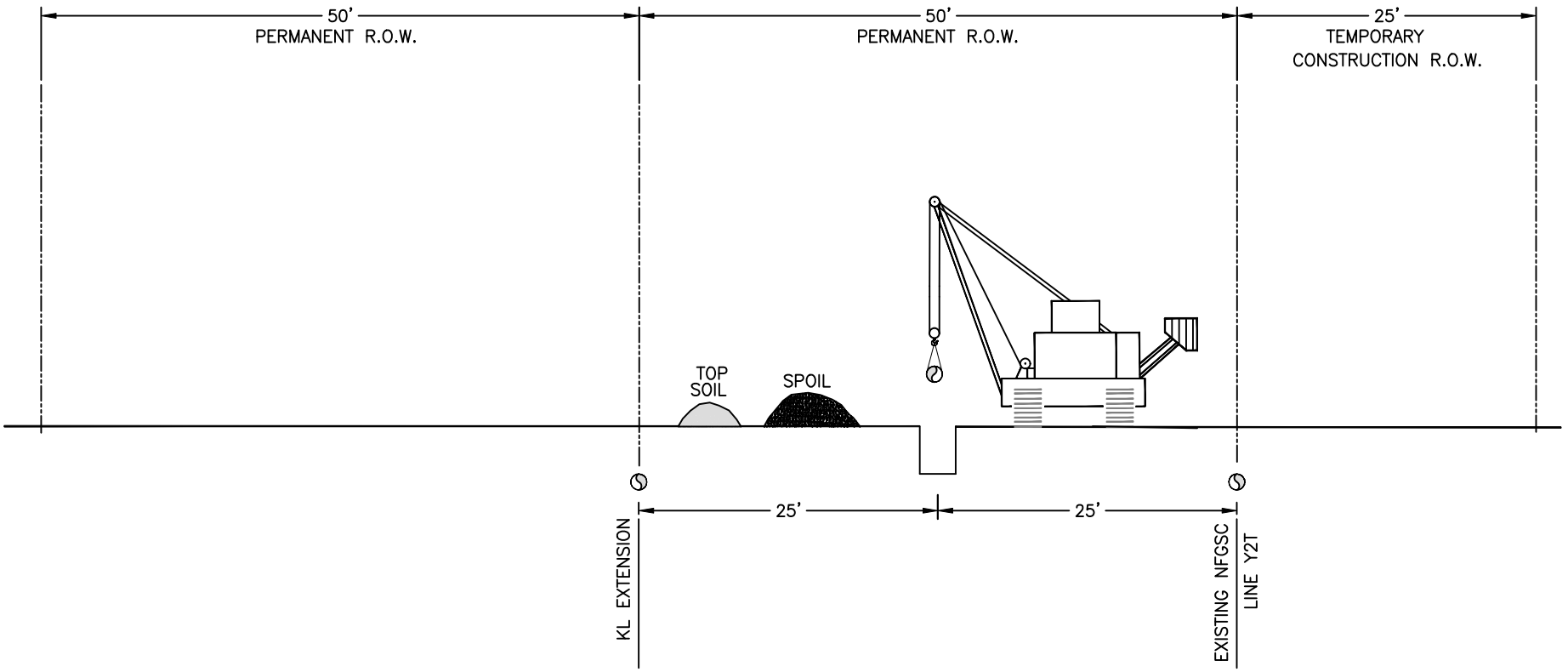
National Fuel

NATIONAL FUEL GAS SUPPLY CORPORATION
YM58 PIPELINE CONSTRUCTION RIGHT-OF-WAY
TYPICAL DRAWING
FIGURE 1

YM58 FIG 1.DWG

06/05/2019

YM58 TYPICAL FIGURE #2



NOTE:
DRAWING IS NOT TO SCALE

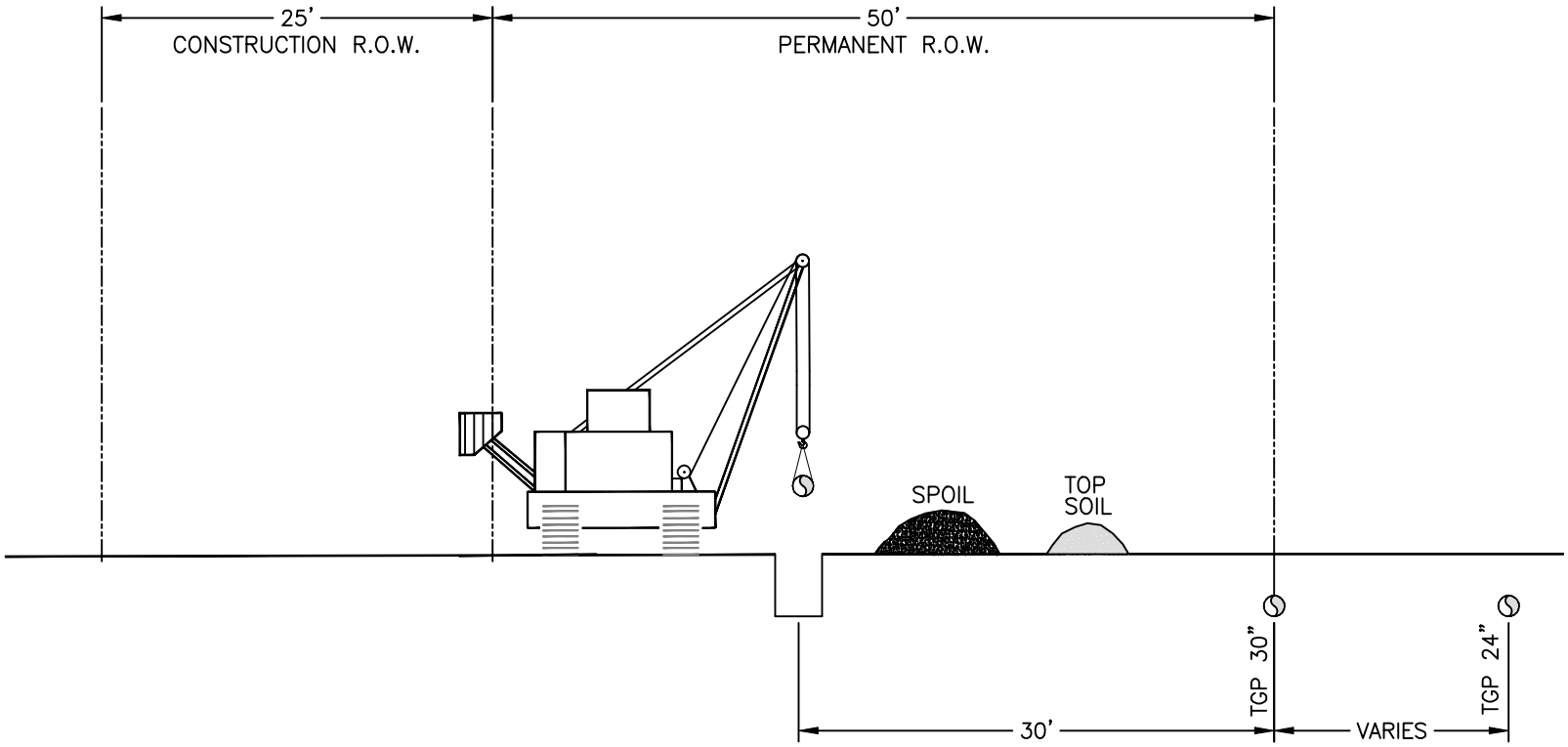
National Fuel

NATIONAL FUEL GAS SUPPLY CORPORATION
YM58 PIPELINE CONSTRUCTION RIGHT-OF-WAY
TYPICAL DRAWING
FIGURE 2

YM58 FIG 2.DWG

06/05/2019

YM58 TYPICAL FIGURE #3



NOTE:
DRAWING IS NOT TO SCALE

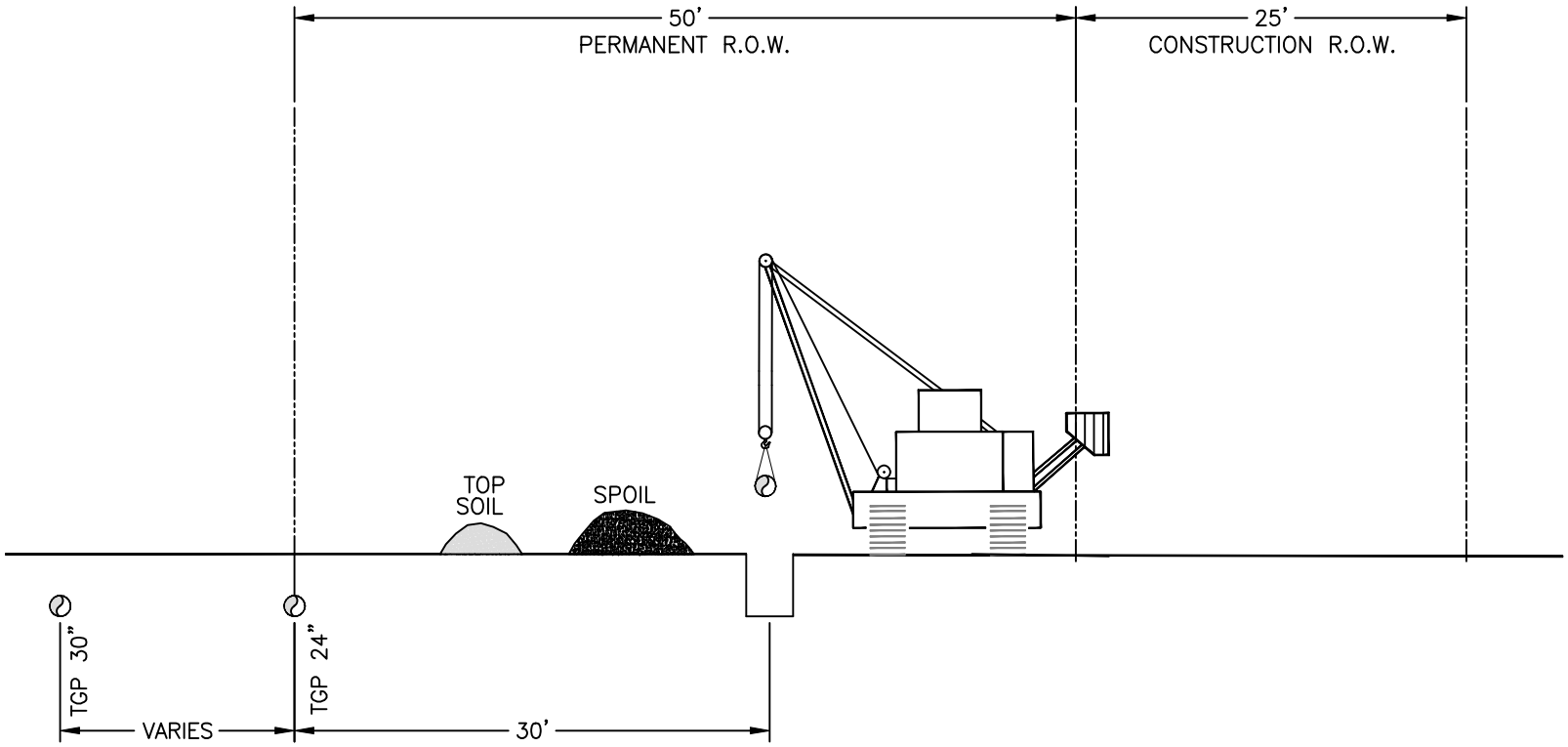
National Fuel

NATIONAL FUEL GAS SUPPLY CORPORATION
YM58 PIPELINE CONSTRUCTION RIGHT-OF-WAY
TYPICAL DRAWING
FIGURE 3

YM58 FIG 3.DWG

06/05/2019

YM58 TYPICAL FIGURE #4



NOTE:
DRAWING IS NOT TO SCALE

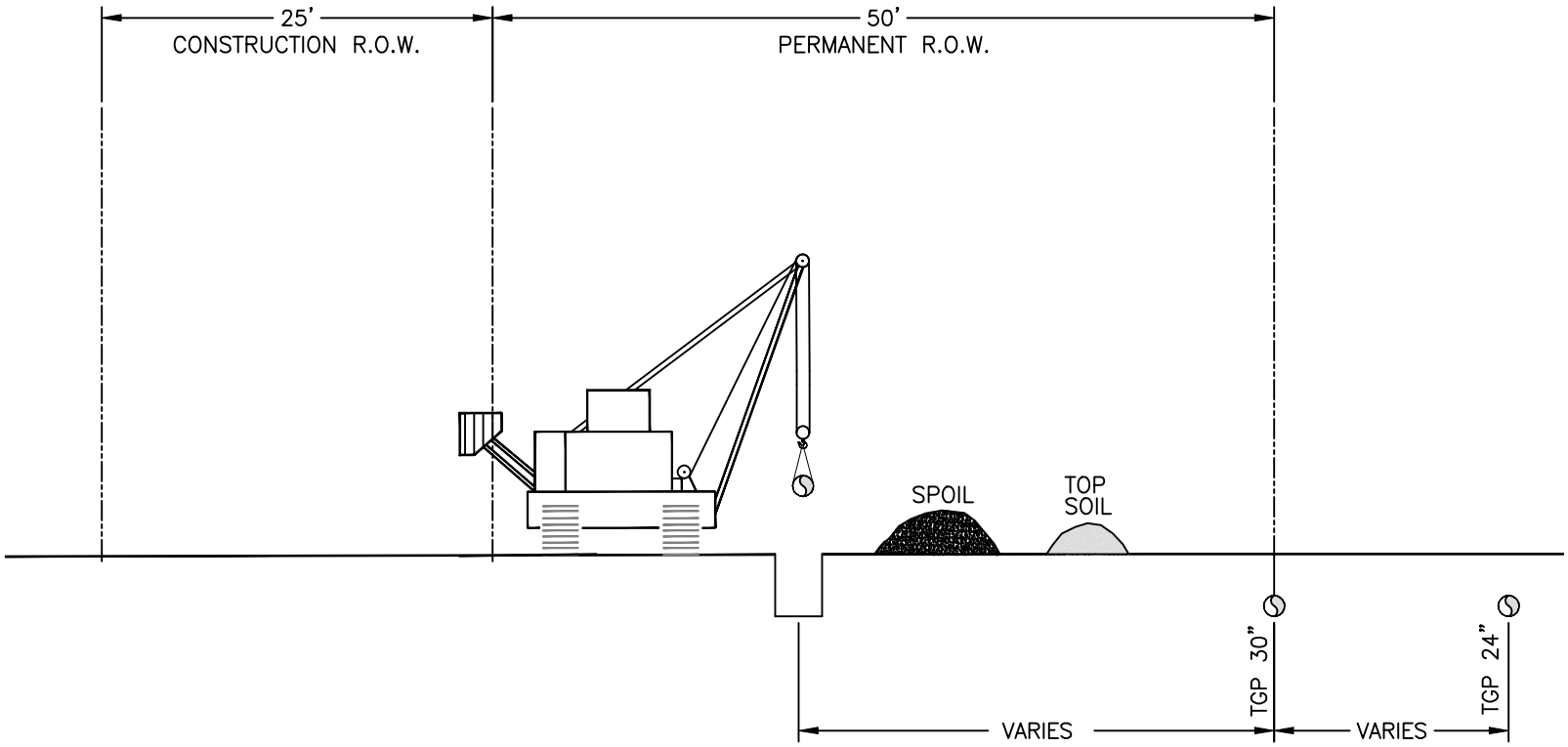
National Fuel

NATIONAL FUEL GAS SUPPLY CORPORATION
YM58 PIPELINE CONSTRUCTION RIGHT-OF-WAY
TYPICAL DRAWING
FIGURE 4

YM58 FIG 4.DWG

06/05/2019

YM58 TYPICAL FIGURE #5



NOTE:
DRAWING IS NOT TO SCALE

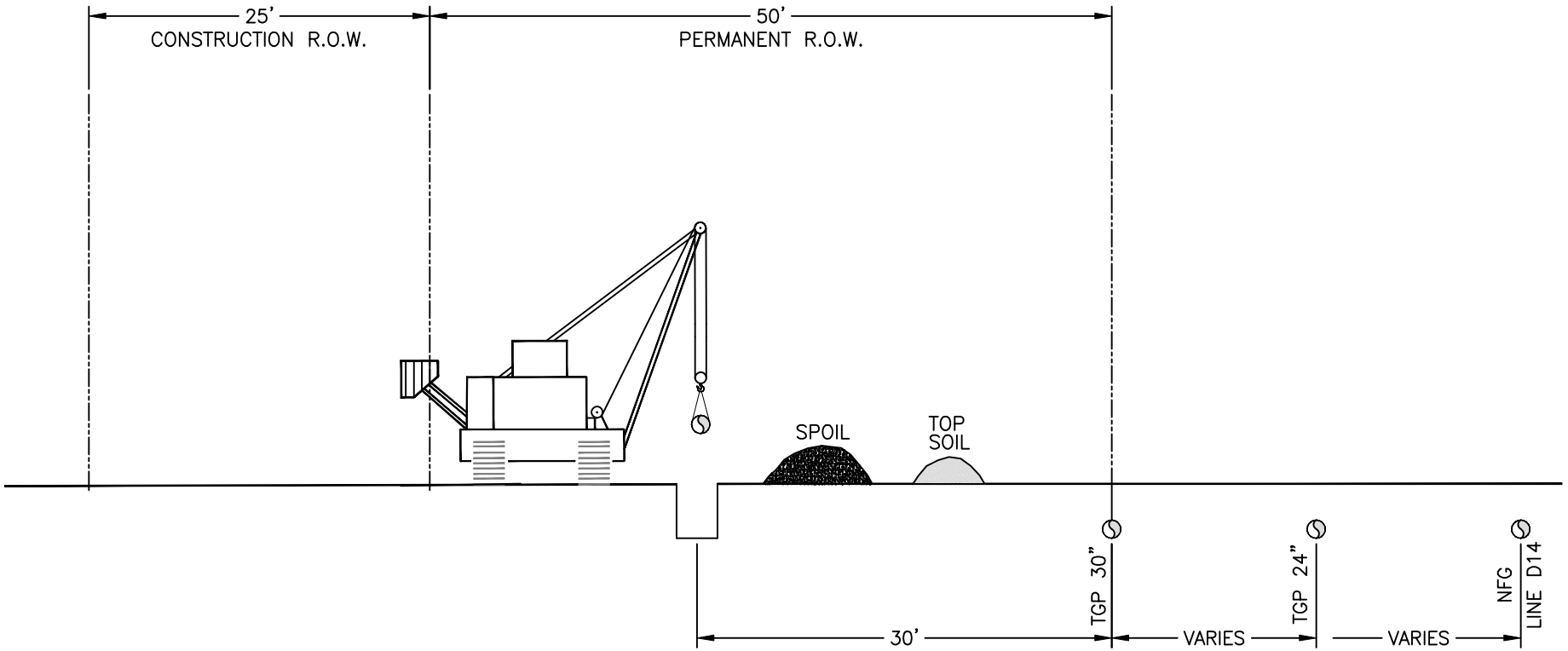
National Fuel

NATIONAL FUEL GAS SUPPLY CORPORATION
YM58 PIPELINE CONSTRUCTION RIGHT-OF-WAY
TYPICAL DRAWING
FIGURE 5

YM58 FIG 5.DWG

06/05/2019

YM58 TYPICAL FIGURE #6



NOTE:
DRAWING IS NOT TO SCALE

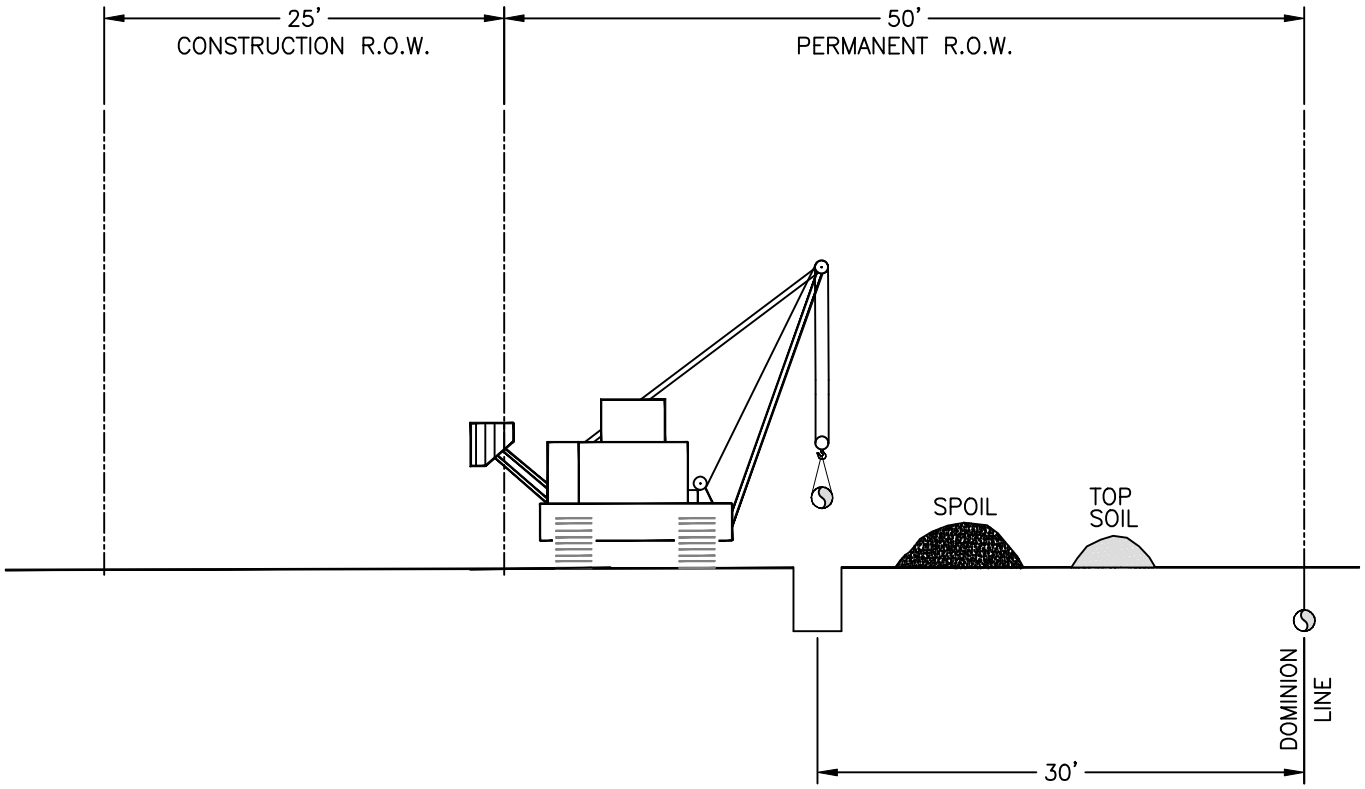
National Fuel

NATIONAL FUEL GAS SUPPLY CORPORATION
YM58 PIPELINE CONSTRUCTION RIGHT-OF-WAY
TYPICAL DRAWING
FIGURE 6

YM58 FIG 6.DWG

06/05/2019

YM58 TYPICAL FIGURE #7



NOTE:
DRAWING IS NOT TO SCALE

National Fuel

NATIONAL FUEL GAS SUPPLY CORPORATION
YM58 PIPELINE CONSTRUCTION RIGHT-OF-WAY
TYPICAL DRAWING
FIGURE 7

YM58 FIG 7.DWG

06/05/2019

YM58 TYPICAL ROWS

STA BK	STA AH	MP BK	MP AH	FIGURE
0	200	0.00	0.04	1
200	1900	0.04	0.36	2
2000	2150	0.38	0.41	1
2150	23520	0.41	4.45	3
23520	25880	4.45	4.90	1
25880	34950	4.90	6.62	3
34950	35730	6.62	6.77	1
35730	36660	6.77	6.94	HDD
36660	37160	6.94	7.04	1
37160	38050	7.04	7.21	4
38050	47120	7.21	8.92	3
47120	47850	8.92	9.06	5
47850	48130	9.06	9.12	6
48130	62960	9.12	11.92	3
62960	73170	11.92	13.86	4
73170	73770	13.86	13.97	5
73770	74650	13.97	14.14	HDD
74650	74800	14.14	14.17	5
74800	77650	14.17	14.71	4
77650	78170	14.71	14.80	1
78170	78990	14.80	14.96	HDD
78990	79240	14.96	15.01	1
79240	99830	15.01	18.91	4
99830	103210	18.91	19.55	1
103210	104560	19.55	19.80	3
104560	104740	19.80	19.84	5
104740	106520	19.84	20.17	1
106520	119400	20.17	22.61	3
119400	124175	22.61	23.52	4
124175	124880	23.52	23.65	5
124880	135400	23.65	25.64	1
135400	149360	25.64	28.29	3
149360	155680	28.29	29.48	7
155680	155820	29.48	29.51	1

YM224 LOOP TYPICAL ROWS

STA BK	STA AH	MP BK	MP AH	FIGURE
0	7442	0.00	1.41	1

Transco

Leidy South Project

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC

LEIDY SOUTH PROJECT

PROPOSED 42” BENTON LOOP

TYPICAL RIGHT-OF-WAY CROSS -SECTIONS

LYCOMING COUNTY, PENNSYLVANIA

3.48 MILES - M.P. 116.95 TO M.P. 120.44

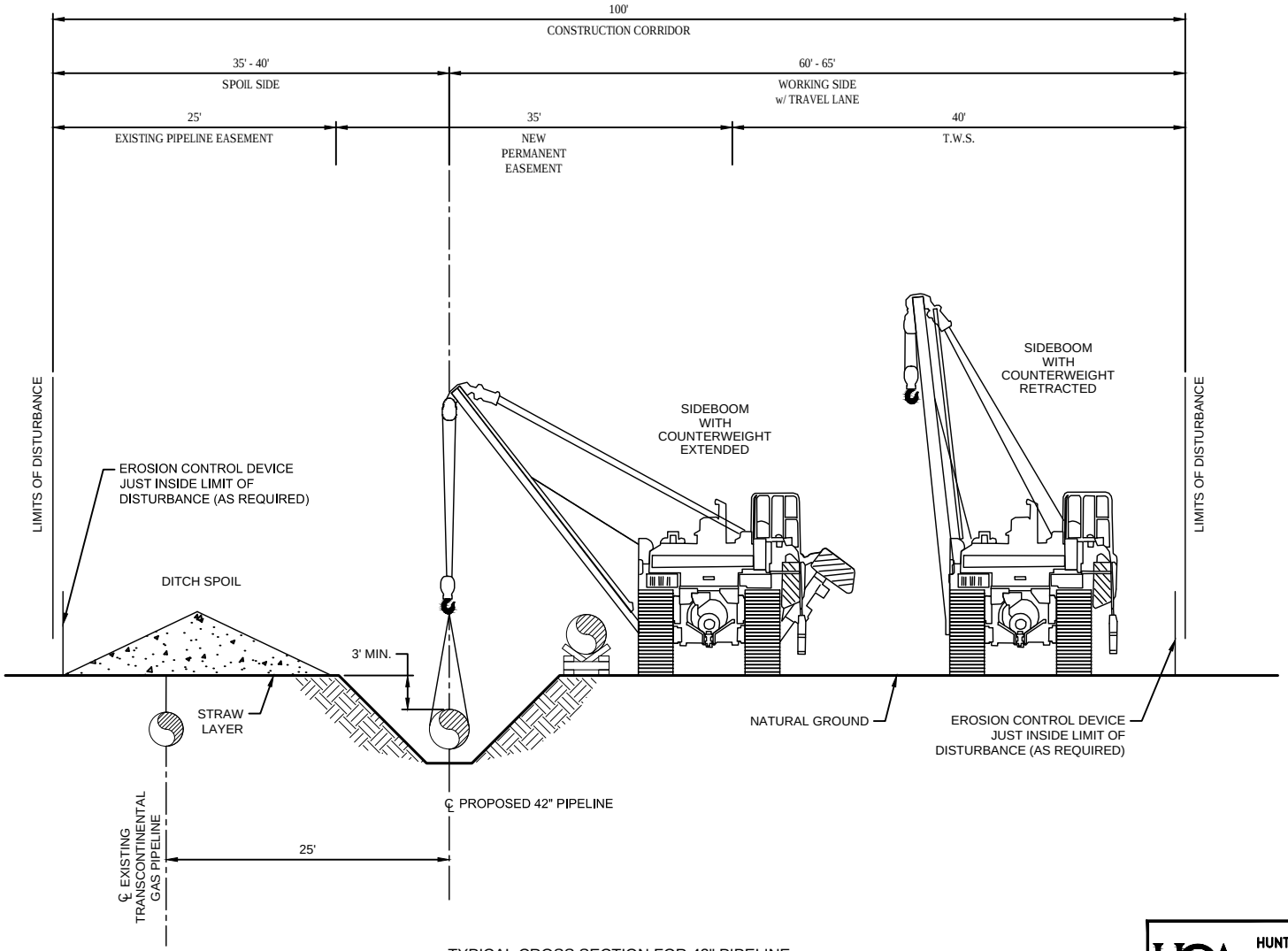
DATE: JUNE 14, 2019

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC

LEIDY SOUTH PROJECT

PROPOSED 42” BENTON LOOP

FERC TABLE OF CONTENTS



TYPICAL CROSS SECTION FOR 42" PIPELINE
NO TOPSOIL STRIPPING - ADJACENT TO EXISTING TRANSCONTINENTAL GAS PIPELINE

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED
ROBERT LAMAR ARGENT, JR.
ENGINEER
PE035426
6-14-19

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH PROJECT
PROPOSED 42" BENTON LOOP
M.P. 116.95 - M.P. 120.44
LYCOMING COUNTY, PENNSYLVANIA

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	02/22/2019	HGA	ISSUED FOR REVIEW	1211227		
B	04/12/2019	HGA	ISSUED FOR FERC DRAFT	1211227		
C	05/24/2019	HGA	ISSUED FOR REVIEW	1211227		
D	06/14/2019	HGA	ISSUED FOR FERC FILING	1211227		

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CHECKED BY: HGA	DATE: 11/05/2018	ISSUED FOR CONSTRUCTION:	REVISION: D
APPROVED BY: HGA	DATE: 11/05/2018	DRAWING NUMBER: FX-BENT-D_LM	SHEET 1
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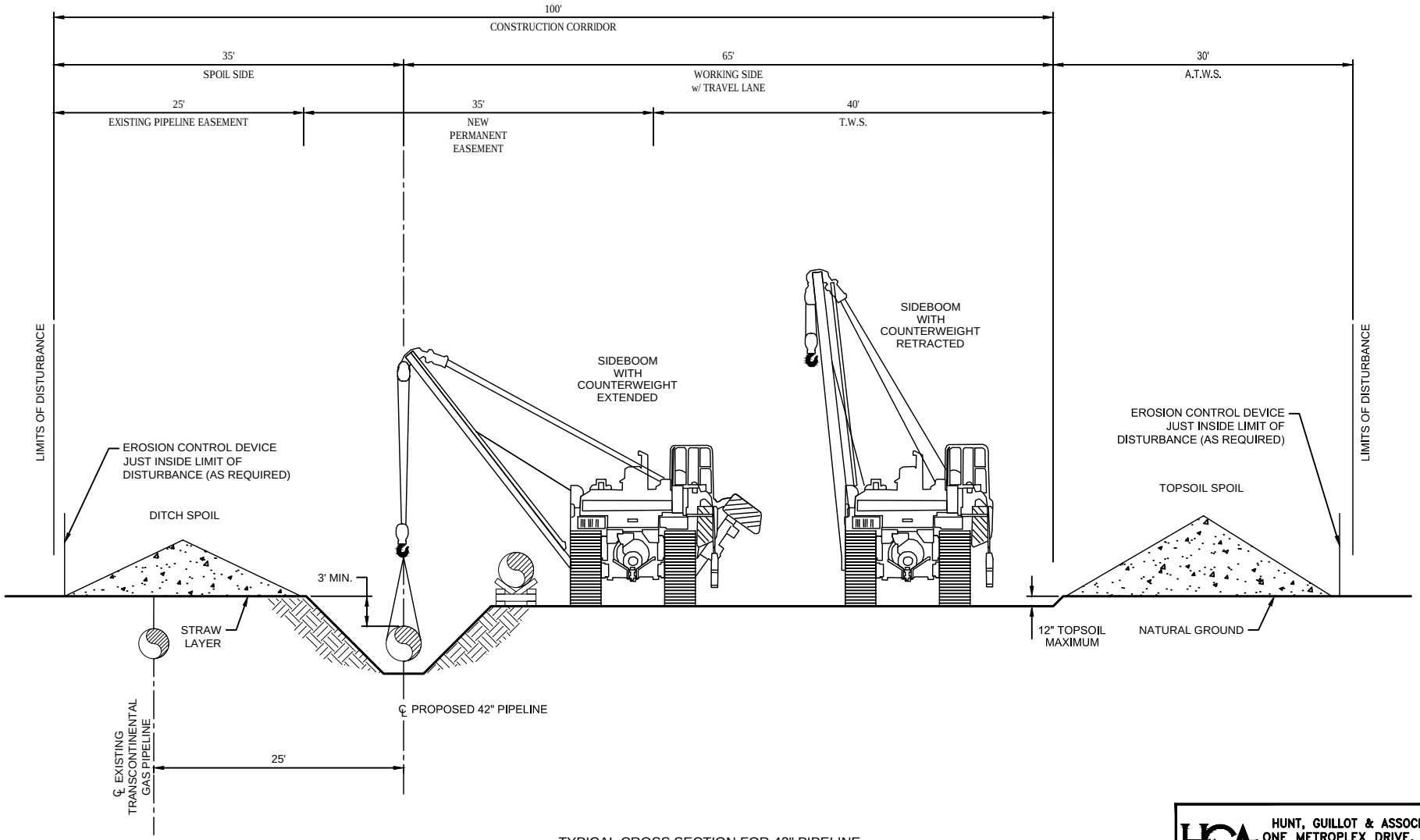

TYPICAL CROSS SECTION FOR 42" PIPELINE
TOPSOIL STRIPPING - ADJACENT TO EXISTING TRANSCONTINENTAL GAS PIPELINE WITH A.T.W.S.

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED
ROBERT LAMAR ARGENT, JR.
ENGINEER
PE035426
6-14-19

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH PROJECT
PROPOSED 42" BENTON LOOP
M.P. 116.95 - M.P. 120.44
LYCOMING COUNTY, PENNSYLVANIA

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	02/22/2019	HGA	ISSUED FOR REVIEW	1211227		
B	04/12/2019	HGA	ISSUED FOR FERC DRAFT	1211227		
C	05/04/2019	HGA	ISSUED FOR REVIEW	1211227		
D	06/14/2019	HGA	ISSUED FOR FERC FILING	1211227		

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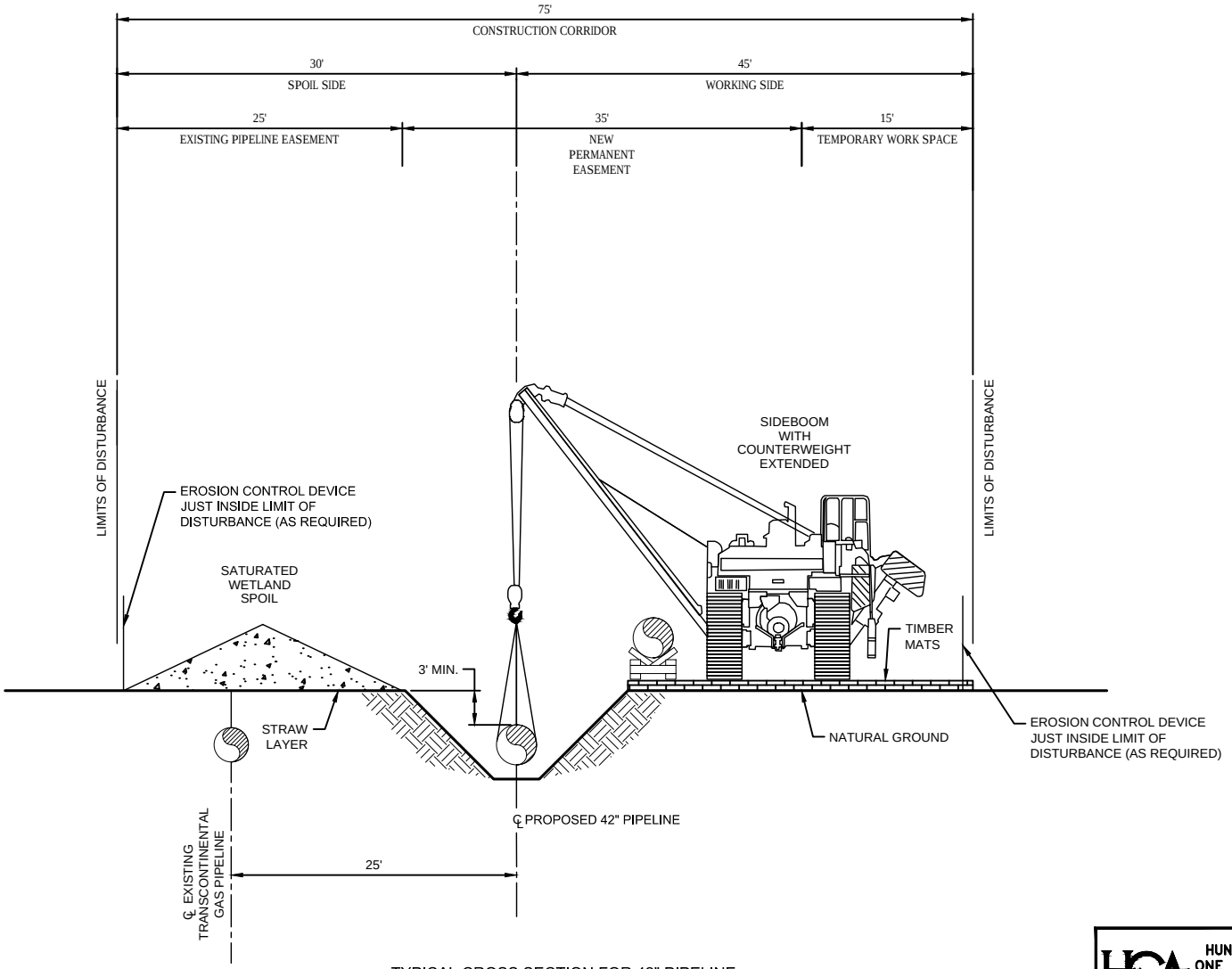

TYPICAL CROSS SECTION FOR 42" PIPELINE
WITHIN WETLAND AREAS - ADJACENT TO EXISTING TRANSCONTINENTAL GAS PIPELINE

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED
ROBERT LAMAR ARGENT, JR.
ENGINEER
PE035426
6-14-19

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH PROJECT
PROPOSED 42" BENTON LOOP
M.P. 116.95 - M.P. 120.44
LYCOMING COUNTY, PENNSYLVANIA

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A	02/22/2019	HGA	ISSUED FOR REVIEW	1211227		
B	04/12/2019	HGA	ISSUED FOR FERC DRAFT	1211227		
C	05/24/2019	HGA	ISSUED FOR REVIEW	1211227		
D	06/14/2019	HGA	ISSUED FOR FERC FILING	1211227		

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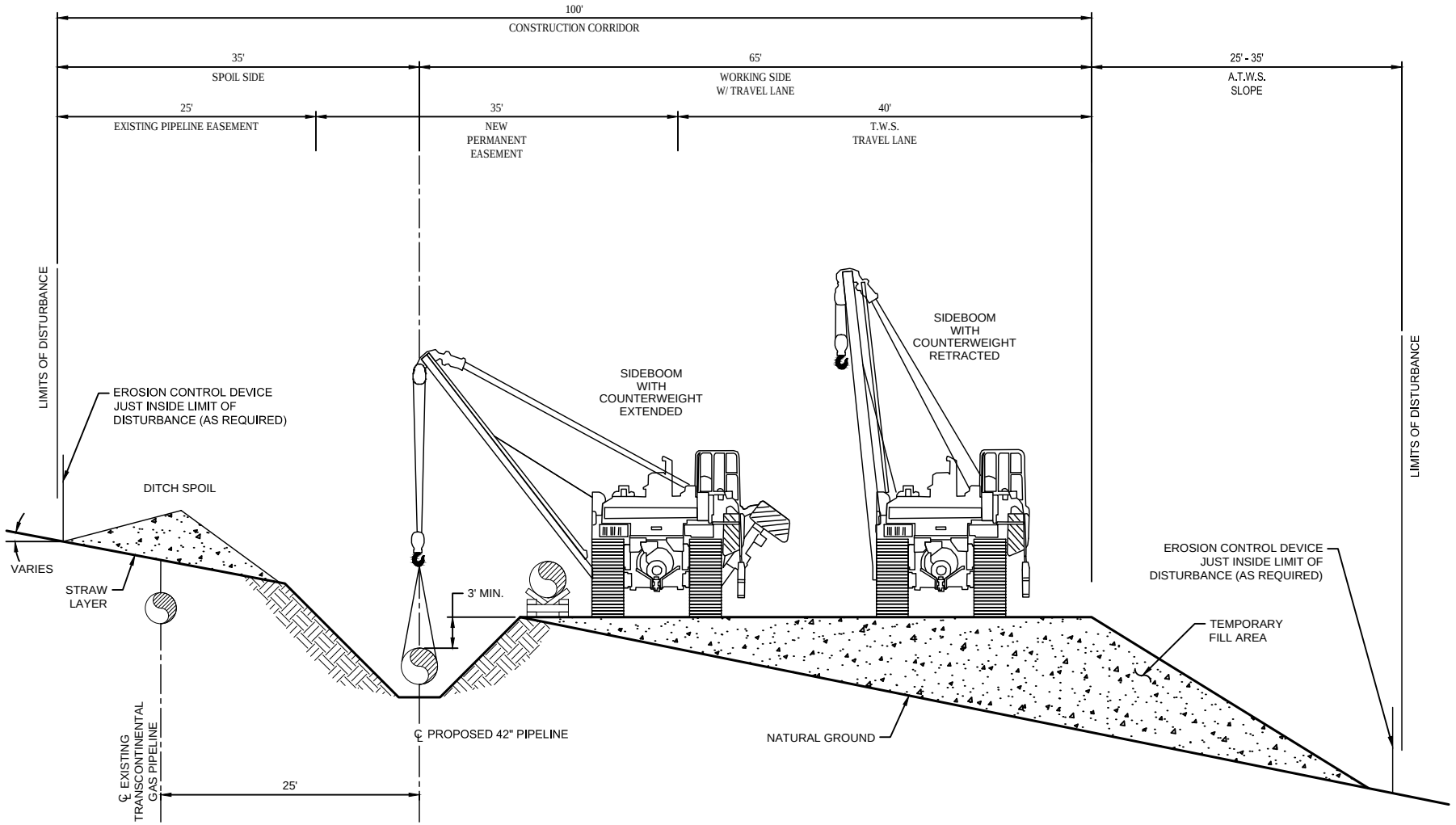

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

TYPICAL CROSS SECTION FOR 42" PIPELINE
MODERATE SIDESLOPE CONSTRUCTION (FILL) - ADJACENT TO EXISTING TRANSCONTINENTAL GAS PIPELINE

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED
ROBERT LAMAR ARGENT, JR.
ENGINEER
PE065426
6-14-19

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH PROJECT
PROPOSED 42" BENTON LOOP
M.P. 116.95 - M.P. 120.44
LYCOMING COUNTY, PENNSYLVANIA

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	03/29/2019	HGA	ISSUED FOR REVIEW	1211227		
B	04/12/2019	HGA	ISSUED FOR FERC DRAFT	1211227		
C	05/24/2019	HGA	ISSUED FOR REVIEW	1211227		
D	06/14/2019	HGA	ISSUED FOR FERC FILING	1211227		

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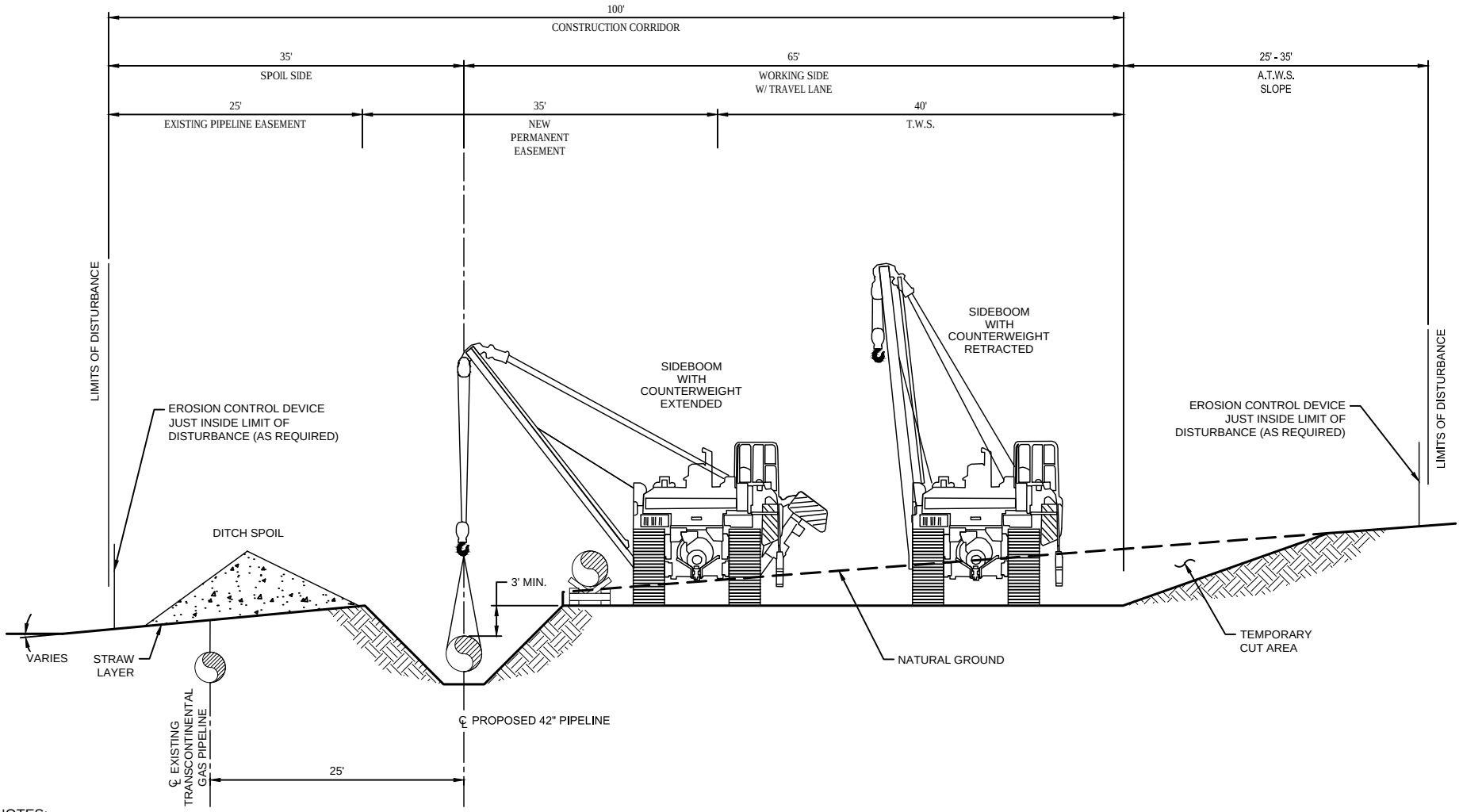

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

TYPICAL CROSS SECTION FOR 42" PIPELINE
MODERATE SIDESLOPE CONSTRUCTION (CUT) - ADJACENT TO EXISTING TRANSCONTINENTAL GAS PIPELINE

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED
ROBERT TAMAR ARGENT, JR.
ENGINEER
PE065426
6-14-19

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH PROJECT
PROPOSED 42" BENTON LOOP
M.P. 116.95 - M.P. 120.44
LYCOMING COUNTY, PENNSYLVANIA

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	03/29/2019	HGA	ISSUED FOR REVIEW	1211227		
B	04/12/2019	HGA	ISSUED FOR FERC DRAFT	1211227		
C	05/24/2019	HGA	ISSUED FOR REVIEW	1211227		
D	06/14/2019	HGA	ISSUED FOR FERC FILING	1211227		

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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC

LEIDY SOUTH PROJECT

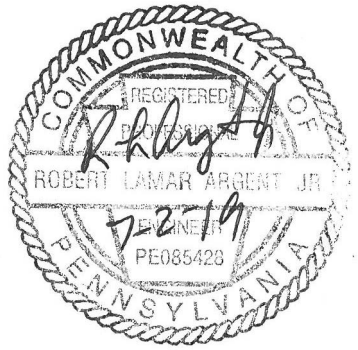
PROPOSED 36” HENSEL REPLACEMENT

TYPICAL RIGHT-OF-WAY CROSS -SECTIONS

CLINTON COUNTY, PENNSYLVANIA

6.26 MILES - M.P. 188.51 TO M.P. 194.00

DATE: JULY 2, 2019

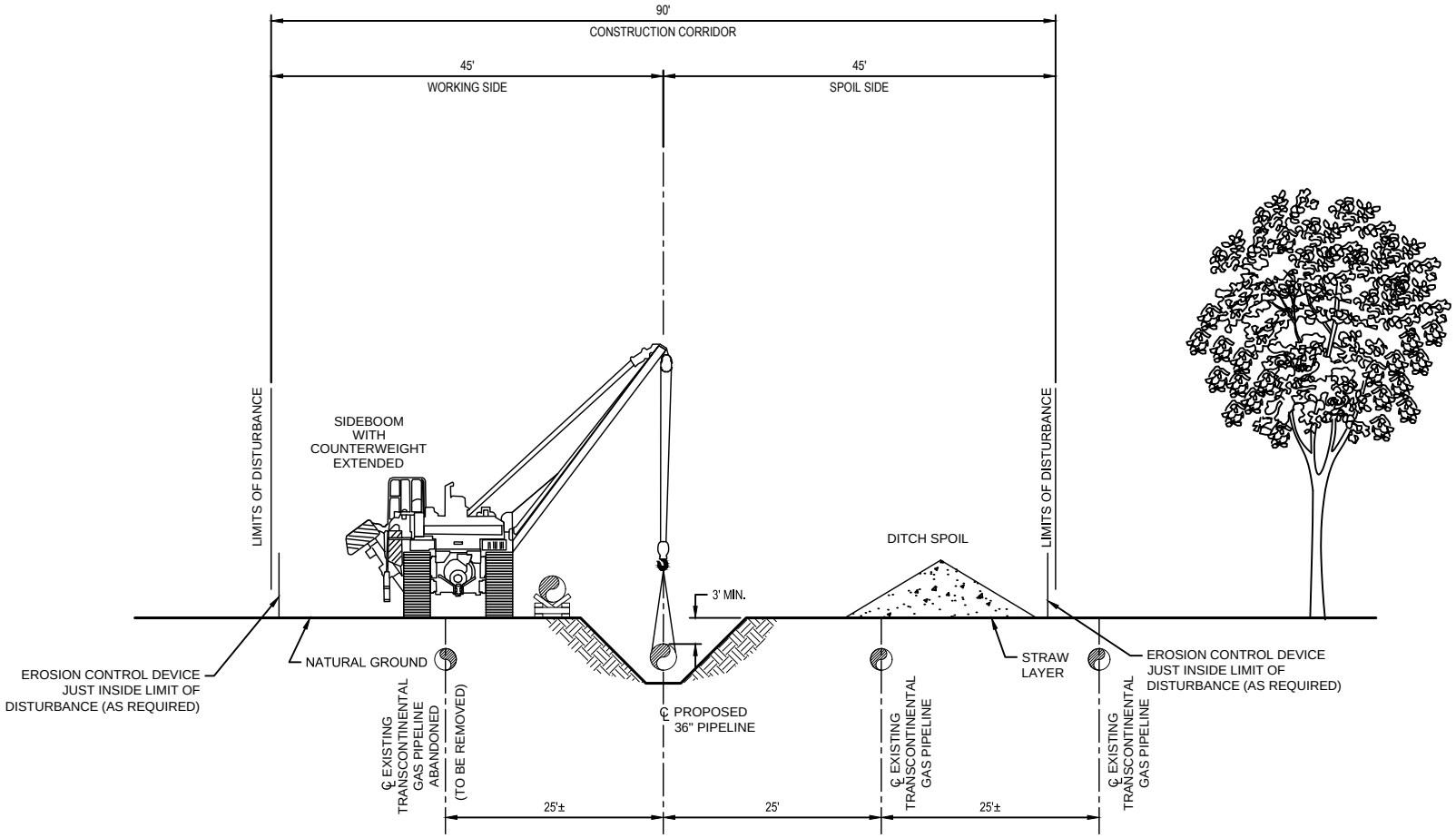


TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC

LEIDY SOUTH PROJECT

PROPOSED 36” HENSEL REPLACEMENT

FERC TABLE OF CONTENTS



TYPICAL CROSS SECTION FOR 36" PIPELINE
NO TOPSOIL STRIPPING - ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
ROBERT LAMAR ARGENT JR
PE085428
7-2-19

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH EXPANSION PROJECT
PROPOSED 36" HENSEL REPLACEMENT
M.P. 188.51 - M.P. 194.00
CLINTON COUNTY, PENNSYLVANIA

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	02/22/2019	HGA	ISSUED FOR REVIEW	1211223		
B	04/12/2019	HGA	ISSUED FOR FERC DRAFT	1211223		
C	07/02/2019	HGA	ISSUED FOR FERC FILING	1211223		

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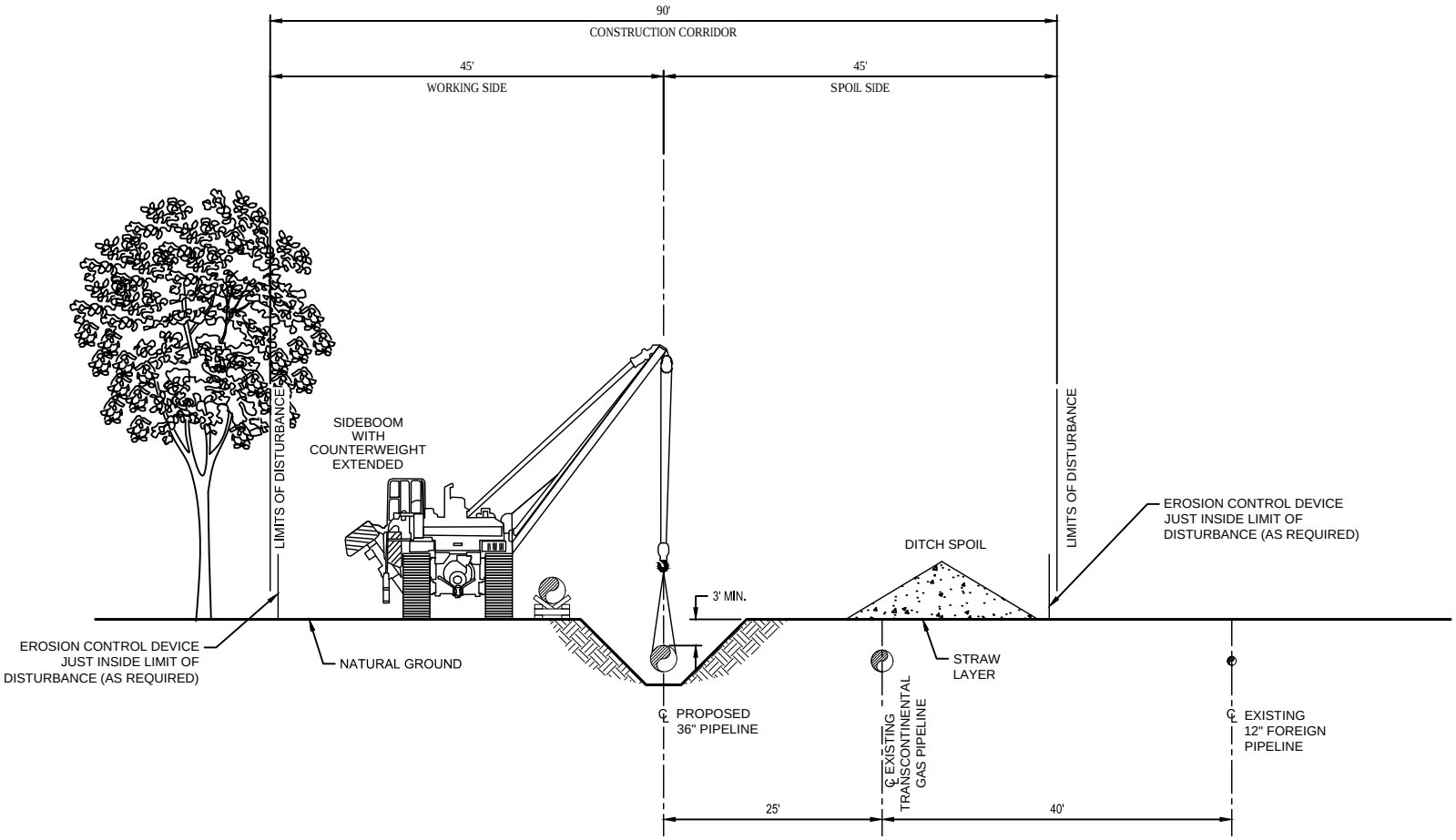

TYPICAL CROSS SECTION FOR 36" PIPELINE
NO TOPSOIL STRIPPING - ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
ROBERT LAMAR ARGENT JR
7-25-19
PE085428

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH PROJECT
PROPOSED 36" HENSEL REPLACEMENT
M.P. 188.51 - M.P. 194.00
CLINTON COUNTY, PENNSYLVANIA

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	02/22/2019	HGA	ISSUED FOR REVIEW	1211223		
B	04/12/2019	HGA	ISSUED FOR FERC DRAFT	1211223		
C	07/02/2019	HGA	ISSUED FOR FERC FILING	1211223		

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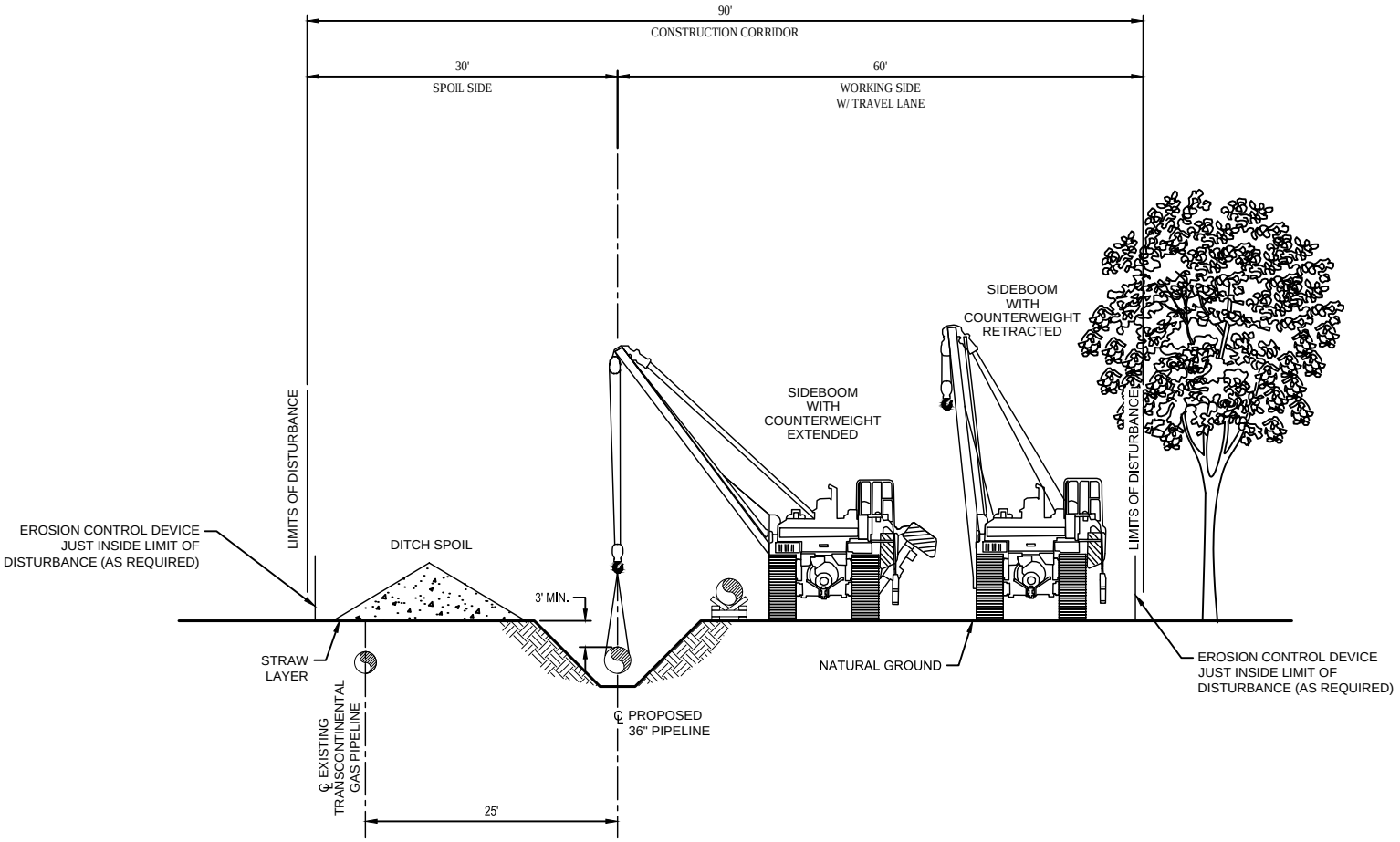

TYPICAL CROSS SECTION FOR 36" PIPELINE
NO TOPSOIL STRIPPING - ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
ROBERT LAMAR ARGENT JR
7-25-19
PE085428

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH PROJECT
PROPOSED 36" HENSEL REPLACEMENT
M.P. 188.51 - M.P. 194.00
CLINTON COUNTY, PENNSYLVANIA

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	02/22/2019	HGA	ISSUED FOR REVIEW	1211223		
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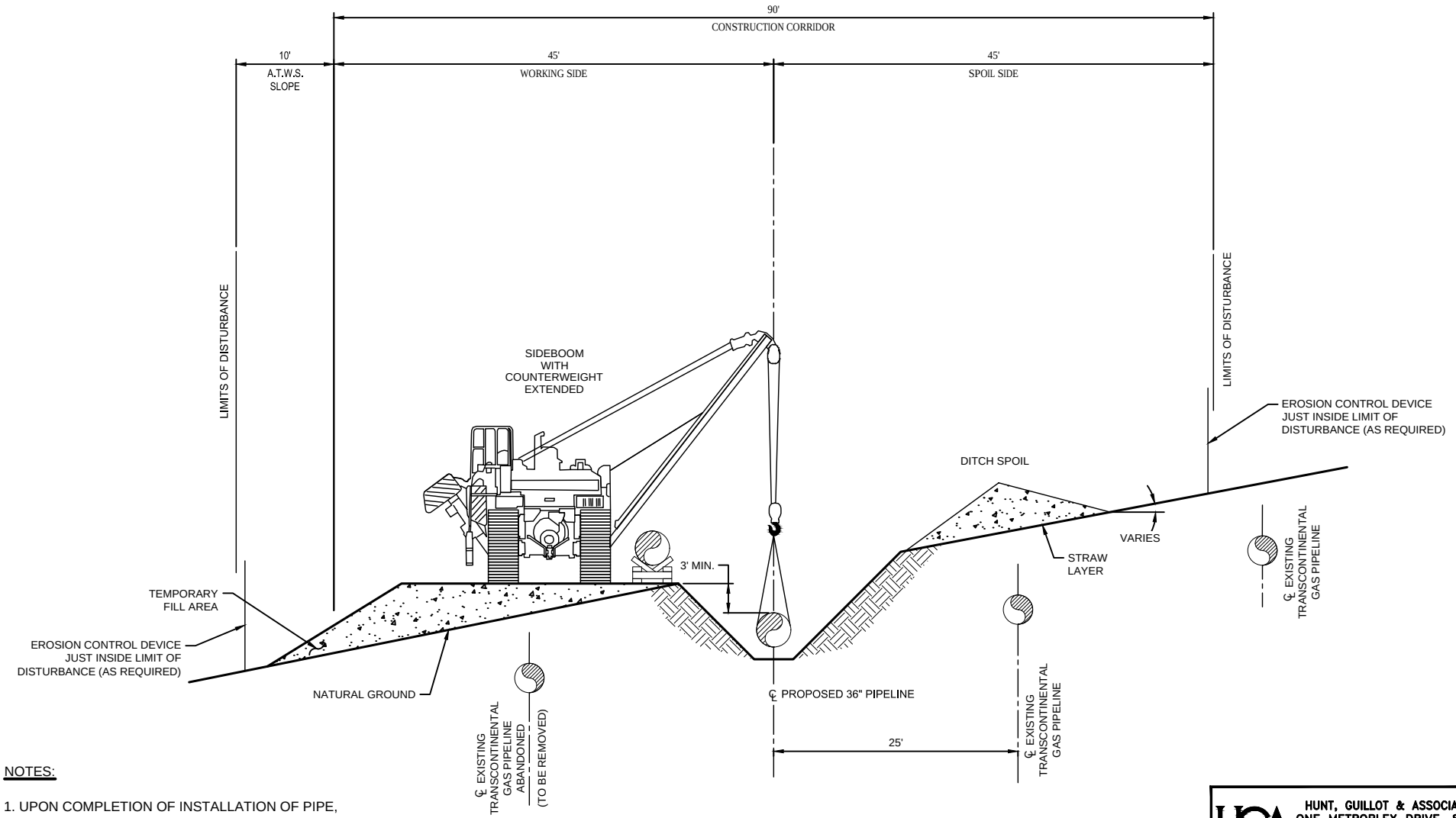

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

TYPICAL CROSS SECTION FOR 36" PIPELINE
STEEP SIDESLOPE CONSTRUCTION - ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE (FILL)

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
ROBERT LAMAR ARGENT JR
7-2-19
PE085428

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH PROJECT
PROPOSED 36" HENSEL REPLACEMENT
M.P. 188.51 - M.P. 194.00
CLINTON COUNTY, PENNSYLVANIA

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	03/29/2019	HGA	ISSUED FOR REVIEW	1211223		
B	04/12/2019	HGA	ISSUED FOR FERC DRAFT	1211223		
C	07/02/2019	HGA	ISSUED FOR FERC FILING	1211223		

DRAWN BY: HGA	DATE: 03/28/2019	ISSUED FOR BID:	SCALE: NTS
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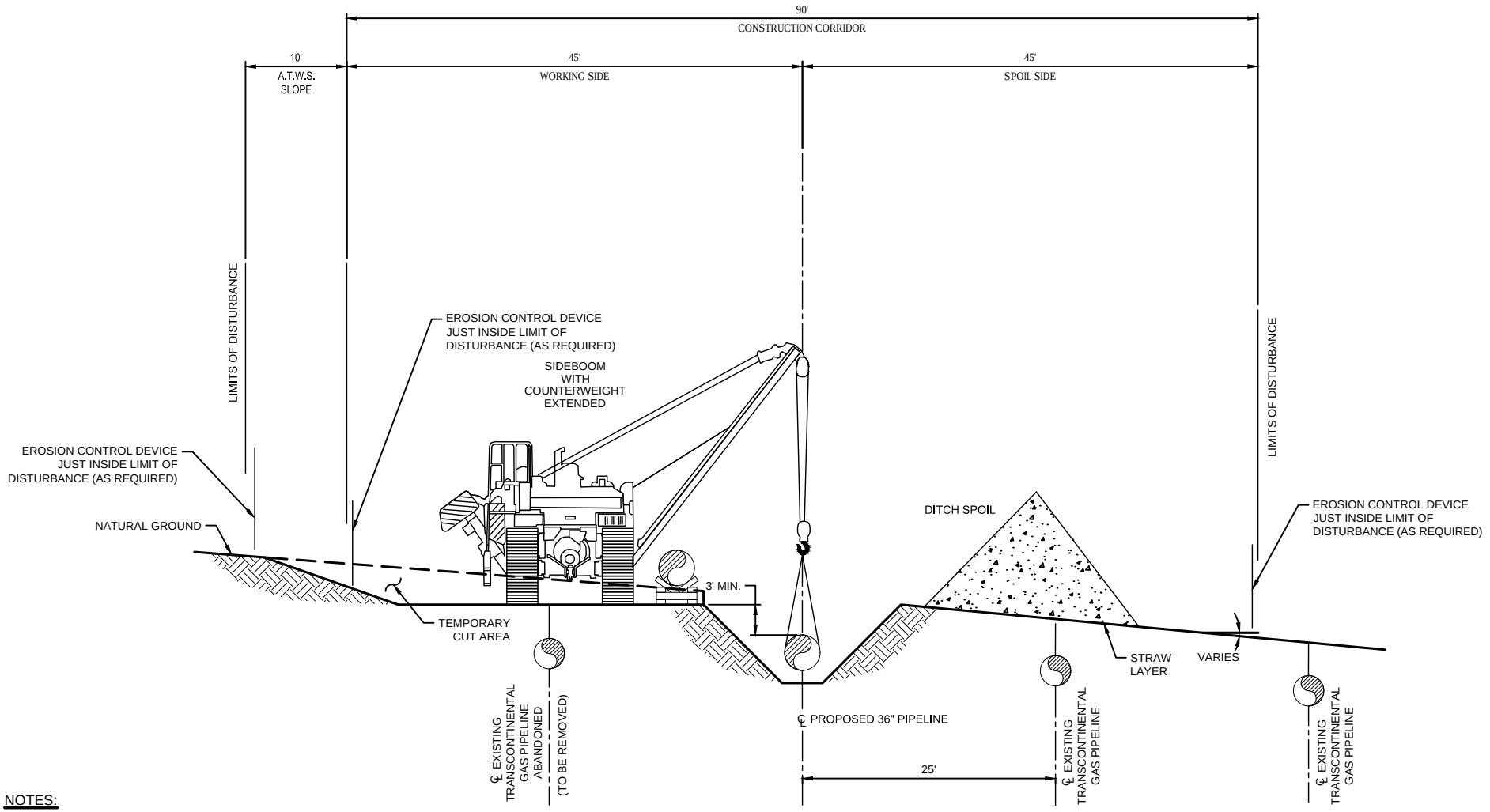

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

TYPICAL CROSS SECTION FOR 36" PIPELINE
STEEP SIDESLOPE CONSTRUCTION - ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE (CUT)

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
ROBERT LAMAR ARGENT JR
PE085428
7-25-19

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH PROJECT
PROPOSED 36" HENSEL REPLACEMENT
M.P. 188.51 - M.P. 194.00
CLINTON COUNTY, PENNSYLVANIA

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
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C	07/02/2019	HGA	ISSUED FOR FERC FILING	1211223		

DRAWN BY: HGA	DATE: 03/28/2019	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: HGA	DATE: 03/28/2019	ISSUED FOR CONSTRUCTION:	REVISION: C
APPROVED BY: HGA	DATE: 03/28/2019	DRAWING NUMBER: FX-HENS-D_LM	SHEET 5
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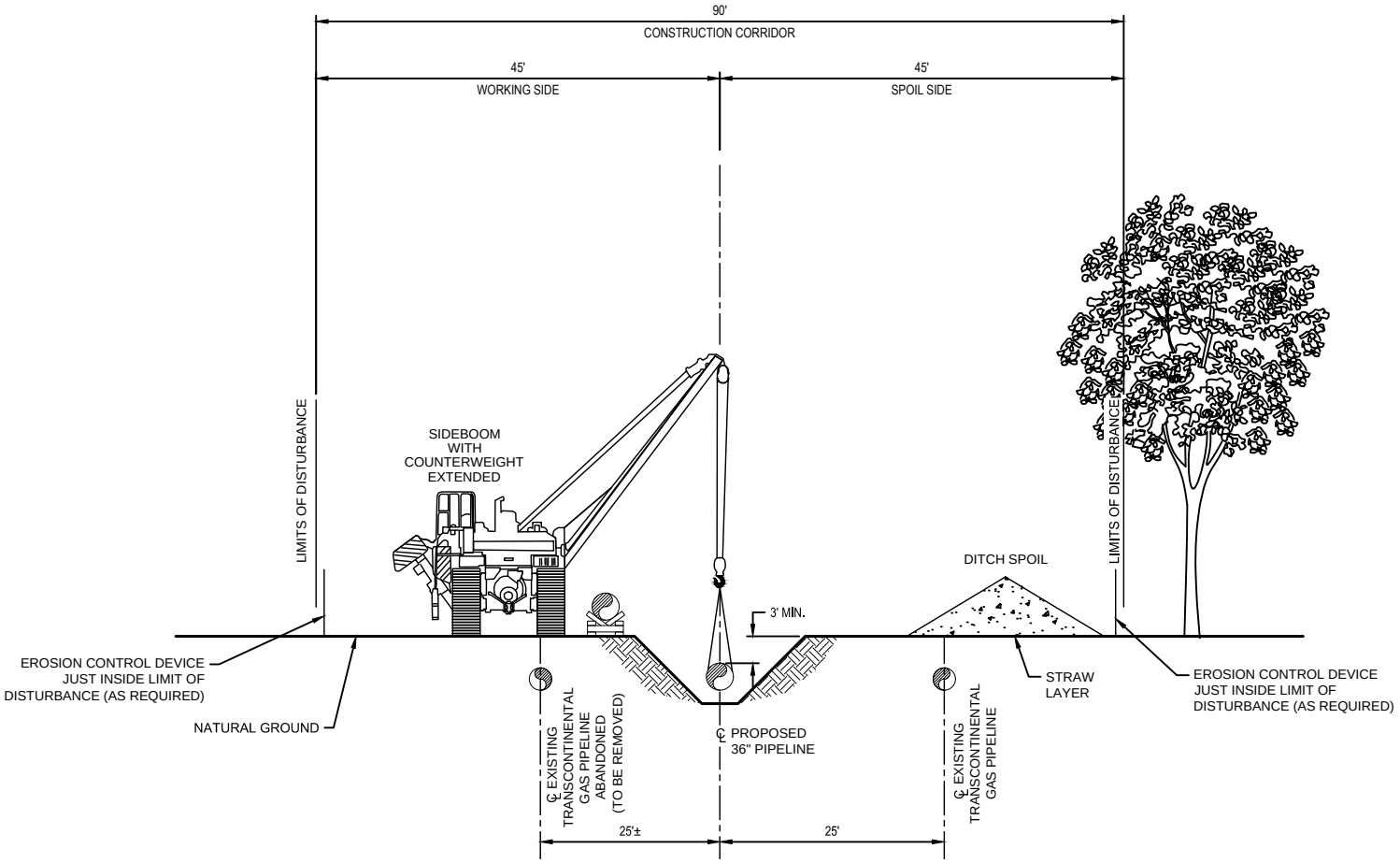

TYPICAL CROSS SECTION FOR 36" PIPELINE
NO TOPSOIL STRIPPING - ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
ROBERT LAMAR ARGENT JR
7-25-19
PE085428

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH EXPANSION PROJECT
PROPOSED 36" HENSEL REPLACEMENT
M.P. 188.51 - M.P. 194.00
CLINTON COUNTY, PENNSYLVANIA

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	07/02/2019	HGA	ISSUED FOR FERC FILING	1211223		

DRAWN BY: HGA	DATE: 02/04/2019	ISSUED FOR BID:	SCALE: NTS
CHECKED BY: HGA	DATE: 02/04/2019	ISSUED FOR CONSTRUCTION:	REVISION: A
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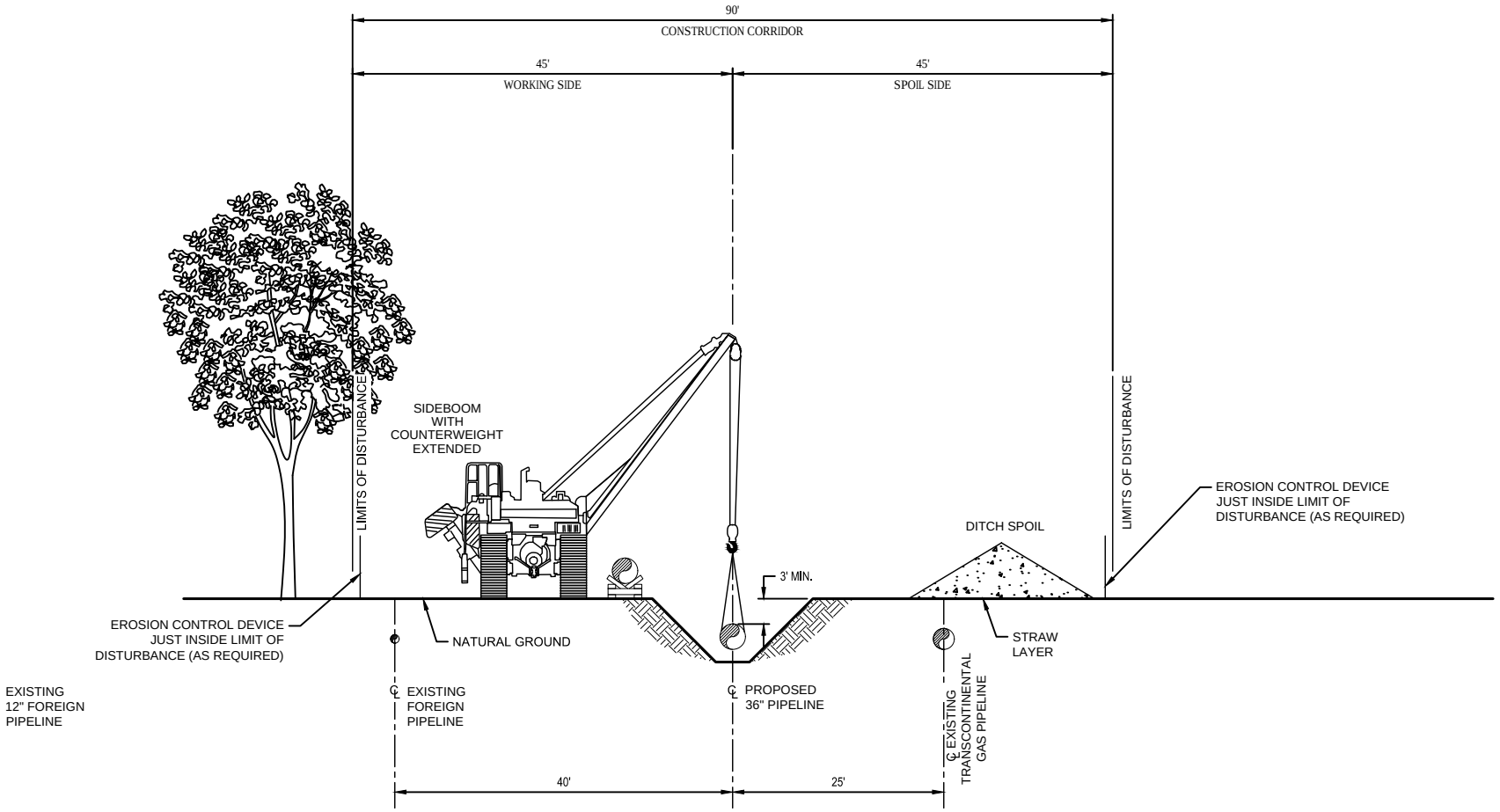

TYPICAL CROSS SECTION FOR 36" PIPELINE
NO TOPSOIL STRIPPING - ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
ROBERT LAMAR ARGENT JR
7-2-19
PE085428

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH PROJECT
PROPOSED 36" HENSEL REPLACEMENT
M.P. 188.51 - M.P. 194.00
CLINTON COUNTY, PENNSYLVANIA

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	07/02/2019	HGA	ISSUED FOR FERC FILING	1211223		

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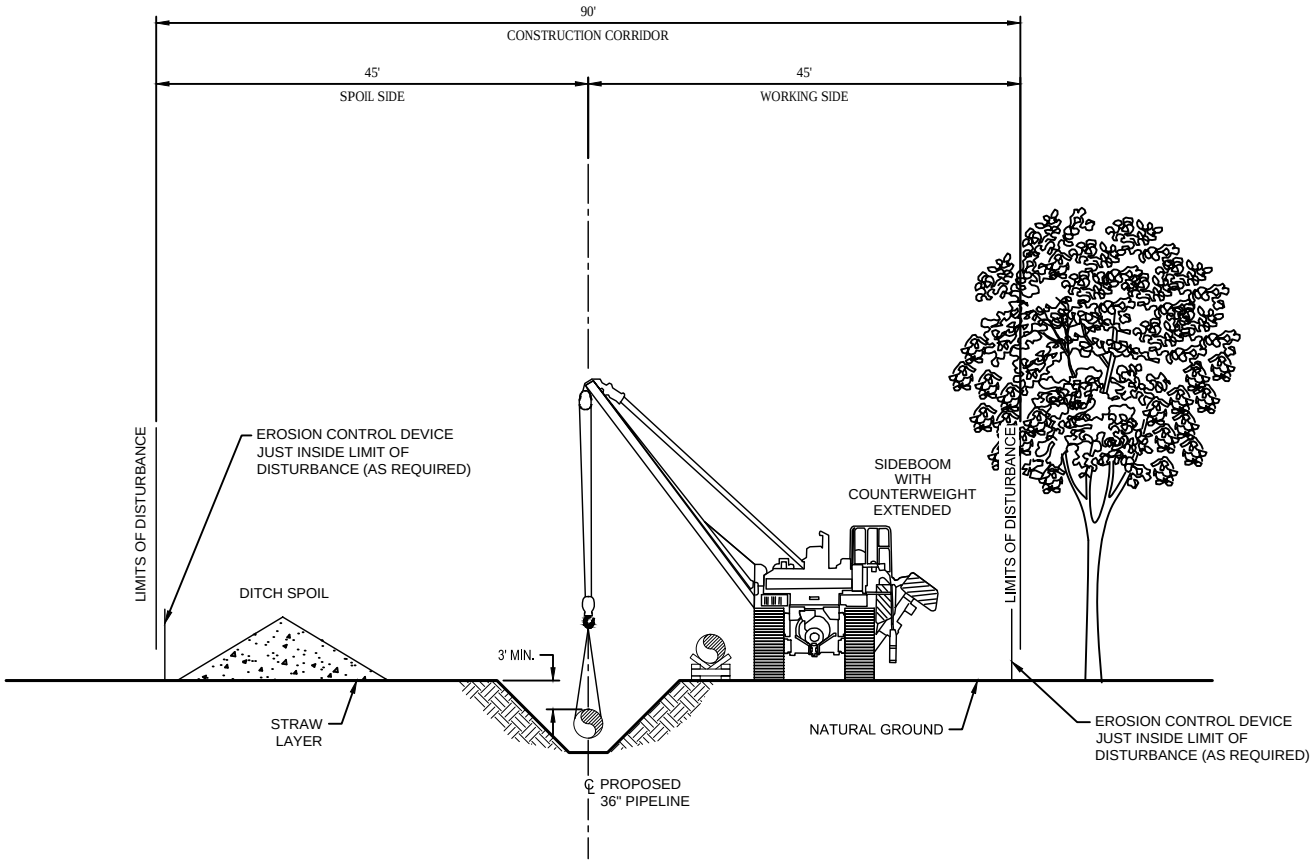

TYPICAL CROSS SECTION FOR 36" PIPELINE
NO TOPSOIL STRIPPING - TYPICAL WORK CORRIDOR

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
ROBERT LAMAR ARGENT JR
7-2-19
PE085428

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH EXPANSION PROJECT
PROPOSED 36" HENSEL REPLACEMENT
M.P. 188.51 - M.P. 194.00
CLINTON COUNTY, PENNSYLVANIA

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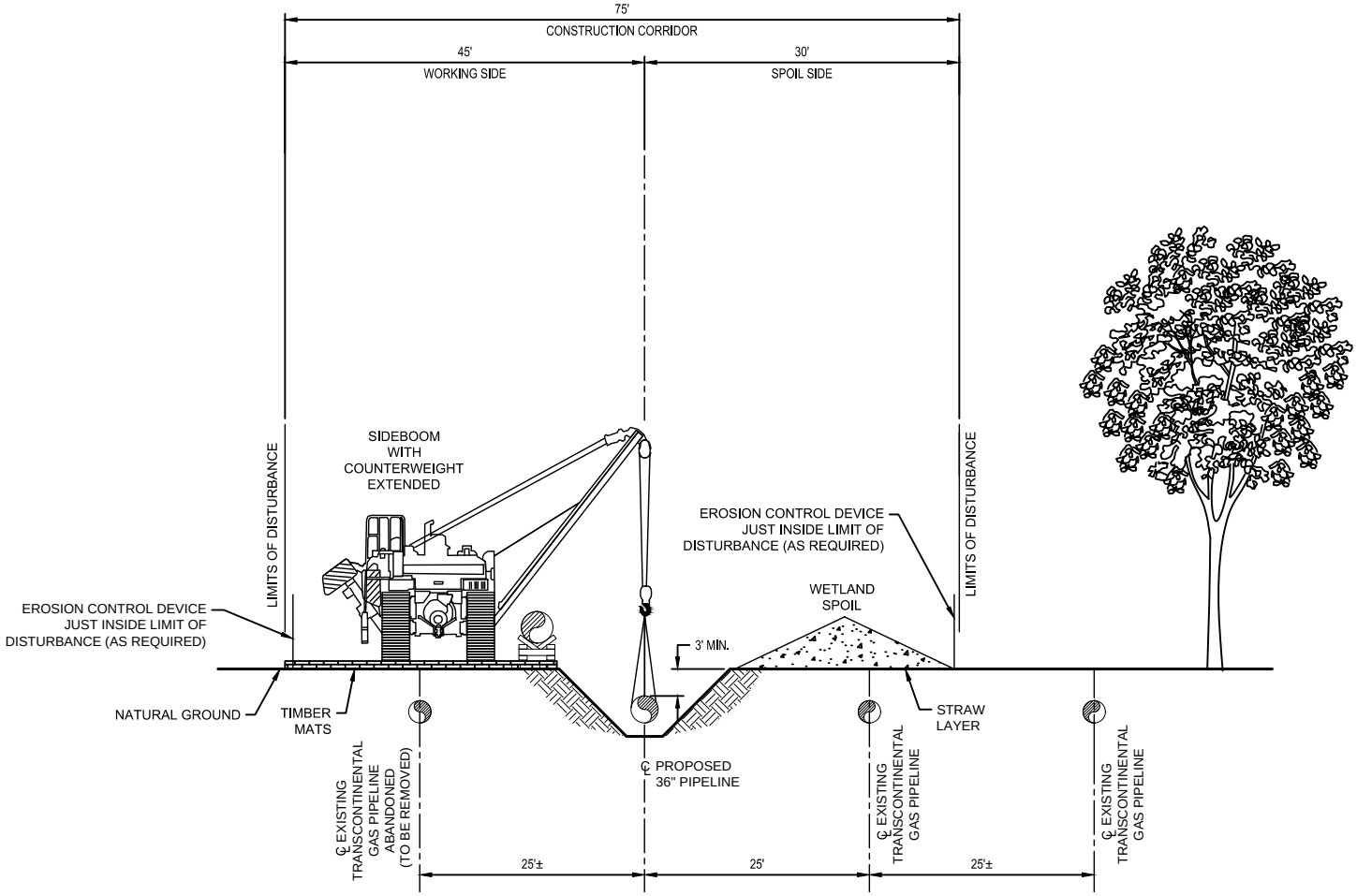

TYPICAL CROSS SECTION FOR 42" PIPELINE
WITHIN WETLAND AREAS - ADJACENT TO EXISTING TRANSCONTINENTAL PIPELINE

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
ROBERT LAMAR ARGENT JR
7-25-19
PE085428

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH EXPANSION PROJECT
PROPOSED 36" HENSEL REPLACEMENT
M.P. 188.51 - M.P. 194.00
CLINTON COUNTY, PENNSYLVANIA

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CHECKED BY: HGA	DATE: 02/04/2019	ISSUED FOR CONSTRUCTION:	REVISION: A
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TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC

LEIDY SOUTH PROJECT

PROPOSED 36” HILLTOP LOOP

TYPICAL RIGHT-OF-WAY CROSS -SECTIONS

CLINTON COUNTY, PENNSYLVANIA

2.41 MILES - M.P. 183.55 TO M.P. 186.01

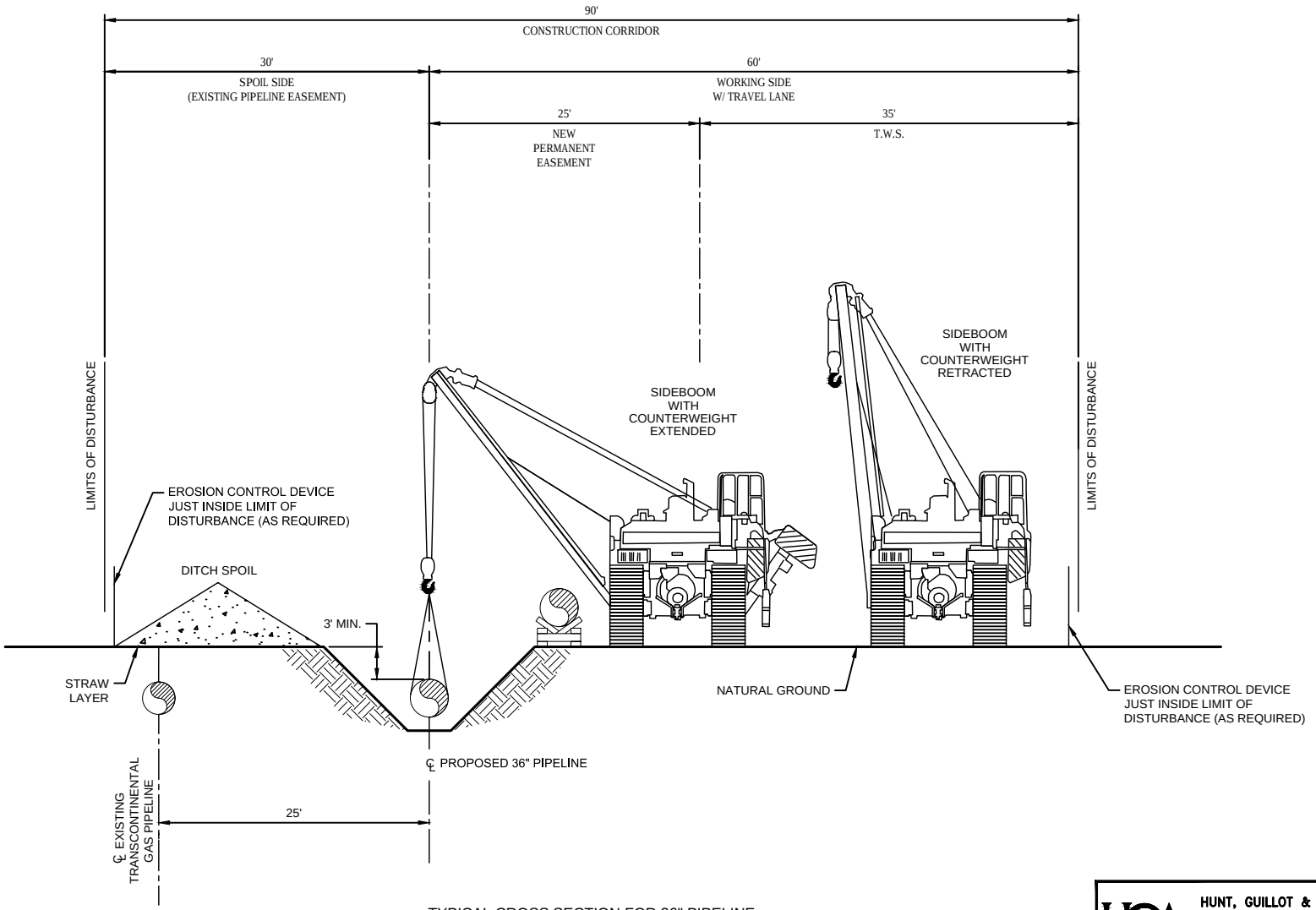
DATE: JUNE 14, 2019

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC

LEIDY SOUTH PROJECT

PROPOSED 36” HILLTOP LOOP

FERC TABLE OF CONTENTS



TYPICAL CROSS SECTION FOR 36" PIPELINE
NO TOPSOIL STRIPPING - ADJACENT TO EXISTING TRANSCONTINENTAL GAS PIPELINE

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ROBERT LAMAR AGENT, JR.
6-14-19
ENGINEER
PE065426

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH PROJECT
PROPOSED 36" HILLTOP LOOP
M.P. 183.55 - M.P. 186.01
CLINTON COUNTY, PENNSYLVANIA

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
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B	04/12/2019	HGA	ISSUED FOR FERC DRAFT	1211229		
C	05/24/2019	HGA	ISSUED FOR REVIEW	1211229		
D	06/14/2019	HGA	ISSUED FOR FERC FILING	1211229		

DRAWN BY: HGA	DATE: 11/05/2018	ISSUED FOR BID:	SCALE: NTS
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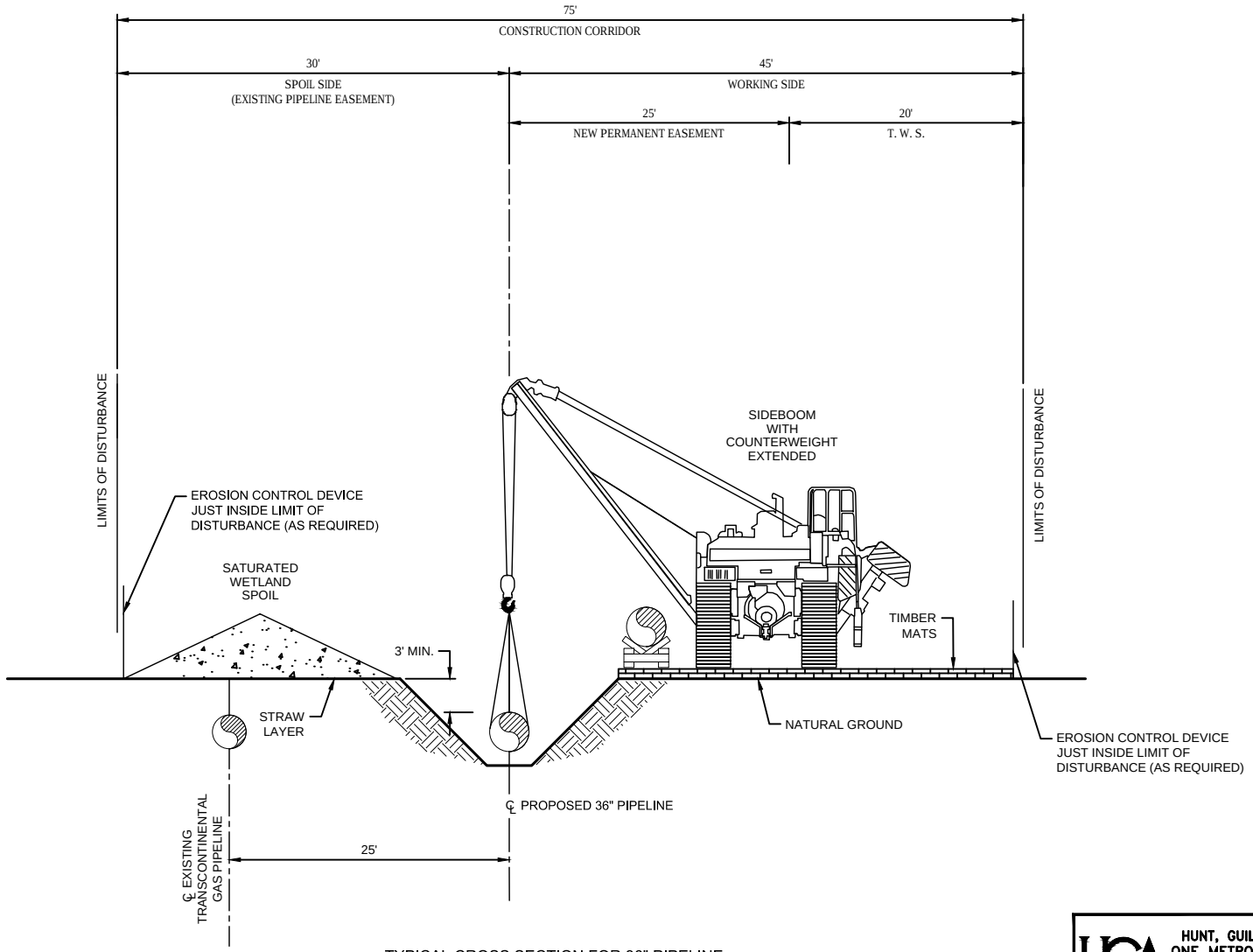

TYPICAL CROSS SECTION FOR 36" PIPELINE
WITHIN WETLAND AREAS - ADJACENT TO EXISTING TRANSCONTINENTAL GAS PIPELINE

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED
ROBERT LAMAR AGENT, JR.
6-14-19
ENGINEER
PE065426

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH PROJECT
PROPOSED 36" HILLTOP LOOP
M.P. 183.55 - M.P. 186.01
CLINTON COUNTY, PENNSYLVANIA

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	02/22/2019	HGA	ISSUED FOR REVIEW	1211229		
B	04/12/2019	HGA	ISSUED FOR FERC DRAFT	1211229		
C	05/24/2019	HGA	ISSUED FOR REVIEW	1211229		
D	06/14/2019	HGA	ISSUED FOR FERC FILING	1211229		

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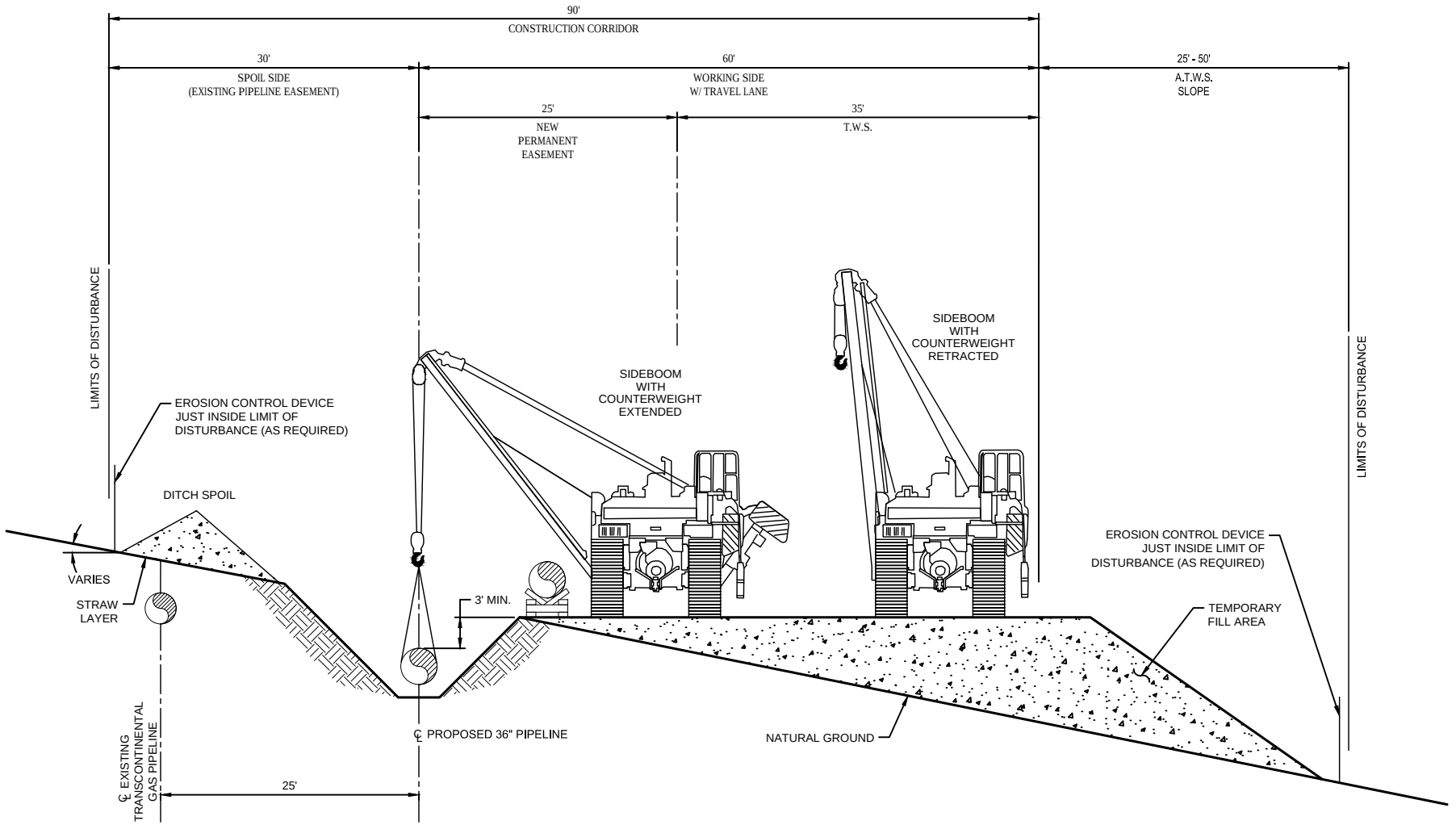

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

TYPICAL CROSS SECTION FOR 36" PIPELINE
MODERATE SIDESLOPE CONSTRUCTION (FILL) - ADJACENT TO EXISTING TRANSCONTINENTAL GAS PIPELINE

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ROBERT LAMAR AGENT, JR.
6-14-19
ENGINEER
PE065426

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH PROJECT
PROPOSED 36" HILLTOP LOOP
M.P. 183.55 - M.P. 186.01
CLINTON COUNTY, PENNSYLVANIA

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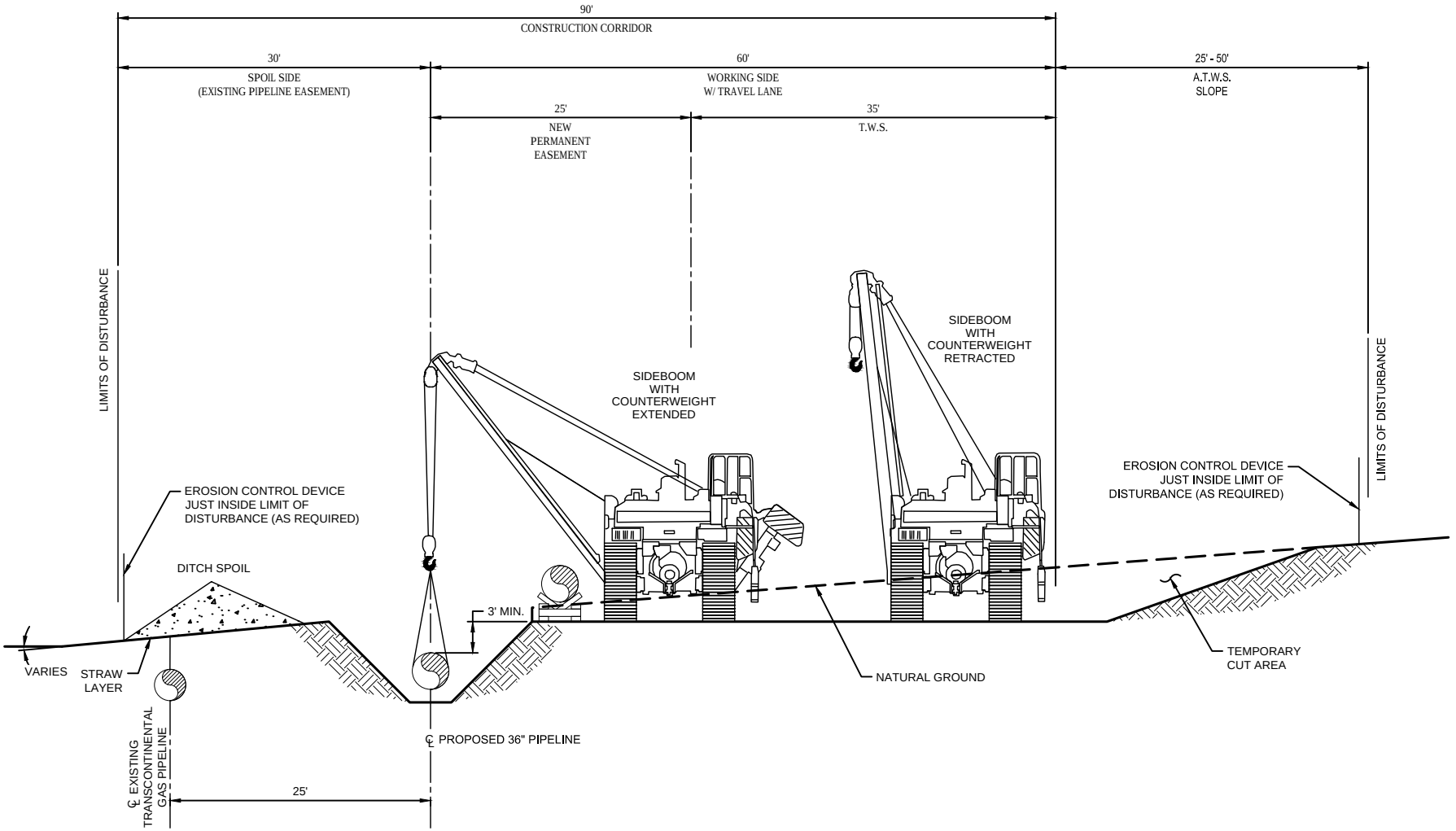

NOTES:

1. UPON COMPLETION OF INSTALLATION OF PIPE, ORIGINAL SLOPE TO BE RESTORED.

TYPICAL CROSS SECTION FOR 36" PIPELINE
MODERATE SIDESLOPE CONSTRUCTION (CUT) - ADJACENT TO EXISTING TRANSCONTINENTAL GAS PIPELINE

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ROBERT TAMAR ARGENT, JR.
ENGINEER
PE065426
6-14-19

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TYPICAL RIGHT-OF-WAY CROSS-SECTION
LEIDY SOUTH PROJECT
PROPOSED 36" HILLTOP LOOP
M.P. 183.55 - M.P. 186.01
CLINTON COUNTY, PENNSYLVANIA

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APPROVED BY: HGA	DATE: 03/28/2019	DRAWING NUMBER: FX-HILL-D_LM	SHEET 4
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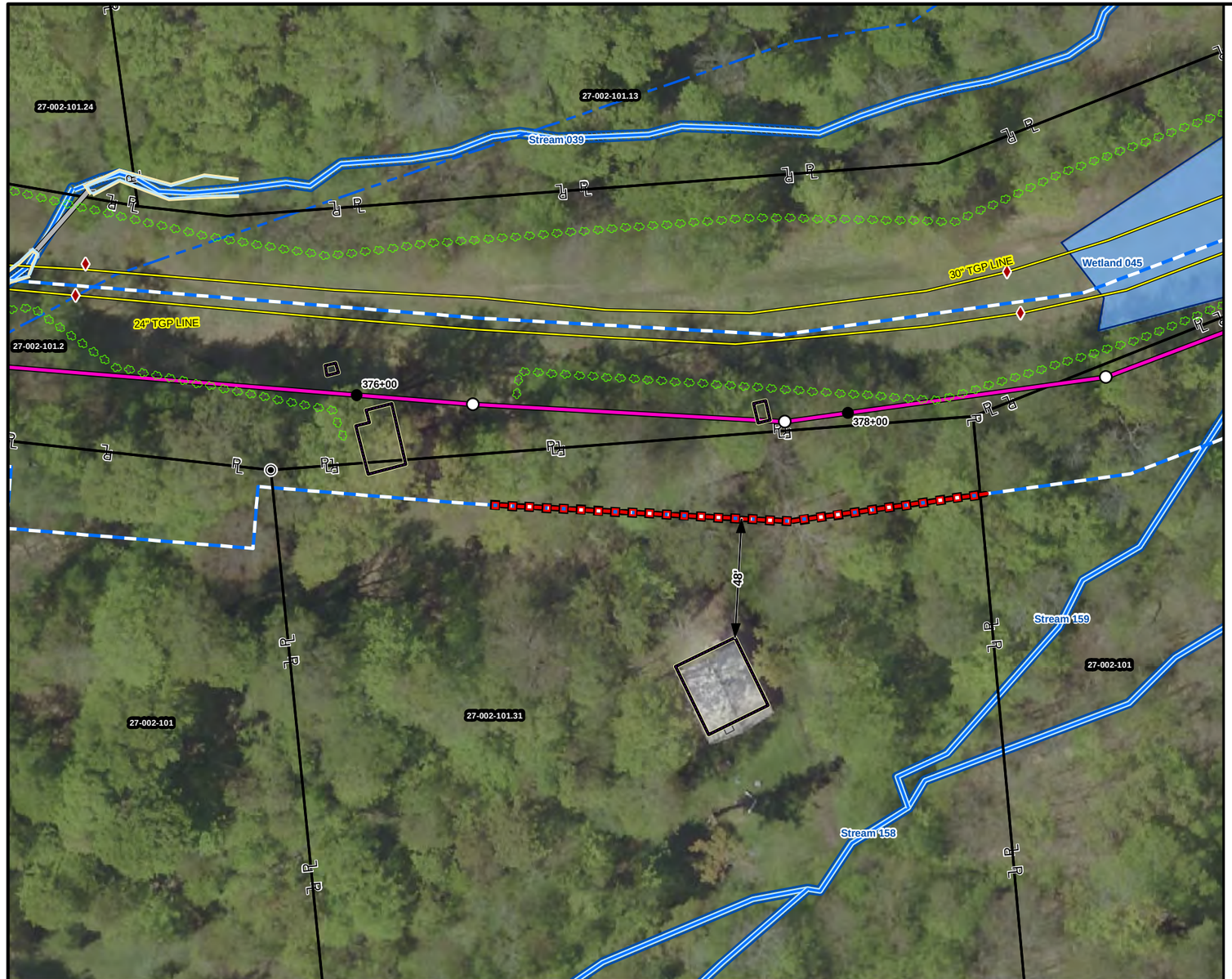
Appendix C

Residential Construction Plans

National Fuel

FM100 Project



DESCRIPTION:

THIS DRAWING DOCUMENTS A RESIDENTIAL BUILDING NEAR THE PROPOSED CONSTRUCTION WORK AREA. CONTRACTOR SHALL COMPLY WITH THE FOLLOWING CONSTRUCTION MITIGATION REQUIREMENTS IN ADDITION TO THOSE LISTED IN THE CONSTRUCTION SPECIFICATIONS.

CONSTRUCTION REQUIREMENTS:

1. ALL PROPOSED CONSTRUCTION WORK AREAS SHALL BE CONFINED TO THE LIMITS SHOWN ON THIS DRAWING.
2. CONTRACTOR SHALL ERECT AND MAINTAIN SAFETY FENCE AS SHOWN ON THIS DRAWING.
3. CONTRACTOR SHALL INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES AS REQUIRED BY APPLICABLE PERMITS AND PROJECT DOCUMENTS TO ENSURE THAT CONSTRUCTION SPOIL IS CONTAINED WITHIN THE APPROVED CONSTRUCTION WORK AREA.
4. VEHICLE ACCESS SHALL BE MAINTAINED TO THE RESIDENCES/BUSINESSES DURING THE CONSTRUCTION PERIOD.
5. TRENCH SHALL NOT BE EXCAVATED UNTIL PIPELINE IS READY FOR INSTALLATION IN THE AREA NEAR THE RESIDENCE SHOWN ON THIS DRAWING. DITCH SHALL BE EXCAVATED AND BACKFILLED IN THE SAME DAY, WHEN PRACTICABLE. ALL OPEN DITCHES SHALL BE BARRICADED/FENCED OFF WHEN CONSTRUCTION ACTIVITIES ARE NOT IN PROGRESS.
6. OTHER EXISTING PHYSICAL FEATURES THAT NEED TO BE PROTECTED WILL BE ENCLOSED IN SAFETY FENCE TO AVOID DISTURBANCE DURING CONSTRUCTION.
7. DISTURBED ITEMS SUCH AS DRIVEWAYS, LAWNS AND LANDSCAPED AREAS SHALL BE RESTORED IMMEDIATELY AFTER FINAL GRADING (WEATHER DEPENDENT) EXCEPT FOR CONTRACTOR TRAVEL LANE.
8. CONTRACTOR SHALL COMPLY WITH ALL LOCAL NOISE ORDINANCES (IF APPLICABLE). WORK WILL ONLY BE DONE DURING DAYLIGHT HOURS.
9. CONTRACTOR SHALL TAKE APPROPRIATE MEANS TO MINIMIZE FUGITIVE DUST FROM CONSTRUCTION ACTIVITIES NEAR RESIDENCES/BUSINESSES.
10. CONTRACTOR TO NOTIFY LANDOWNER PRIOR TO PIPELINE INSTALLATION AND TO COORDINATE LANDOWNER ACCESS DURING CONSTRUCTION

Legend

- PI
- Even_Stations
- Bore Entry/Exit
- Water Well
- Utility Pole
- Line Marker
- Property Corner
- Building
- Culvert
- Drainage Ditch
- Edge of Gravel
- Edge of Pavement
- Edge of Agricultural Field
- Edge of Water
- Fence
- Surveyed Temporary Access Road
- Surveyed Permanent Access Road
- Treeline
- Water Line
- Electric Overhead
- Telephone Overhead
- Guy Wire
- Pipeline - Surveyed
- Slab Top, Deck or Porch
- Proposed Bore
- Proposed Pipeline
- Temporary Construction Barrier Fence
- Ch93 Designated Use Stream
- Delineated Stream
- Limits of Disturbance
- Parcel Boundary
- Wetland

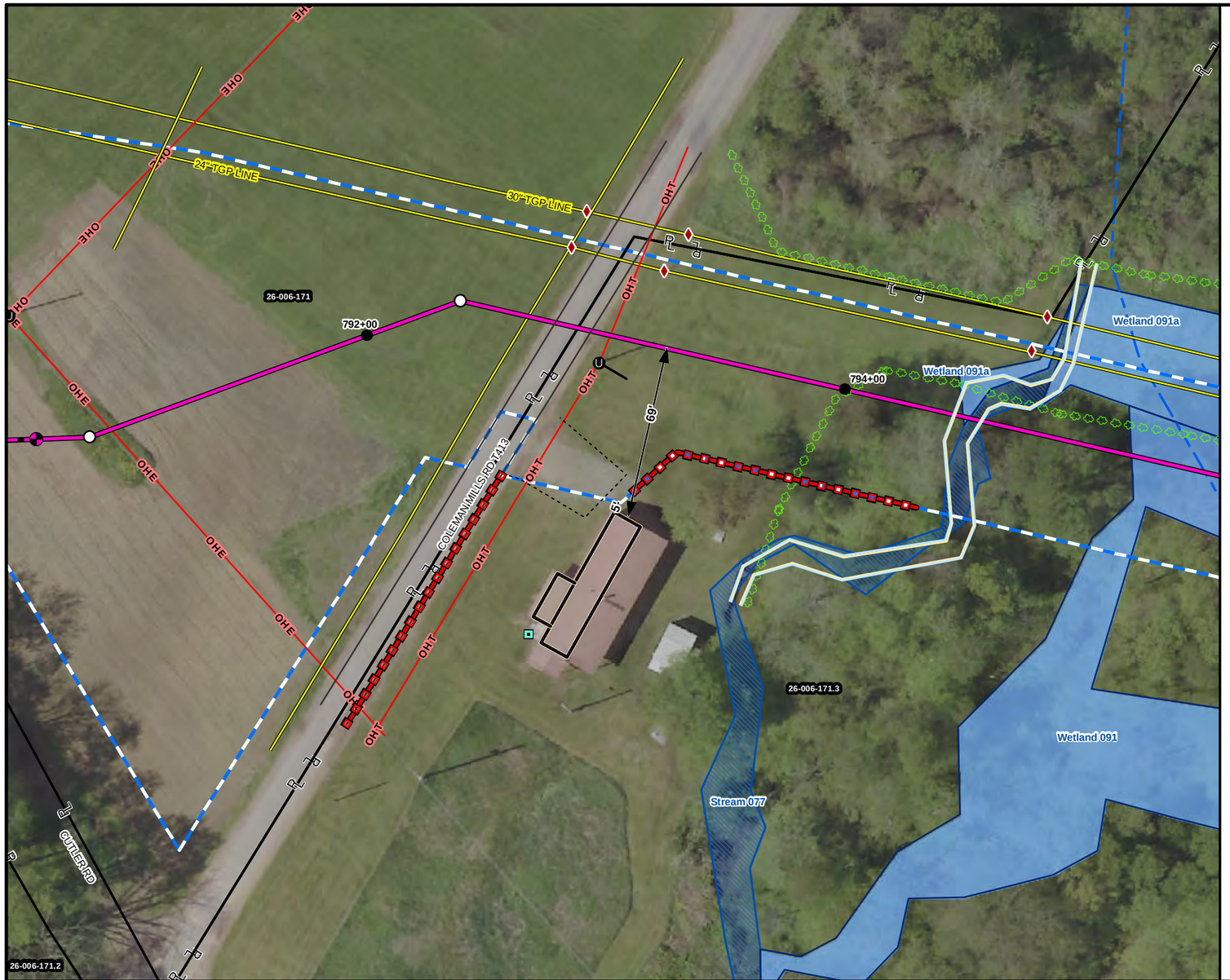
0 50 100 Feet

National Fuel Distribution Corporation

FISHER ASSOCIATES

FM100 Project
STRUCTURE NEAR CONSTRUCTION WORK AREA

Camp
SBL: 27-002-101.31
STA 376+12



DESCRIPTION:

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4. VEHICLE ACCESS SHALL BE MAINTAINED TO THE RESIDENCES/BUSINESSES DURING THE CONSTRUCTION PERIOD.
5. TRENCH SHALL NOT BE EXCAVATED UNTIL PIPELINE IS READY FOR INSTALLATION IN THE AREA NEAR THE RESIDENCE SHOWN ON THIS DRAWING. DITCH SHALL BE EXCAVATED AND BACKFILLED IN THE SAME DAY, WHEN PRACTICABLE. ALL OPEN DITCHES SHALL BE BARRICADED/FENCED OFF WHEN CONSTRUCTION ACTIVITIES ARE NOT IN PROGRESS.
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7. DISTURBED ITEMS SUCH AS DRIVEWAYS, LAWNS AND LANDSCAPED AREAS SHALL BE RESTORED IMMEDIATELY AFTER FINAL GRADING (WEATHER DEPENDENT) EXCEPT FOR CONTRACTOR TRAVEL LANE.
8. CONTRACTOR SHALL COMPLY WITH ALL LOCAL NOISE ORDINANCES (IF APPLICABLE). WORK WILL ONLY BE DONE DURING DAYLIGHT HOURS.
9. CONTRACTOR SHALL TAKE APPROPRIATE MEANS TO MINIMIZE FUGITIVE DUST FROM CONSTRUCTION ACTIVITIES NEAR RESIDENCES/BUSINESSES.
10. CONTRACTOR TO NOTIFY LANDOWNER PRIOR TO PIPELINE INSTALLATION AND TO COORDINATE LANDOWNER ACCESS DURING CONSTRUCTION

Legend

- PI
- Even_Stations
- Bore Entry/Exit
- Water Well
- Utility Pole
- Line Marker
- Property Corner
- Building
- Culvert
- Drainage Ditch
- Edge of Gravel
- Edge of Pavement
- Edge of Agricultural Field
- Edge of Water
- Fence
- Surveyed Temporary Access Road
- Surveyed Permanent Access Road
- Treeline
- Water Line
- Electric Overhead
- Telephone Overhead
- Guy Wire
- Pipeline - Surveyed
- Slab Top, Deck or Porch
- Proposed Bore
- Proposed Pipeline
- Temporary Construction Barrier Fence
- Ch93 Designated Use Stream
- Delineated Stream
- Limits of Disturbance
- Parcel Boundary
- Wetland

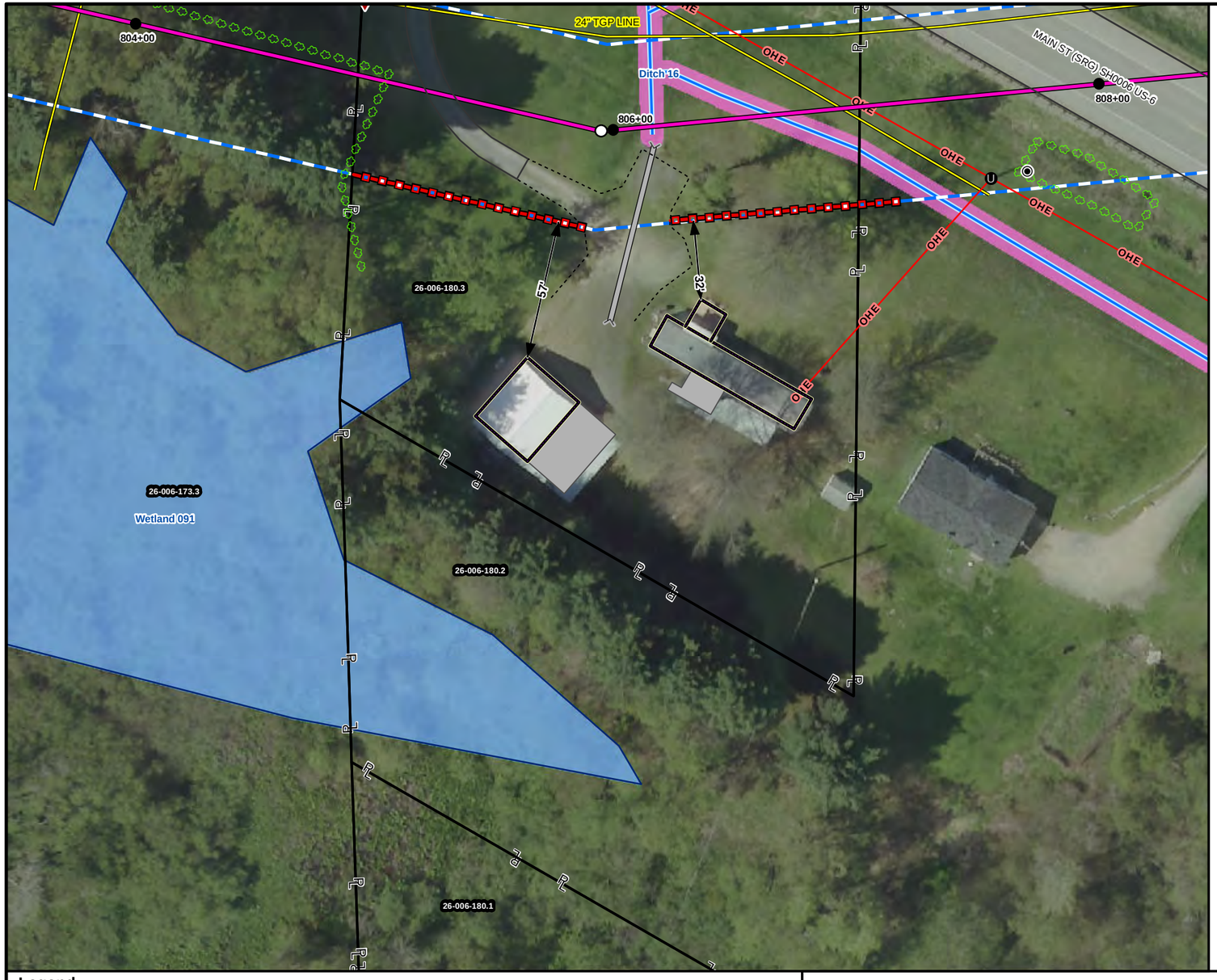
0 50 100 Feet

National Fuel Distribution Corporation

FISHER ASSOCIATES

FM100 Project
STRUCTURE NEAR CONSTRUCTION WORK AREA

Residence
SBL: 26-006-171.3
STA 793+26



DESCRIPTION:

THIS DRAWING DOCUMENTS A RESIDENTIAL BUILDING NEAR THE PROPOSED CONSTRUCTION WORK AREA. CONTRACTOR SHALL COMPLY WITH THE FOLLOWING CONSTRUCTION MITIGATION REQUIREMENTS IN ADDITION TO THOSE LISTED IN THE CONSTRUCTION SPECIFICATIONS.

CONSTRUCTION REQUIREMENTS:

1. ALL PROPOSED CONSTRUCTION WORK AREAS SHALL BE CONFINED TO THE LIMITS SHOWN ON THIS DRAWING.
2. CONTRACTOR SHALL ERECT AND MAINTAIN SAFETY FENCE AS SHOWN ON THIS DRAWING.
3. CONTRACTOR SHALL INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES AS REQUIRED BY APPLICABLE PERMITS AND PROJECT DOCUMENTS TO ENSURE THAT CONSTRUCTION SPOIL IS CONTAINED WITHIN THE APPROVED CONSTRUCTION WORK AREA.
4. VEHICLE ACCESS SHALL BE MAINTAINED TO THE RESIDENCES/BUSINESSES DURING THE CONSTRUCTION PERIOD.
5. TRENCH SHALL NOT BE EXCAVATED UNTIL PIPELINE IS READY FOR INSTALLATION IN THE AREA NEAR THE RESIDENCE SHOWN ON THIS DRAWING. DITCH SHALL BE EXCAVATED AND BACKFILLED IN THE SAME DAY, WHEN PRACTICABLE. ALL OPEN DITCHES SHALL BE BARRICADED/FENCED OFF WHEN CONSTRUCTION ACTIVITIES ARE NOT IN PROGRESS.
6. OTHER EXISTING PHYSICAL FEATURES THAT NEED TO BE PROTECTED WILL BE ENCLOSED IN SAFETY FENCE TO AVOID DISTURBANCE DURING CONSTRUCTION.
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- Ch93 Designated Use Stream
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- Parcel Boundary
- Wetland
- Ditch

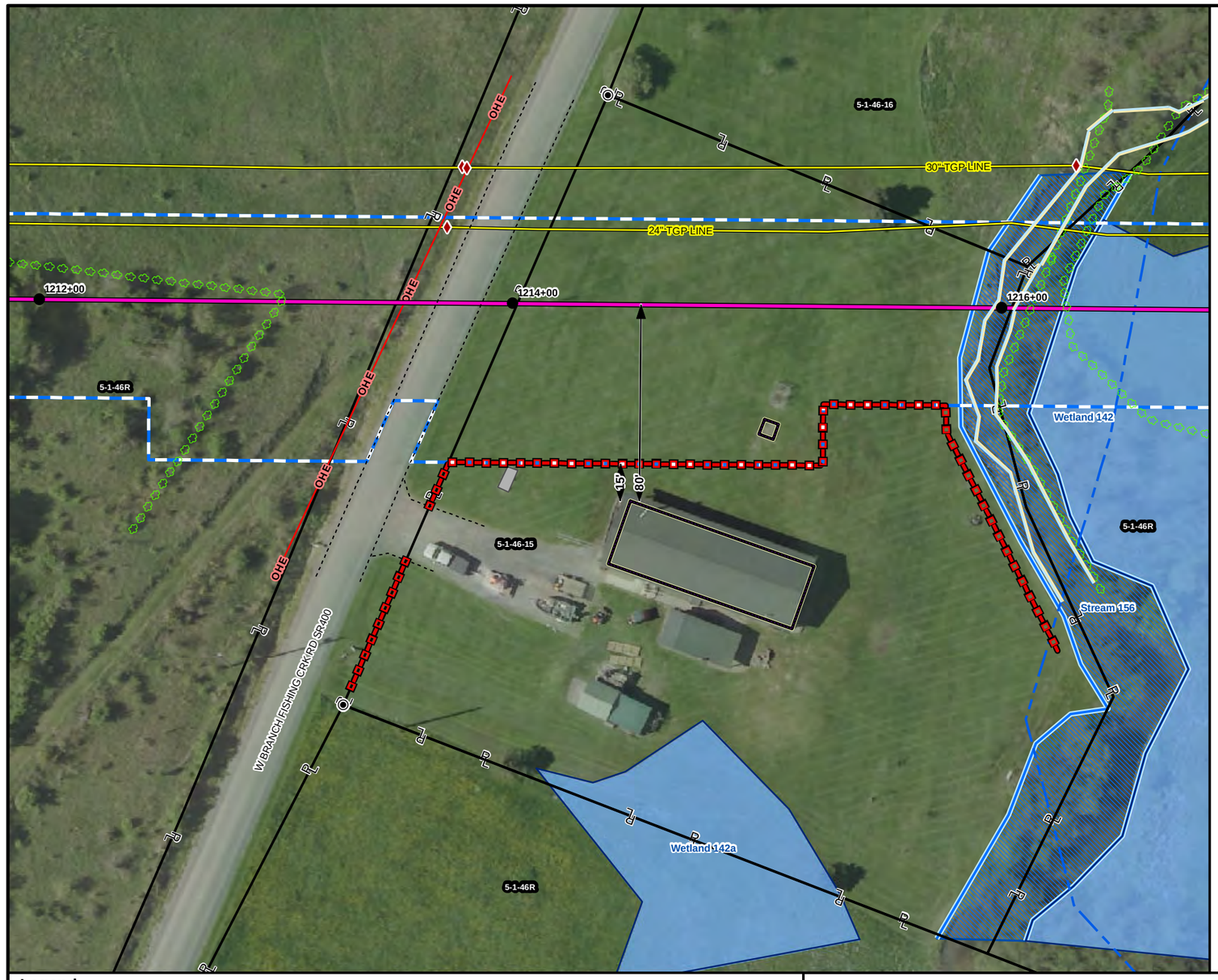
0 50 100 Feet

National Fuel Distribution Corporation

FISHER ASSOCIATES

FM100 Project
STRUCTURE NEAR CONSTRUCTION WORK AREA

Mobile Home
SBL: 26-006-180.3
STA 806+00



DESCRIPTION:

THIS DRAWING DOCUMENTS A RESIDENTIAL BUILDING NEAR THE PROPOSED CONSTRUCTION WORK AREA. CONTRACTOR SHALL COMPLY WITH THE FOLLOWING CONSTRUCTION MITIGATION REQUIREMENTS IN ADDITION TO THOSE LISTED IN THE CONSTRUCTION SPECIFICATIONS.

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1. ALL PROPOSED CONSTRUCTION WORK AREAS SHALL BE CONFINED TO THE LIMITS SHOWN ON THIS DRAWING.
2. CONTRACTOR SHALL ERECT AND MAINTAIN SAFETY FENCE AS SHOWN ON THIS DRAWING.
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- Parcel Boundary
- Wetland

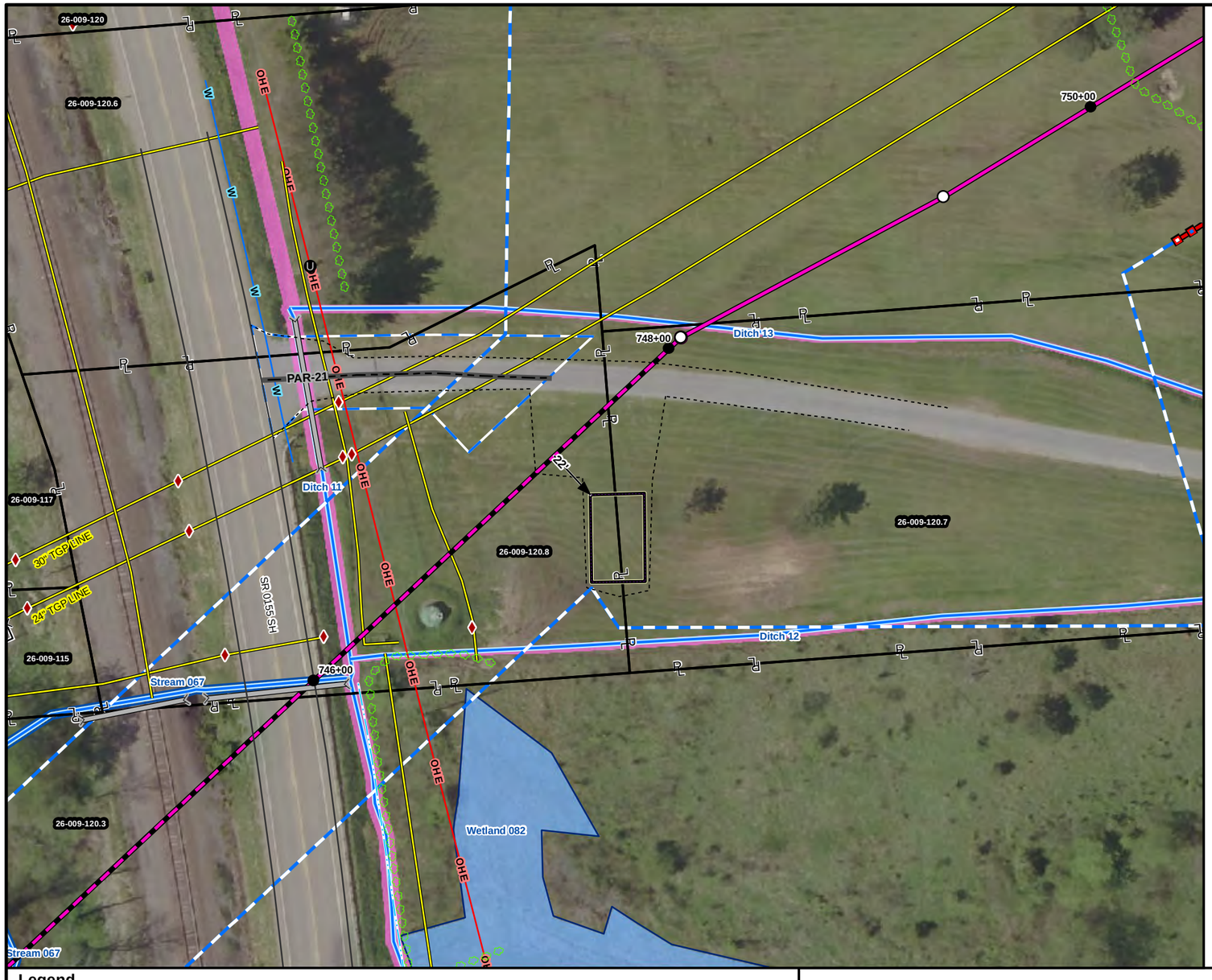
0 50 100 Feet

National Fuel Distribution Corporation

FISHER ASSOCIATES

FM100 Project
STRUCTURE NEAR CONSTRUCTION WORK AREA

Residence
SBL: 5-1-46-15
STA 1214+52



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- Ch93 Designated Use Stream
- Delineated Stream
- Limits of Disturbance
- Parcel Boundary
- Wetland
- Ditch

0 50 100 Feet

National Fuel Distribution Corporation

FISHER ASSOCIATES

FM100 Project
STRUCTURE NEAR CONSTRUCTION WORK AREA

BEAUTY SHOP
SBL: 26-009-120.8
STA 747+34

Transco

Leidy South Project

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC

LEIDY SOUTH PROJECT

PROPOSED 42" BENTON LOOP

RESIDENTIAL CONSTRUCTION PLANS

LYCOMING COUNTY, PENNSYLVANIA

3.48 MILES - M.P. 116.95 TO M.P. 120.44

DATE: JUNE 28, 2019

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC

LEIDY SOUTH PROJECT

PROPOSED 42" BENTON LOOP

FERC TABLE OF CONTENTS

JORDAN TOWNSHIP

GARAGE

LEONARD R. MINIER
BL-PA-LY-0017
CONSTRUCTION METHOD:
W (SEE NOTE 1 SHEET 2 OF 2)

55'

SAF

SAF

SAF

LIMITS OF DISTURBANCE

87'

48'

RESIDENCE

MILE 117.2

SAF

PROPOSED EASEMENT

65'

DRIVEWAY

STATE HIGHWAY 118

EXISTING TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC EASEMENT

25'

47'

26'

PROPOSED 42" BENTON LOOP

EXISTING 24" LEIDY LINE "A"

EXISTING 24" LEIDY LINE "B"

EXISTING 36" LEIDY LINE "C"

50' 0 50'

SCALE IN FEET

DATE OF PHOTOGRAPHY
05/24/2018

COMMONWEALTH OF PENNSYLVANIA
REGISTERED
ROBERT LEAR AGNEW
PE036428
6-28-19

LEGEND

PROPOSED 42" BENTON LOOP	CONSTRUCTION SAFETY FENCE
EXISTING PIPELINES	STREAM CROSSING
FOREIGN PIPELINES	RESIDENTIAL STRUCTURE WITHIN 50' OF CONSTRUCTION
PROPOSED EASEMENT	TREE LINE
EXISTING TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC EASEMENT	OVERHEAD POWER LINE
PROPOSED FENCE	POWER POLE
EXISTING FENCE	
PROPERTY LINE	
LIMITS OF DISTURBANCE	
WETLAND AREA	

SAFETY FENCE LOCATION
0' TYP
LIMITS OF DISTURBANCE
SAF SAF
SAFETY FENCE

THE LOCATION OF THE SAFETY FENCE SHOWN IN THE PLAN IS APPROXIMATE AND ADJUSTED FOR CLARITY. SAFETY FENCES LOCATED NEAR THE LIMITS OF DISTURBANCE SHALL BE INSTALLED AT THE LIMIT LINE AS SHOWN ABOVE

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	05/29/2019	HGA	ISSUED FOR REVIEW	1211227		
B	06/28/2019	HGA	ISSUED FOR FERC FILING	1211227		

DRAWING NO.

REFERENCE TITLE

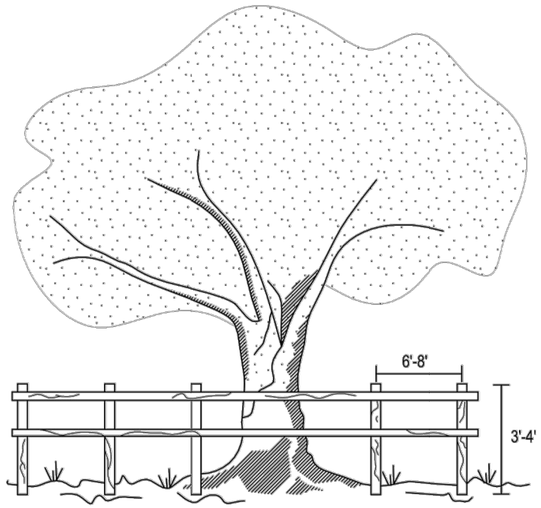
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC.
RESIDENTIAL CONSTRUCTION PLAN
LEIDY SOUTH PROJECT
PROPOSED 42" BENTON LOOP
FOR THE PROPERTY OF TRACT NO. BL-PA-LY-0017
JORDAN TOWNSHIP
LYCOMING COUNTY, PENNSYLVANIA

Williams

DRAWN BY: HGA	DATE: 05/23/2019	ISSUED FOR BID:	SCALE: 1" = 50'		
CHECKED BY: HGA	DATE: 05/23/2019	ISSUED FOR CONSTRUCTION:	REVISION: B		
APPROVED BY: HGA	DATE: 05/23/2019	DRAWING NUMBER: 25-1000-70-06D-D_RCPP/117.19-01	SHEET 01		
WO: 1211227	RID: 02/11/2019	1:17:56 PM JPRESTON 7/1/2019 K:\MAPPING\PA\LEIDY\LOOP0116_18\LAND\RCP\Dwg\25-1000-70-06D-D_RCPP_117.19-01_01.dwg	OF 02		

JORDAN TOWNSHIP

BARRICADE DETAIL
FOR PROTECTED AND GRAND TREES



HORIZONTAL: WOOD MEMBER, ORANGE FENCING,
CHAIN LINK FENCE OR OTHER
APPROVED MATERIAL

VERTICAL: WOOD MEMBER OR APPROVED MATERIAL
BARRICADES PLACED AT DESIGNATED
PROTECTIVE ROOT ZONE.

1. ALL SENSITIVE AREAS SHALL BE PROTECTED AS PER PLAN.
2. WHEN PRACTICABLE, INSTALL HIGH VISIBILITY FENCE 3 FEET OUTSIDE THE DRIP LINE OF THE TREE.
3. SAFETY FENCE SHOULD BE FASTENED SECURELY TO THE POST.
4. THE FENCE MUST REMAIN IN PLACE DURING ALL PHASES OF CONSTRUCTION; ANY CHANGE OF THE PROTECTIVE FENCING MUST BE APPROVED.

NOTES:

1. CONSTRUCTION TECHNIQUES TO BE USED TO MINIMIZE IMPACT TO THIS RESIDENCE ARE DENOTED ON SHEET 1 OF THIS DRAWING. CONSTRUCTION TECHNIQUES INCLUDE REDUCED PIPELINE SEPARATION (N), DRAG SECTION (D), WORKING OVER EXISTING PIPELINE (W), PIPELINE CROSSOVERS (C), REDUCED CONSTRUCTION RIGHT-OF-WAY (R).

2. EXCAVATION OF THE PIPELINE TRENCH WILL NOT BE INITIATED UNTIL THE PIPE IS READY FOR INSTALLATION. THE PIPELINE TRENCH SHALL BE BACKFILLED IMMEDIATELY UPON COMPLETION OF THE PIPELINE INSTALLATION.

3. HOMEOWNER SHALL BE NOTIFIED ONE (1) WEEK PRIOR TO EXCAVATION OF PIPELINE TRENCH.

4. CONSTRUCTION SAFETY PERIMETER FENCING SHALL BE INSTALLED AND MAINTAINED ALONG THE WORK AREA. "SEE LOCATION DETAIL THIS SHEET. REMOVE AFTER RESTORATION IS COMPLETE."

5. ALL FEATURES WITHIN THE CONSTRUCTION WORK AREA OR LIMITS OF DISTURBANCE SHALL BE REMOVED EXCEPT AS NOTED ON THE DRAWING. MATURE TREES AND LANDSCAPING WITHIN THE EDGE OF THE CONSTRUCTION WORK AREA MAY BE SAVED UNLESS NECESSARY TO REMOVE FOR SAFE OPERATION OF CONSTRUCTION EQUIPMENT.

6. CONTRACTOR SHALL MAINTAIN RESIDENTIAL ACCESS AT ALL TIMES. IF APPLICABLE, CONTRACTOR SHALL PROVIDE PRIOR NOTICE TO COMPANY WHEN THE EXISTING DRIVEWAY IS PLANNED TO BE OPEN CUT. COMPANY SHALL THEN NOTIFY THE HOMEOWNER(S). DRIVEWAY ACCESS MAY BE TEMPORARILY CLOSED FOR THE PIPELINE INSTALLATION, STEEL PLATES SHALL BE USED ACROSS THE OPEN TRENCH IF NOT BACKFILLED DURING SAME WORK DAY.

7. THIS PROPERTY
   (DOES) (DOES NOT) HAVE A SEPTIC SYSTEM
   (DOES) (DOES NOT) HAVE A WATER WELL

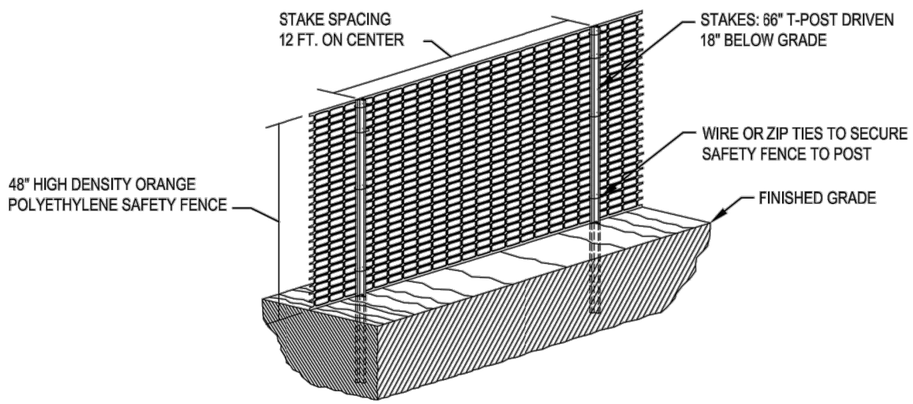
☐ ☐
☐ _____
☐ _____
☐ _____

8. A MOBILE WATER TRUCK WILL BE USED TO CONTROL DUST ON THE R.O.W. AS NEEDED.

9. TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC IS OFFERING PRE-CONSTRUCTION AND POST-CONSTRUCTION MONITORING PROGRAM. THE HOMEOWNER:

☐ ACCEPTS ☐ DECLINES TO PARTICIPATE

SAFETY FENCE



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC.
RESIDENTIAL CONSTRUCTION PLAN
LEIDY SOUTH PROJECT
PROPOSED 42" BENTON LOOP
FOR THE PROPERTY OF TRACT NO. BL-PA-LY-0017
JORDAN TOWNSHIP
LYCOMING COUNTY, PENNSYLVANIA

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	05/29/2019	HGA	ISSUED FOR REVIEW	1211227		
B	06/28/2019	HGA	ISSUED FOR FERC FILING	1211227		

DRAWN BY: HGA	DATE: 05/23/2019	ISSUED FOR BID:	SCALE: N.T.S.
CHECKED BY: HGA	DATE: 05/24/2019	ISSUED FOR CONSTRUCTION:	REVISION: B
APPROVED BY: HGA	DATE: 05/24/2019	DRAWING NUMBER: 25-1000-70-06D-D_RCPP/117.19-01	SHEET 02
WO: 1211227	RID: 02/11/2019	1:19:39 PM JPRESTON 7/1/2019 K:\MAPPING\PA\LEIDY\LOOP\0116_18\LAND\RCP\Dwg\25-1000-70-06D-D_RCPP_117.19-01_02.dwg	OF 02

HGA
HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

JORDAN TOWNSHIP

WETLAND W11-T6 (PFO)

WETLAND W10-T6 (PEM)

WETLAND W8-T6 (PEM)

WETLAND W9-T6 (PEM)

WETLAND W12-T6 (PEM)

STREAM S5-T6

STREAM S3-T6

BOUDMAN ROAD / T-750

N WOODS ROAD / T-748

EXISTING TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC EASEMENT

EXISTING 24" LEIDY LINE "A"

EXISTING 24" LEIDY LINE "B"

EXISTING 36" LEIDY LINE "C"

MILE 118.0

47'

25'

25'

PROPOSED 42" BENTON LOOP

PROPOSED EASEMENT

60'

85'

45'

45'

SAF

LIMITS OF DISTURBANCE

RESIDENCE

STREAM S5-T6

KURVIN SCHRUM
BL-PA-LY-0027
CONSTRUCTION METHOD:
W (SEE NOTE 1 SHEET 2 OF 2)

50' 0 50'
SCALE IN FEET

DATE OF PHOTOGRAPHY
05/24/2018

COMMONWEALTH OF PENNSYLVANIA
REGISTERED
ROBERT L. HAR AGENT JR.
PE038429
6-28-19

LEGEND

PROPOSED 42" BENTON LOOP	CONSTRUCTION SAFETY FENCE
EXISTING PIPELINES	STREAM CROSSING
FOREIGN PIPELINES	RESIDENTIAL STRUCTURE WITHIN 50' OF CONSTRUCTION
PROPOSED EASEMENT	TREE LINE
EXISTING TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC EASEMENT	OVERHEAD POWER LINE
PROPOSED FENCE	POWER POLE
EXISTING FENCE	
PROPERTY LINE	
LIMITS OF DISTURBANCE	
WETLAND AREA	

SAFETY FENCE LOCATION
0'TYP
LIMITS OF DISTURBANCE
SAF SAF
SAFETY FENCE

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HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
A	05/29/2019	HGA	ISSUED FOR REVIEW	1211227		
B	06/28/2019	HGA	ISSUED FOR FERC FILING	1211227		

DRAWING NO.

REFERENCE TITLE

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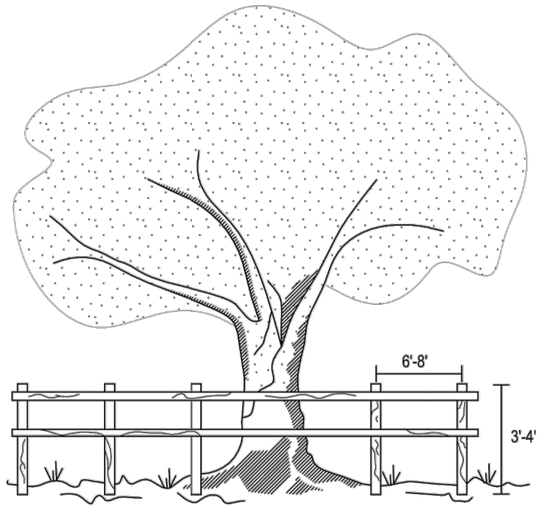
LEIDY SOUTH PROJECT
PROPOSED 42" BENTON LOOP
FOR THE PROPERTY OF TRACT NO. BL-PA-LY-0027
JORDAN TOWNSHIP
LYCOMING COUNTY, PENNSYLVANIA

Williams

DRAWN BY: HGA	DATE: 05/23/2019	ISSUED FOR BID:	SCALE: 1" = 50'		
CHECKED BY: HGA	DATE: 05/23/2019	ISSUED FOR CONSTRUCTION:	REVISION: B		
APPROVED BY: HGA	DATE: 05/23/2019	DRAWING NUMBER: 25-1000-70-06D-D_RCPP/118.06-01	SHEET 01		
WO: 1211227	RID: 02/11/2019	1:20:16 PM JPRESTON 7/1/2019 K:\MAPPING\PA\LEIDY\LOOP\0116_18\LAND\RCP\Dwg\25-1000-70-06D-D_RCPP_118.06-01_01.dwg	OF 02		

JORDAN TOWNSHIP

BARRICADE DETAIL
FOR PROTECTED AND GRAND TREES



HORIZONTAL: WOOD MEMBER, ORANGE FENCING,
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   (DOES) (DOES NOT) HAVE A SEPTIC SYSTEM
   (DOES) (DOES NOT) HAVE A WATER WELL

☐ ☐
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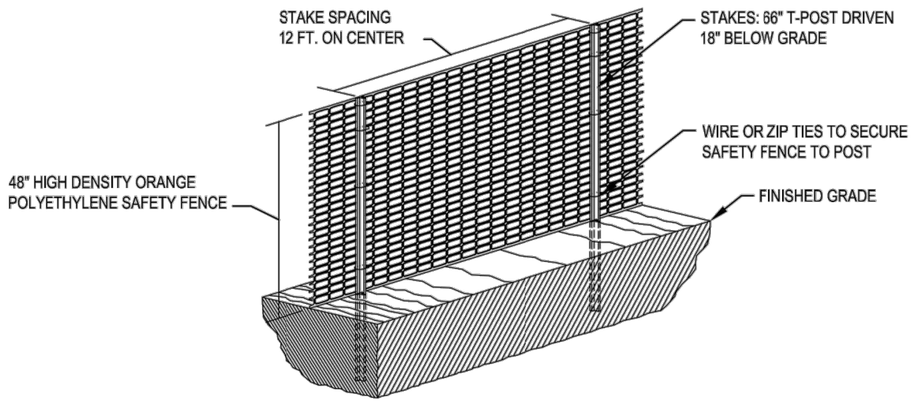
☐ ACCEPTS ☐ DECLINES TO PARTICIPATE

SAFETY FENCE



DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC.
RESIDENTIAL CONSTRUCTION PLAN
LEIDY SOUTH PROJECT
PROPOSED 42" BENTON LOOP
FOR THE PROPERTY OF TRACT NO. BL-PA-LY-0027
JORDAN TOWNSHIP
LYCOMING COUNTY, PENNSYLVANIA

Williams

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HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC

LEIDY SOUTH PROJECT

PROPOSED 36" HILLTOP LOOP

RESIDENTIAL CONSTRUCTION PLANS

CLINTON COUNTY, PENNSYLVANIA

2.41 MILES - M.P. 183.55 TO M.P. 186.01

DATE: JUNE 28, 2019

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC

LEIDY SOUTH PROJECT

PROPOSED 36" HILLTOP LOOP

FERC TABLE OF CONTENTS

CHAPMAN TOWNSHIP

EXISTING TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC EASEMENT

EXISTING 30" LEIDY LINE "C"

EXISTING 24" LEIDY LINE "B"

EXISTING 24" LEIDY LINE "A"

MILE 185.1

MILE 185.0

LIMITS OF DISTURBANCE

24'

46'

25'

WETLAND W2-T4-HL (PEM)

38'

95'

PROPOSED EASEMENT

PROPOSED 36" HILLTOP LOOP

GARAGE

STREAM S1-T4-HL

YOUNGWOMANS CREEK

SAF

STREAM S7-T2-HL

WETLAND W5-T2-HL (PFO)

GARAGE

33'

LIMITS OF DISTURBANCE

RESIDENCE

ANDREW J. GAVLOCK
HL-PA-CL-0005
CONSTRUCTION METHOD:
W (SEE NOTE 1 SHEET 2 OF 2)

STREAM S8-T2-HL

POND W6-T2-HL (POW)

WETLAND W3-T2-HL (PEM)

50' 0 50'
SCALE IN FEET

DATE OF PHOTOGRAPHY
05/24/2018

COMMONWEALTH OF PENNSYLVANIA
REGISTERED
ROBERT LAMAR ARGENTIERI
PE039428
6-28-19

LEGEND

- PROPOSED 36" HILLTOP LOOP
- EXISTING PIPELINES
- FOREIGN PIPELINES
- PROPOSED EASEMENT
- EXISTING TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC EASEMENT
- PROPOSED FENCE
- EXISTING FENCE
- PROPERTY LINE
- LIMITS OF DISTURBANCE
- WETLAND AREA
- CONSTRUCTION SAFETY FENCE
- STREAM CROSSING
- RESIDENTIAL STRUCTURE WITHIN 50' OF CONSTRUCTION
- TREE LINE
- OVERHEAD POWER LINE
- POWER POLE

SAFETY FENCE LOCATION

0' TYP — LIMITS OF DISTURBANCE — SAF SAF — SAFETY FENCE

THE LOCATION OF THE SAFETY FENCE SHOWN IN THE PLAN IS APPROXIMATE AND ADJUSTED FOR CLARITY. SAFETY FENCES LOCATED NEAR THE LIMITS OF DISTURBANCE SHALL BE INSTALLED AT THE LIMIT LINE AS SHOWN ABOVE

HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

DRAWING NO.	REFERENCE TITLE

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LEIDY SOUTH PROJECT
PROPOSED 36" HILLTOP LOOP
FOR THE PROPERTY OF TRACT NO. HL-PA-CL-0005
CHAPMAN TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

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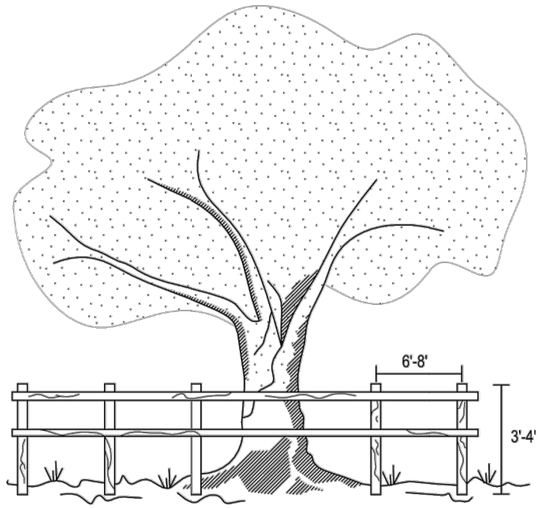
CHAPMAN TOWNSHIP

BARRICADE DETAIL
FOR PROTECTED AND GRAND TREES



HORIZONTAL: WOOD MEMBER, ORANGE FENCING,
CHAIN LINK FENCE OR OTHER
APPROVED MATERIAL

VERTICAL: WOOD MEMBER OR APPROVED MATERIAL
BARRICADES PLACED AT DESIGNATED
PROTECTIVE ROOT ZONE.

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2. WHEN PRACTICABLE, INSTALL HIGH VISIBILITY FENCE 3 FEET OUTSIDE THE DRIP LINE OF THE TREE.
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NOTES:

1. CONSTRUCTION TECHNIQUES TO BE USED TO MINIMIZE IMPACT TO THIS RESIDENCE ARE DENOTED ON SHEET 1 OF THIS DRAWING. CONSTRUCTION TECHNIQUES INCLUDE REDUCED PIPELINE SEPARATION (N), DRAG SECTION (D), WORKING OVER EXISTING PIPELINE (W), PIPELINE CROSSOVERS (C), REDUCED CONSTRUCTION RIGHT-OF-WAY (R).

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3. HOMEOWNER SHALL BE NOTIFIED ONE (1) WEEK PRIOR TO EXCAVATION OF PIPELINE TRENCH.

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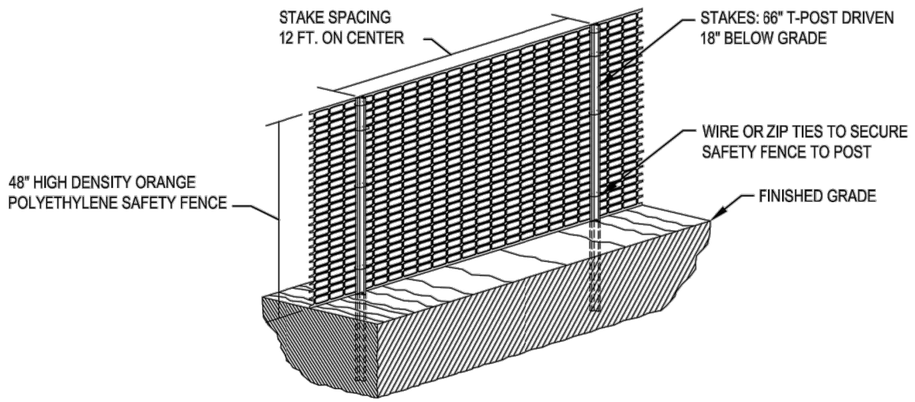

COMMONWEALTH OF PENNSYLVANIA
REGISTERED
ROBERT LEAR AGENT JR
PE038429
6-28-19

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC.
RESIDENTIAL CONSTRUCTION PLAN
LEIDY SOUTH PROJECT
PROPOSED 36" HILLTOP LOOP
FOR THE PROPERTY OF TRACT NO. HL-PA-CL-0005
CHAPMAN TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

Williams

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HGA
HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

CHAPMAN TOWNSHIP

WETLAND
W11-T5-HL
(PEM)

TEMPORARY
ACCESS ROAD
(AR-185.7-N)

EXISTING 24" LEIDY LINE "B"

EXISTING 24" LEIDY LINE "A"

LIMITS OF DISTURBANCE

MILE
185.8

WETLAND
W12-T5-HL
(PEM)

25'

60'

105'

45'

72'

SAF

EXISTING 30" LEIDY LINE "C"

PROPOSED EASEMENT

EXISTING
TRANSCONTINENTAL
GAS PIPE LINE COMPANY,
LLC EASEMENT

EXISTING
EDGE OF ROAD

PROPOSED 36" HILLTOP LOOP

RESIDENCE

LIMITS OF DISTURBANCE

POST HOLLOW LLC
HL-PA-CL-0017
CONSTRUCTION METHOD:
W & C (SEE NOTE 1 SHEET 2 OF 2)

50' 0 50'
SCALE IN FEET

DATE OF PHOTOGRAPHY
05/24/2018

COMMONWEALTH OF PENNSYLVANIA
REGISTERED
ROBERT LAMAR AUGHTMAN
PE038429
6-28-19

LEGEND

PROPOSED 36" HILLTOP LOOP	CONSTRUCTION SAFETY FENCE
EXISTING PIPELINES	STREAM CROSSING
FOREIGN PIPELINES	RESIDENTIAL STRUCTURE WITHIN 50' OF CONSTRUCTION
PROPOSED EASEMENT	TREE LINE
EXISTING TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC EASEMENT	OVERHEAD POWER LINE
PROPOSED FENCE	POWER POLE
EXISTING FENCE	
PROPERTY LINE	
LIMITS OF DISTURBANCE	
WETLAND AREA	

SAFETY FENCE LOCATION
0' TYP
LIMITS OF DISTURBANCE
SAF SAF
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CHAPMAN TOWNSHIP

BARRICADE DETAIL
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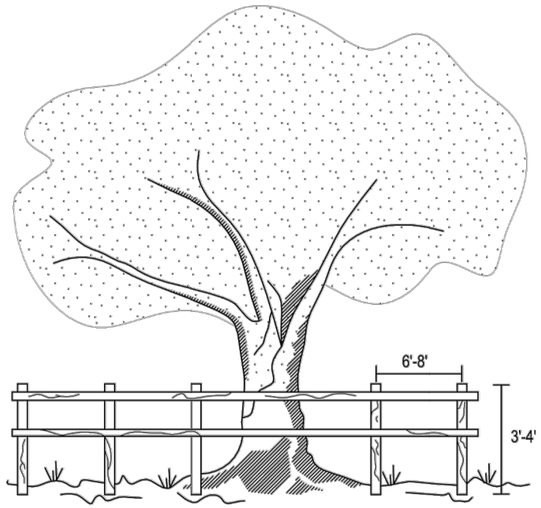

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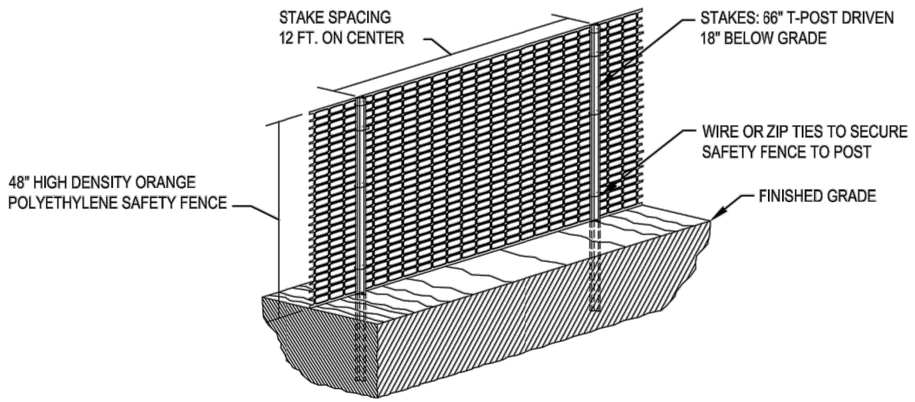
SAFETY FENCE



COMMONWEALTH OF PENNSYLVANIA
REGISTERED
ROBERT LEAR AGENT JR
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6-28-19

DRAWING NO.	REFERENCE TITLE

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RESIDENTIAL CONSTRUCTION PLAN
LEIDY SOUTH PROJECT
PROPOSED 36" HILLTOP LOOP
FOR THE PROPERTY OF TRACT NO. HL-PA-CL-0017
CHAPMAN TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

Williams

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HGA
HUNT, GUILLOT & ASSOCIATES, LLC
ONE METROPLEX DRIVE, SUITE 100
BIRMINGHAM, AL 35209
PHONE: 205-970-4977

Appendix D

Waterbodies Crossed by the FM100 Project and Leidy South Project

APPENDIX D

Waterbodies Crossed by the FM100 Project and Leidy South Project

Waterbody Name	Milepost [a]	Crossing Width (feet) [b]	Flow Type	FERC Classification [c]	Fishery Class / Sensitivity [d]	Timing Restriction [e,f]	Proposed Crossing Method
FM100 PROJECT							
Line YM58							
Unnamed Tributary to Wernway Hollow	0.9	3.0	Intermittent	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Wernway Hollow	1.2	4.0	Perennial	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Wernway Hollow	1.4	6.5	Perennial	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Wernway Hollow	1.5	3.0	Intermittent	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Wernway Hollow	1.6	6.5	Intermittent	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Wernway Hollow	1.6	1.0	Intermittent	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Wernway Hollow	1.8	3.0	Intermittent	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Browns Mill Hollow Run	2.2	2.5	Intermittent	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Browns Mill Hollow Run	2.2	2.5	Intermittent	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Robbins Brook	3.0	3.0	Intermittent	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Robbins Brook	3.3	3.0	Perennial	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Robbins Brook	3.4	27.0	Perennial	Intermediate	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Donley Fork	3.6	7.0	Perennial	Minor	HQ-CWF	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Robbins Brook	4.2	3.0	Intermittent	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Robbins Brook	4.9	3.0	Ephemeral	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Potato Creek	6.6	26.2	Perennial	Intermediate	TSF	10/01 – 12/31	Dam and Pump/Flume
Potato Creek	6.8	205.2	Perennial	Major	TSF	None	HDD
Unnamed Tributary to Potato Creek	7.1	5.0	Perennial	Minor	TSF	3/1 – 6/15	Dam and Pump/Flume
Unnamed Tributary to Potato Creek	7.1	4.0	Intermittent	Minor	CWF	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Potato Creek	7.2	30.0	Ephemeral	Intermediate	CWF	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Walcott Brook	7.9	3.0	Ephemeral	Minor	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Walcott Brook	7.9	9.4	Perennial	Minor	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Walcott Brook	8.0	16.7	Perennial	Intermediate	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Coalbed Hollow	10.4	8.5	Perennial	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Bemis Hollow	11.2	5.0	Ephemeral	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Bemis Hollow	11.2	20.2	Perennial	Intermediate	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Bemis Hollow	11.3	3.0	Perennial	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Allegheny Portage Creek	13.6	3.0	Ephemeral	Minor	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Allegheny Portage Creek	14.1	129.3	Perennial	Major	WTS/TSF	None	HDD
Unnamed Tributary to Allegheny Portage Creek	14.1	3.0	Intermittent	Minor	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Allegheny Portage Creek	14.2	6.5	Ephemeral	Minor	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Allegheny Portage Creek	14.3	6.5	Intermittent	Minor	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Allegheny River	14.5	3.0	Ephemeral	Minor	CWF	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Allegheny River	14.6	3.0	Ephemeral	Minor	CWF	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Allegheny River	14.7	3.0	Ephemeral	Minor	CWF	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Allegheny River	14.7	2.0	Intermittent	Minor	CWF	10/01 – 5/31	Dam and Pump/Flume

APPENDIX D

Waterbodies Crossed by the FM100 Project and Leidy South Project

Waterbody Name	Milepost [a]	Crossing Width (feet) [b]	Flow Type	FERC Classification [c]	Fishery Class / Sensitivity [d]	Timing Restriction [e,f]	Proposed Crossing Method
Allegheny River	14.8	169.6	Perennial	Major	CWF	None	HDD
Unnamed Tributary to Benson Hollow	15.0	17.8	Perennial	Intermediate	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Allegheny River	15.4	3.5	Intermittent	Minor	CWF	10/01 – 5/31	Dam and Pump/Flume
Coleman Creek	15.7	16.2	Intermittent	Intermediate	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Jordan Hollow	18.1	3.0	Intermittent	Minor	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Jordan Hollow	18.1	3.0	Intermittent	Minor	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Jordan Hollow	18.1	1.0	Intermittent	Minor	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Jordan Hollow	18.1	18.1	Perennial	Intermediate	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Ernst Hollow	18.9	37.7	Perennial	Intermediate	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Sartwell Creek	19.1	28.0	Intermittent	Intermediate	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Sartwell Creek	19.2	28.5	Perennial	Intermediate	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Sartwell Creek	19.6	33.0	Perennial	Intermediate	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Sartwell Creek	19.7	6.0	Ephemeral	Minor	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Baker Hollow	21.8	21.5	Perennial	Intermediate	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Fishing Creek	23.0	37.4	Perennial	Intermediate	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to East Branch Fishing Creek	25.0	3.0	Intermittent	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
East Branch Fishing Creek	26.7	3.0	Intermittent	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Whitney Creek	27.4	3.0	Ephemeral	Minor	EV, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Whitney Creek	27.8	3.0	Ephemeral	Minor	EV, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Whitney Creek	28.7	4.0	Ephemeral	Minor	EV, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Line YM58 Access Roads							
Unnamed Tributary to Red Mill Brook	PAR-3	3.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Red Mill Brook	PAR-3	3.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Red Mill Brook	PAR-3	3.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Red Mill Brook	PAR-3	3.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Red Mill Brook	TAR-4	3.0	Ephemeral	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Irons Hollow	PAR-5	3.0	Ephemeral	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Irons Hollow	PAR-5	3.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Irons Hollow	PAR-5	3.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Irons Hollow	PAR-5	1.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Irons Hollow	PAR-5	3.5	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Irons Hollow	PAR-5	3.5	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Robbins Brook	TAR-6	3.0	Ephemeral	Minor	HQ-CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Robbins Brook	TAR-6	3.0	Intermittent	Minor	HQ-CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Robbins Brook	TAR-6	3.0	Intermittent	Minor	HQ-CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Robbins Brook	TAR-6	3.0	Intermittent	Minor	HQ-CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Robbins Brook	TAR-6	3.0	Intermittent	Minor	HQ-CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Robbins Brook	TAR-6	3.0	Intermittent	Minor	HQ-CWF, WTW/NRT	None	N/A - Existing Road

APPENDIX D

Waterbodies Crossed by the FM100 Project and Leidy South Project

Waterbody Name	Milepost [a]	Crossing Width (feet) [b]	Flow Type	FERC Classification [c]	Fishery Class / Sensitivity [d]	Timing Restriction [e,f]	Proposed Crossing Method
Unnamed Tributary to Walcott Brook	TAR-10	3.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Walcott Brook	PAR-12	3.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Walcott Brook	TAR-10	3.0	Ephemeral	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Walcott Brook	PAR-12	3.0	Ephemeral	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Walcott Brook	PAR-12	9.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Walcott Brook	PAR-12	1.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Walcott Brook	PAR-12	3.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Walcott Brook	PAR-12	3.0	Ephemeral	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Ditch	PAR-12	2.5	Ditch	Minor	N/A	None	N/A – Existing Road
Unnamed Tributary to Walcott Brook	TAR-13	3.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Walcott Brook	TAR-13	6.5	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Walcott Brook	TAR-13	2.5	Ephemeral	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Bemis Hollow	PAR-14	3.0	Ephemeral	Minor	HQ-CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Bemis Hollow	PAR-14	3.0	Ephemeral	Minor	HQ-CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Bemis Hollow	PAR-14	6.5	Perennial	Minor	HQ-CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Bemis Hollow	PAR-14	3.0	Ephemeral	Minor	HQ-CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Bemis Hollow	PAR-14	3.0	Perennial	Minor	HQ-CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Bemis Hollow	PAR-14	3.0	Intermittent	Minor	HQ-CWF, WTW/NRT	None	N/A - Existing Road
Bemis Hollow	PAR-14	6.5	Perennial	Minor	HQ-CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Bemis Hollow	PAR-14	3.0	Intermittent	Minor	HQ-CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Bemis Hollow	PAR-14	3.0	Intermittent	Minor	HQ-CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Benson Hollow	PAR-25	3.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Benson Hollow	PAR-25	10.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Coleman Creek	PAR-25	10.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Coleman Creek	PAR-25	3.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Coleman Creek	PAR-25	3.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Coleman Creek	PAR-25	3.0	Ephemeral	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Coleman Creek	PAR-25	3.0	Ephemeral	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Coleman Creek	PAR-25	3.0	Ephemeral	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Coleman Creek	TAR-28	3.0	Ephemeral	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Jordan Hollow	TAR-26	3.0	Ephemeral	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Jordan Hollow	TAR-26	3.0	Ephemeral	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Jordan Hollow	TAR-26	3.0	Ephemeral	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Potato Creek	SA-7	7.0	Ephemeral	Minor	CWF, WTW/NRT	10/01 – 5/31	Temporary bridge
Unnamed Tributary to Fishing Creek	PAR-31	13.5	Perennial	Intermediate	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Fishing Creek	PAR-31	1.5	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Fishing Creek	PAR-31	1.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Ditch	PAR-14	3.0	Ditch	Minor	N/A	None	N/A - Existing Road

APPENDIX D

Waterbodies Crossed by the FM100 Project and Leidy South Project

Waterbody Name	Milepost [a]	Crossing Width (feet) [b]	Flow Type	FERC Classification [c]	Fishery Class / Sensitivity [d]	Timing Restriction [e,f]	Proposed Crossing Method
Unnamed Ditch	TAR-11	3.0	Ditch	Minor	N/A	None	N/A - Existing Road
Unnamed Tributary to Fishing Creek	PAR-33	3.0	Intermittent	Minor	CWF, WTW/NRT	None	N/A - Existing Road
Marvindale Compressor Station Access Roads							
Unnamed Tributary to Warner Brook	PAR-31	4.0	Intermittent	Minor	HQ-CWF, WTW/NRT	None	N/A - Existing Road
Unnamed Tributary to Warner Brook	PAR-31	4.0	Intermittent	Minor	HQ-CWF, WTW/NRT	None	N/A - Existing Road
Line FM100 Abandonment							
Unnamed Tributary to Bennett Branch Sinnemahoning Creek	0.0	3.0	Intermittent	Minor	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Bennett Branch Sinnemahoning Creek	0.2	65.2	Perennial	Intermediate	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Bennett Branch Sinnemahoning Creek	0.4	3.0	Ephemeral	Minor	CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Laurel Run	4.8	21.0	Intermittent	Intermediate	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Unnamed Tributary to Medix Run	7.9	4.0	Intermittent	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
Medix Run	7.9	1.0	Perennial	Minor	HQ-CWF, WTW/NRT	10/01 – 5/31	Dam and Pump/Flume
LEIDY SOUTH PROJECT							
Hensel Replacement							
Dark Hollow	189.1	20.6	Perennial	Intermittent	EV, MF/WTW	10/1 – 12/31	Dry open cut with dam and pump or flume
Unnamed Tributary to Paddy Run	190.4	6.0	Perennial	Minor	EV, MF/WTW	10/1 – 12/31	Dry open cut with dam and pump or flume
Paddy Run	190.5	30.6	Perennial	Intermittent	EV, MF/WTW	10/1 – 12/31	Dry open cut with dam and pump or flume
Hensel Fork	190.7	39.3	Perennial	Intermittent	EV, MF/WTW	10/1 – 12/31	Dry open cut with dam and pump or flume
Hensel Fork	191.0	20.4	Perennial	Intermittent	EV, MF/WTW	10/1 – 12/31	Dry open cut with dam and pump or flume
Unnamed Tributary to Drury Run	193.1	N/A	Intermittent	-	EV, MF/WTW	-	N/A
Drury Run	193.1	52.2	Perennial	Intermittent	EV, MF/WTW	10/1 – 12/31	Dry open cut with dam and pump or flume
Drury Run	AR-192.7	N/A	Perennial	-	EV, MF/WTW	-	N/A – existing bridge/culvert
Unnamed Tributary to Drury Run	193.9	4.9	Ephemeral	Minor	EV, MF/WTW	10/1 – 12/31	Dry open cut with dam and pump or flume
Hilltop Loop							
Young Womans Creek	185.0	99.8	Perennial	Major	HQ-CWF, MF/WTW/TSF	10/1 -12/31; 3/1 - 6/15	Cofferdam/ Dam and pump
Unnamed Tributary to Young Womans Creek	AR-185.2-S	N/A	Ephemeral	-	HQ-CWF, MF/WTW/TSF	-	N/A – existing culvert
Unnamed Tributary to Young Womans Creek	AR-185.7-S	N/A	Intermittent	-	HQ-CWF, MF/WTW/TSF	-	N/A – existing culvert
Unnamed Tributary to Young Womans Creek	AR-185.7-S	N/A	Intermittent	-	HQ-CWF, MF/WTW/TSF	-	N/A – existing culvert
Unnamed Tributary to Skunk Hollow	AR-185.7-S	N/A	Intermittent	-	HQ-CWF, MF/WTW	-	N/A – existing culvert

APPENDIX D

Waterbodies Crossed by the FM100 Project and Leidy South Project

Waterbody Name	Milepost [a]	Crossing Width (feet) [b]	Flow Type	FERC Classification [c]	Fishery Class / Sensitivity [d]	Timing Restriction [e,f]	Proposed Crossing Method
Benton Loop							
Unnamed Tributary to Little Muncy Creek	117.8	11.6	Ephemeral	Intermittent	EV, CWF, MF/WTW	10/1 – 12/31	Dry open cut with dam and pump or flume
Unnamed Tributary to Little Muncy Creek	118.1	3.3	Ephemeral	Minor	EV, CWF, MF/WTW	10/1 – 12/31	Dry open cut with dam and pump or flume
Unnamed Tributary to Little Muncy Creek	118.2	7.7	Perennial	Minor	EV, CWF, MF/WTW	10/1 – 12/31	Dry open cut with dam and pump or flume
Little Muncy Creek	118.8	17.8	Perennial	Intermittent	EV, CWF, MF/WTW	10/1 – 12/31	Dry open cut with dam and pump or flume
Unnamed Tributary to Little Muncy Creek	118.8	2.0	Intermittent	Minor	EV, CWF, MF/WTW	10/1 – 12/31	Dry open cut with dam and pump or flume
Buck Run	119.2	11.8	Perennial	Intermittent	EV, CWF, MF/WTW	10/1 – 12/31	Dry open cut with dam and pump or flume
Unnamed Tributary to Little Muncy Creek	119.6	7.7	Perennial	Minor	EV, CWF, MF/WTW	10/1 – 12/31	Dry open cut with dam and pump or flume
Unnamed Tributary to West Branch Little Muncy Creek	120.2	14.2	Perennial	Minor	EV, CWF, MF/WTW	-	Conventional bore

[a] The milepost provided represents the nearest location of the proposed pipeline in relation to the waterbody, or the access road ID for the access road that would cross the waterbody (FM100 Project: PAR = permanent access road, TAR = temporary access road; Leidy South Project: AR = access road).

[b] Crossing Width is the distance from top of bank to top of bank.

[c] MI = Minor (<10 feet); I = Intermediate (10 - 100 feet); M = Major (100+ feet)

[d] EV = Exceptional Value Waterbody
CWF - Cold water fishery
TSF – Trout-stocked fishery
MF - Migratory fishery
HQ-CWF - High quality, Cold water fishery
WTW - Wild Trout Water
NRT – Naturally Reproducing Trout Water
TSF – Trout-stocked Fishery

[e] Timing restrictions indicate timeframes when work cannot be conducted in the waterbodies.

[f] National Fuel's timing restrictions in this table reflect the instream work windows included in FERC Procedures; however, National Fuels consultation with PFBC regarding timing windows is ongoing.
Transco's timing restrictions confirmed through consultation with PFBC (PFBC, 2019).

Appendix E

Additional Temporary Workspace within 50 Feet of Wetlands and Waterbodies

APPENDIX E

Additional Temporary Workspace within 50 feet of a Wetland or Waterbody

Location/Facility/ ATWS ID	Milepost	Purpose	Wetland/Waterbody Identification Number	Distance from Wetland/ Waterbody (feet)	Justification
FM100 PROJECT					
McKean County, Pennsylvania					
Line YM58					
ATWS-085	14.8	Waterbody Crossing	Wetland 161	23	ATWS is required to support the HDD guide wires system for the river crossing. Impacts to wetlands would be limited to hand clearing in order to place the guide wires.
ATWS-049	7.2	Point of Inflection	Stream 159	35	The point of inflection is a substantial bend that would likely requiring specialty fittings. The opposite side of the workspace is constrained by a wetland.
LEIDY SOUTH PROJECT					
Clinton County, Pennsylvania					
Hensel Replacement					
ATWS-HE-036	190.65	Road, Waterbody, and Wetland, Crossing	W1-T7-HR	9	The road crossing is near a stream and wetland. ATWS is required for stockpiling excavated materials to facilitate safe and efficient crossing.
ATWS-HE-037	190.71	Side Slope	W4-T6-HR	15	Due to the severity of the side slope, ATWS is required for stockpiling excavated materials to facilitate a safe and efficient crossing.
ATWS-HE-039	190.95	Steep Slope	W1-T7-HR	11	Due to the steep terrain, ATWS is required for stockpiling excavated materials to facilitate a safe and efficient stream and wetland crossing.
ATWS-HE-057	193.10	Point of Inflection	W4-T5-HR	0	Due to the close proximity to a point of inflection, an ATWS is required to assemble a drag section of pipe for the wetland crossing.
ATWS-HE-059	193.16	Waterbody and Wetland Crossing	W4-T5-HR	20	ATWS is required for stockpiling excavated materials for the stream crossing, which is in close proximity to the wetland crossing.
ATWS-HE-075	194.00	Road Crossing	W1-T10-HR	22	ATWS is required to stockpile gravel for the maintenance of Hensel Fork Rd during construction.
Clinton County, Pennsylvania					
Hilltop Loop					
ATWS-HI-014	184.41	Moderate Slope	W1-T5-HL	37	ATWS is needed to accommodate excessive spoil due to the moderate slope.
ATWS-HI-016	184.59	Steep Slope and Wetland Crossing	W1-T4-HL	18	Due to the severity of the slope, ATWS is required to facilitate a safe and efficient wetland crossing.
ATWS-HI-018	184.93	Waterbody Crossing	W1-T4-HL	12	Due to steep terrain, foreign lines, and the substantial width of the wetland crossing, ATWS is needed to stockpile excavated materials and install BMPs to facilitate a safe and efficient stream crossing.

APPENDIX E

Additional Temporary Workspace within 50 feet of a Wetland or Waterbody

Location/Facility/ ATWS ID	Milepost	Purpose	Wetland/Waterbody Identification Number	Distance from Wetland/ Waterbody (feet)	Justification
ATWS-HI-020	184.95	Waterbody Crossing	W1-T4-HL	0	Due to steep terrain, foreign lines, and the substantial width of the wetland crossing, ATWS is needed to stockpile excavated materials and install BMPs to facilitate a safe and efficient stream crossing.
ATWS-HI-021	184.97	Road and Wetland Crossing	W3-T2-HL	18	The road crossing is near a wetland. ATWS is required for stockpiling excavated materials to facilitate safe and efficient crossing.
ATWS-HI-022	184.98	Road and Wetland Crossing	W2-T4-HL	19	The road crossing is near a wetland. ATWS is required for stockpiling excavated materials to facilitate safe and efficient crossing.
ATWS-HI-023	185.05	Road Crossing	W3-T2-HL	0	Due to small space between two road crossings, ATWS required for stockpiling excavated materials to complete both road crossings.
ATWS-HI-033	185.83	Pipeline Crossover	W11-T5-HL	0	ATWS is required to safely complete a crossover of the pipe across the existing Transco system and a foreign line.
CSA-015	183.56	Work on Steep Slopes	W1-T8	0	Due to the severity of the slope and the special construction method of “winching” the equipment, the extra work area would allow crews to safely install the pipe down the steep slope in a safe and timely manner.
CSA-016	184.46	Staging Area	W1-T5-HL	14	A staging area is needed to allow for additional material set up and spoil storage to safely install the pipeline on the steep slope.
CY-005	N/A	Contractor Yard	W3-T7-HL	2	A contractor yard needed to allow adequate space for contractor setup and material storage.
CY-005	N/A	Contractor Yard	W2-T7-HL	28	A contractor yard needed to allow adequate space for contractor setup and material storage.
Lycoming County, Pennsylvania					
Benton Loop					
ATWS-BE-001	116.95	BMP Installation	W8-T1	31	ATWS required for the installation of the post-construction stormwater management elements.
ATWS-BE-002	116.95	BMP Installation	W8-T1	8	ATWS required for the installation of the post-construction stormwater management elements.
ATWS-BE-008	117.30	Road and Wetland Crossing	W13-T6 / W14-T6	28	The road crossing is near a wetland. ATWS is required for stockpiling excavated materials to facilitate a safe and efficient crossing.
ATWS-BE-021	117.85	Waterbody Crossing	W6-T6	20	ATWS is required for stockpiling excavated materials to facilitate a safe and efficient stream crossing
ATWS-BE-027	117.3	Road, Waterbody, and Wetland, Crossing	W10-T6	28	The road crossing is near a stream and wetland. ATWS is required for stockpiling excavated materials to facilitate a safe and efficient crossing.

APPENDIX E

Additional Temporary Workspace within 50 feet of a Wetland or Waterbody

Location/Facility/ ATWS ID	Milepost	Purpose	Wetland/Waterbody Identification Number	Distance from Wetland/ Waterbody (feet)	Justification
ATWS-BE-036	118.67	Road and Wetland Crossing	W16-T6	42	The road crossing is near a wetland. ATWS is required for stockpiling excavated materials to facilitate safe and efficient crossing.
ATWS-BE-065	120.25	Road, Waterbody, and Wetland, Crossing	W3-T1	30	The road crossing is near a stream and wetland. ATWS required to store spoil for road bore crossing.

Appendix F

Transco's Site-specific Crossing Plans

Transcontinental Gas Pipe Line Company, LLC

Resource Report No. 2

Water Use and Quality

Appendix 2C – Site-Specific Crossing Plan for Young Womans Creek

Leidy South Project

July 2019

OWNERSHIP & TRACT NUMBER	MARK D. MCALANIS 7-25915	MARK A. JONES 7-3928-33 HERBERT E. PROBST III 7-4060	THOMAS WILSON 7-3934 HERBERT E. PROBST III 7-3936	ESTATE OF ROBERT J. GLEICHERT 7-4063

PROFILE (MIN. PIPE DEPTH)	3'	5'	3'	5'	3'	4'	3'

COVER TYPE	MIXED FOREST LAND/MAINTAINED ROW	8201+35'	RESIDENTIAL AREA	8200+83'	WETLAND	8200+10'	OPEN WATER	8199+75'	WETLAND/RESIDENTIAL AREA/MAINTAINED ROW	8196+55'	OPEN WATER	8195+84'	WETLAND	8193+89'	MIXED FOREST LAND/MAINTAINED ROW

SOIL TYPE	HoF	HkE	Bb	HoF	HkE

AVERAGE % SLOPE	60%	21%	53%	10%	21%	11%	<2%	55%

ALIGNMENT

LEGEND

—>->—	PROPOSED WATERBAR AND OUTLET STRUCTURE
	SEDIMENT BARRIER
	TRENCH PLUG
	EROSION CONTROL BLANKET
	ROCK CONSTRUCTION ENTRANCE
	PROPOSED PIPELINE
	LIMITS OF DISTURBANCE
	ENVIRONMENTAL STUDY LIMITS
	DELINEATED WETLAND
	DELINEATED WATERWAY / STREAM (TOP OF BANK)
	STREAM FLOW DIRECTION
	RIPARIAN BUFFER
	50'/FEMA FLOODWAY
— FEMA — FEMA —	FEMA 100-YEAR FLOODPLAIN
MrB2	SOIL BOUNDARY / TYPE
	EXISTING TREELINE / TREE/SHRUB
	PROPERTY LINE
	EXISTING LEIDY / TGPL PIPELINES
	EXISTING FOREIGN PIPELINES
	EXISTING UTILITY POLE / TOWER
— P —	EXISTING UTILITY LINE
	EXISTING VALVE
	EXISTING CULVERT
—X—	EXISTING FENCE
—X—	PROPOSED FENCE
	EXISTING STRUCTURE
	EXISTING ROAD (GRAVEL)
	EXISTING ROAD (PAVED)
	EXISTING MINOR CONTOURS (2' C.I.)
—1200—	EXISTING MAJOR CONTOURS (10' C.I.)
	EXISTING WATERBAR
	TIMBER MAT/BRIDGE

SOIL LEGEND

Bb	BARBOUR-CRAIGSVILLE COMPLEX
HkE	HAZLETON CHANNERY SANDY LOAM, RUBBLY, 25 TO 80% SLOPES
HoF	HAZELTON-LAIDIG GRAVELLY LOAM, EXTREMELY STONY, 25 TO 50% SLOPES

0 100 200 300
SCALE IN FEET
1" = 100'

WHM consulting, INC. designs, permits, resolutions

BA GROUP

KEVIN CLARK, P.E.

PENNSYLVANIA PROFESSIONAL ENGINEERS NO.
P.E.NO. ______________

REVISIONS

NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
LEIDY SOUTH PROJECT - HILLTOP LOOP
YOUNG WOMANS CREEK
SITE SPECIFIC CONSTRUCTION PLAN

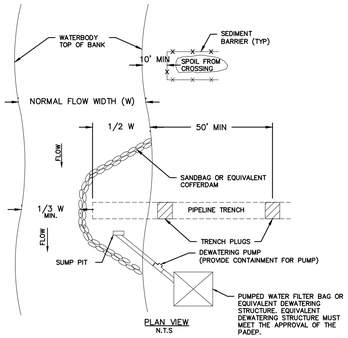
Williams.

CHAPMAN TOWNSHIP, CLINTON COUNTY, PENNSYLVANIA

DRAWN BY:	DATE: 7/22/19	ISSUED FOR BID:	SCALE: 1" = 100'
CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	REVISION:
APPROVED BY:	DATE:	DRAWING NUMBER:	SHEET 1 OF 5
WO: 1211227	RID:		

PIPELINE WORK SEQUENCE AT YOUNG WOMAN CREEK CROSSING

1. MAKE NOTIFICATIONS TO THE PA FISH AND BOAT COMMISSION A MINIMUM OF 10 DAYS PRIOR TO CONSTRUCTION.
2. INSTALL APPROPRIATE PFBC AID TO NAVIGATION SIGNAGE.
3. PRIOR TO INITIATING CONSTRUCTION OF A STREAM CHANNEL LARGER THAN 10 FEET CONTRACTORS AND ENVIRONMENTAL INSPECTOR SHALL EVALUATE WEATHER FORECASTS FOR ANTICIPATED INCLEMENT WEATHER WHICH MAY RESULT IN FLOW CONDITIONS UNSUITABLE FOR CONSTRUCTION. BEFORE CONSTRUCTION OF A STREAM CROSSING GREATER THAN 10 FEET, ENVIRONMENTAL INSPECTOR, FOREMAN, AND ANY OTHER RESPONSIBLE INDIVIDUAL SHOULD SIGN–OFF THAT THE CROSSING CAN BE CONSTRUCTED DURING THE SPECIFIC TIME FRAME.
4. IF INCLEMENT WEATHER IS ANTICIPATED, A CONTINGENCY PLAN WILL BE DISCUSSED TO AVOID THE STREAM CROSSING DURING THE POTENTIALLY UNSUITABLE CONDITIONS."
5. AFTER INSTALLATION OF APPROPRIATE E&S BMPS, INSTALL TEMPORARY EQUIPMENT BRIDGE IN ACCORDANCE WITH DETAILS.
6. FOR DRY OPEN CUT CROSSINGS, INSTALL DAM AND PUMP OR COFFERDAM AS DESCRIBED IN STREAM CROSSING DETAILS.
7. DEWATER WORK AREA. WATER FROM THE EXCAVATION SHALL BE PUMPED TO A SEDIMENT FILTER BAG. WHERE POSSIBLE, EXCAVATION SHALL BE FROM THE TOP OF THE STREAM BANK.
8. INSTALL PIPE.
9. A UTILITY LINE CROSSING OF A STREAM CHANNEL (DITCHING AND STABILIZATION FROM TOP OF BANK TO TOP OF BANK) SHALL BE COMPLETED WITHIN 24 HOURS FOR STREAM CHANNELS 10 FEET OR LESS AND 48 HOURS FOR STREAM CHANNELS BETWEEN 10 – 100 FEET UNLESS SPECIFICALLY OUTLINED IN THE APPROVED PERMIT OR AUTHORIZED BY PADEP.
10. STABILIZE CHANNEL EXCAVATION AND STREAM BANKS PRIOR TO REDIRECTING STREAM FLOW.



PLAN VIEW
N.T.S

PADEP STANDARD NOTES:

1. GRUBBING SHALL NOT TAKE PLACE WITHIN 50 FEET OF TOP–OF–BANK UNTIL ALL MATERIALS REQUIRED TO COMPLETE CROSSING ARE ON SITE AN PIPE IS READY FOR INSTALLATION.
2. TRENCH PLUG SHALL BE INSTALLED WITHIN THE TRENCH ON BOTH SIDES OF THE WATERBODY CHANNEL.
3. 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.
4. HAZARDOUS OR POLLUTANT MATERIAL STORAGE AREAS SHALL BE LOCATED AT LEAST 100 FEET BACK FROM THE TOP OF WATERBODY BANK.
5. ALL EXCESS EXCAVATED MATERIAL SHALL BE IMMEDIATELY REMOVED FROM THE WATERBODY CROSSING AREA.
6. 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 (SEE INSTREAM CROSSING DURATION TABLE).

WILLIAMS STANDARD NOTES:

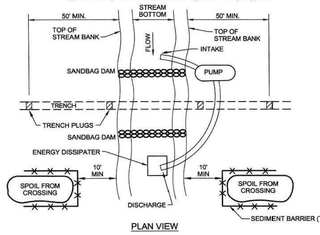
1. THE WATERBODY CROSSING WILL GENERALLY BE COMPLETED IN 2 STAGES. THE DETAIL DEPICTS STAGE 1. STAGE 2 WILL GENERALLY BE COMPLETED USING THE SAME CONFIGURATION FROM THE OPPOSITE BANK;
2. CONSTRUCTION OF THE STREAM CROSSING (FROM CLEARING OF VEGETATION TO FINAL RESTORATION) SHOULD BE CONDUCTED "AS QUICKLY AS POSSIBLE";
3. THE 24–48 HOUR TIMEFRAME FOR MINOR AND MAJOR WATERBODY CROSSINGS BEGINS WHEN DITCHING OCCURS WITHIN THE STREAM TOP OF BANK;
4. THE PROVIDED "INSTREAM CROSSING DURATION" TABLE OUTLINES STREAM CROSSING ASSOCIATED WITH THE PROJECT AND SPECIFIES CERTAIN CROSSINGS WHERE DITCHING IN STREAMS IS EXPECTED TO TAKE LONGER THAN THE 24 OR 48 HOURS. APPROVAL OF THIS PERMIT INCLUDES THE AUTHORIZATION TO EXCEED 24–48 HOUR TIMEFRAMES WHERE SPECIFIED.
5. SANDBAG DAM MAY BE SUBSTITUTED WITH METAL/ROAD PLATE(S) OR EQUIVALENT.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
STANDARD ENVIRONMENTAL DETAIL

CD COFFERDAM STREAM CROSSING

STANDARD CONSTRUCTION DETAIL #13-2
Typical Utility Line Stream Crossing with Pump Bypass



PLAN VIEW

PA DEP

Grubbing shall not take place within 50 feet of top-of-bank until all materials required to complete crossing are on site and pipe is ready for installation.

Bypass pump intake shall be maintained a sufficient distance from the bottom to prevent pumping of channel bottom materials.

Trench plugs shall be installed within the trench on both sides of the stream channel (Standard Construction Detail #13-4).

Water accumulating within the work area shall be pumped to a pumped water filter bag or sediment trap prior to discharging into any receiving surface water.

Hazardous or pollutant material storage areas shall be located at least 100 feet back from the top of streambank.

All excess excavated material shall be immediately removed from the stream crossing area.

All disturbed areas within 50 feet of top-of-bank shall be blanketed or matted within 24 hours of initial disturbance for minor streams or 48 hours of initial disturbance for major streams unless otherwise authorized.

Appropriate streambank protection shall be provided within the channel.

(SEE INSTREAM CROSSING DURATION TABLE).

WILLIAMS STANDARD NOTES:

1. CONSTRUCTION OF THE STREAM CROSSING (FROM CLEARING OF VEGETATION TO FINAL RESTORATION) SHOULD BE CONDUCTED "AS QUICKLY AS POSSIBLE";
2. THE 24–48 HOUR TIMEFRAME FOR MINOR AND MAJOR WATERBODY CROSSINGS BEGINS WHEN DITCHING OCCURS WITHIN THE STREAM TOP OF BANK;
3. THE PROVIDED "INSTREAM CROSSING DURATION" TABLE OUTLINES STREAM CROSSING ASSOCIATED WITH THE PROJECT AND SPECIFIES CERTAIN CROSSINGS WHERE DITCHING IN STREAMS IS EXPECTED TO TAKE LONGER THAN THE 24 OR 48 HOURS. APPROVAL OF THIS PERMIT INCLUDES THE AUTHORIZATION TO EXCEED 24–48 HOUR TIMEFRAMES WHERE SPECIFIED.
4. DAM–AND–PUMPS MAY ONLY BE IN THE STREAM FOR TWO WEEKS.
5. SANDBAG DAM MAY BE SUBSTITUTED WITH METAL/ROAD PLATE(S) OR EQUIVALENT.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
STANDARD ENVIRONMENTAL DETAIL

DPX DAM AND PUMP STREAM CROSSING

WARNING

PIPELINE CONSTRUCTION USE EXTREME CAUTION WHEN BOATING IN THIS AREA

PORTAGE

200 FEET AHEAD

PORTAGE

ALL BOATS EXIT HERE

BOATS KEEP OUT

PORTAGE

ALL BOATS RE-ENTER HERE

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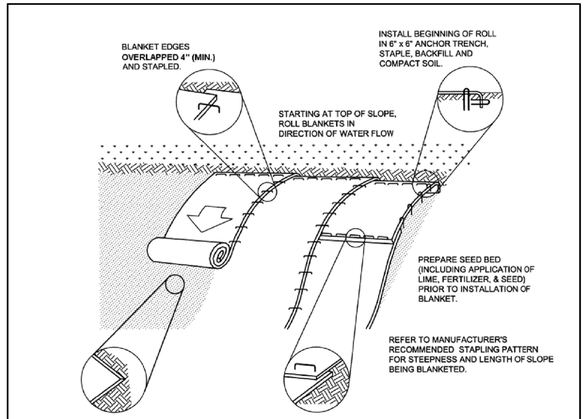
ATON AID TO NAVIGATION (ATON) SIGNAGE



NOT TO SCALE

NOTES:

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.

WILLIAMS SUPPLEMENTAL NOTES:
1. CONTRACTOR SHALL USE SINGLE MAT STRAW FOR SLOPES FLATTER THAN 3:1.
2. HYDRAULIC APPLIED EROSION CONTROL BLANKETS MAY BE USED IN LIEU OF ECB.

NOTE: THIS WILLIAMS STANDARD DETAIL IS BASED ON PADEP STANDARD CONSTRUCTION DETAIL #11–1.

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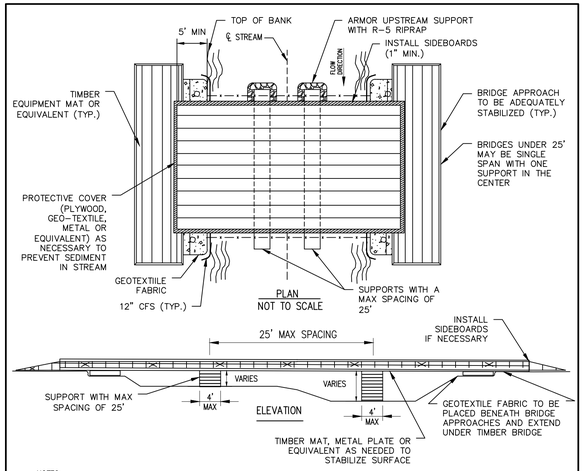
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
STANDARD ENVIRONMENTAL DETAIL

ECB EROSION CONTROL BLANKET



PLAN
NOT TO SCALE

ELEVATION

NOTES:

1. THIS TYPE OF BRIDGE IS GENERALLY USED FOR INTERMEDIATE TO LARGE STREAM CROSSINGS GREATER THAN 20' IN WIDTH IN COMBINATION WITH A PROPER STREAM BANK CONFIGURATION.
2. BOTTOM CHORD OF BRIDGE STRUCTURE SHALL BE CONSTRUCTED ABOVE ORDINARY HIGH WATER MARK/TOP OF BANK.
3. BRIDGE TO REMAIN IN PLACE UNTIL THE COMPLETION OF FINAL RESTORATION.
4. A "SKIRT" FORMED OF GEOTEXTILE FABRIC OR EQUIVALENT SHALL BE PLACED ON THE SIDES AND BOTTOM OF THE BRIDGE TO TRAP SEDIMENT.
5. INDIVIDUAL MATS SHALL BE ANCHORED AND BUTTED TIGHTLY TO MINIMIZE THE INTRODUCTION OF SEDIMENT TO THE WATER BODY.
6. COMPOST FILTER SOCK WILL BE PLACED AT THE EDGE OF EQUIPMENT BRIDGE AT THE END OF THE WORK DAY TO PREVENT EROSION BUT WILL BE REMOVED DURING CONSTRUCTION ACTIVITY.
7. CONTRACTOR SHALL EXTEND TIMBER MAT BRIDGE A MINIMUM OF 10' BEYOND TOP OF STREAM BANK. ABUTMENTS MAY BE KEYED INTO BANK WHERE NEEDED TO INSURE SAFETY.
8. BRIDGES SHALL BE ADEQUATELY ANCHORED AT BOTH ENDS.
9. PERIODICALLY CHECK BRIDGE INSTALLATION AND REMOVE BUILD–UP OF SEDIMENT OR DEBRIS ON BRIDGE.
10. BRIDGE APPROACHES SHALL BE TIMBER EQUIPMENT MATS.
11. MATERIALS PLACED ALONG STREAM CHANNEL SHALL BE COMPLETELY REMOVED DURING FINAL CLEANUP. REMOVAL OF THIS STRUCTURE IS NOT CONTINGENT UPON ESTABLISHMENT OF PERMANENT VEGETATION.
12. RUNOFF FROM ROADWAY SHALL BE DIVERTED OFF THE ROADWAY AND INTO A SEDIMENT REMOVAL BMP BEFORE IT REACHES THE ROCK APPROACH TO THE CROSSING.
13. INSTALLATION AND REMOVAL OF INSTREAM SUPPORT SHALL ADHERE TO TIME OF YEAR RESTRICTIONS.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
STANDARD ENVIRONMENTAL DETAIL

BCC BRIDGE EQUIPMENT CROSSING WITH CENTERED OR MULTIPLE SUPPORTS

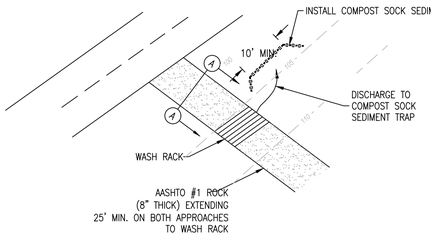
KEVIN CLARK, P.E.

PENNSYLVANIA PROFESSIONAL ENGINEERS NO.
P.E.NO. _____

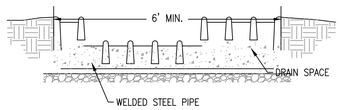
REVISIONS						
NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
LEIDY SOUTH PROJECT - HILLTOP LOOP
YOUNG WOMANS CREEK
SITE SPECIFIC CONSTRUCTION PLAN
DETAILS
CHAPMAN TOWNSHIP, CLINTON COUNTY, PENNSYLVANIA

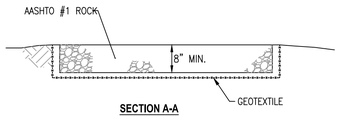
DRAWN BY:	DATE: 7/22/19	ISSUED FOR BID:	SCALE: 1" = 1"
CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	REVISION:
APPROVED BY:	DATE:		SHEET 2
WO: 1211227	RID:	DRAWING NUMBER:	OF 5



PLAN VIEW



WASH RACK

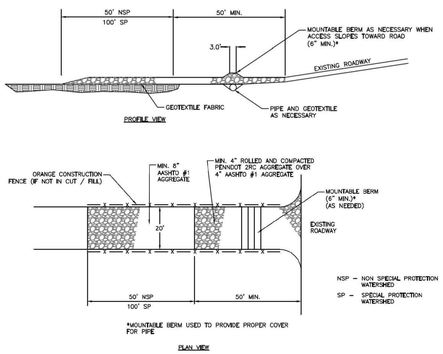


SECTION A-A

NOTE:
1) WASH RACK SHALL BE 20 FEET (MIN.) WIDE OR TOTAL WIDTH OF ACCESS, WHICHEVER IS GREATER.
2) WASH RACK SHALL BE CONSTRUCTED TO ACCOMMODATE ANTICIPATED CONSTRUCTION VEHICULAR TRAFFIC.
3) A WATER SUPPLY SHALL BE MADE AVAILABLE TO WASH THE WHEELS OF ALL VEHICLES EXITING THE SITE.
4) MAINTENANCE: ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE OF ROCK MATERIAL SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. DRAIN SPACE UNDER WASH RACK SHALL BE KEPT OPEN AT ALL TIMES. DAMAGE TO THE WASH RACK SHALL BE REPAIRED PRIOR TO FURTHER USE OF THE RACK. ALL SEDIMENT DEPOSITED ON ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE IMMEDIATELY. WASHING THE ROADWAYS OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER DRAINAGE COURSES IS NOT ACCEPTABLE.

CONSTRUCTION ENTRANCE (CE)
TEMPORARY EROSION CONTROL MEASURE

Example Alternative Rock Construction Entrance



NOTES:

1) REMOVE TOPSOIL PRIOR TO INSTALLATION OF ROCK CONSTRUCTION ENTRANCE. EXTEND ROCK OVER FULL WIDTH OF ENTRANCE.
2) MOUNTABLE BERM SHALL BE INSTALLED WHEREVER OPTIONAL CULVERT PIPE IS USED AND PROPER PIPE COVER AS SPECIFIED BY MANUFACTURER IS NOT OTHERWISE PROVIDED. PIPE SHALL BE SIZED APPROPRIATELY FOR SIZE OF DITCH BEING CROSSED.
3) 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.
4) STREET SWEEPING ON PAVED ROADS
   a. USE A VACUUM TRUCK SWEEPER OR SWEEPER WITH A CATCH BIN ATTACHMENT.
   b. AT A MINIMUM – ANY DAY IN WHICH CONSTRUCTION TRAFFIC IS EXITING THE ROCK CONSTRUCTION ENTRANCE, THE VACUUM TRUCK SWEEPER OR SWEEPER WITH A CATCH BIN ATTACHMENT SHALL CLEAN THE ROAD WAY AT THE END OF THE WORK DAY AND PRIOR TO ANY FORECASTED RAIN EVENT.
5) STREET SWEEPING ON DIRT OR GRAVEL SURFACE PUBLIC ROADS
   a. RIGOROUS MANUAL REMOVAL OF MUD/DIRT FROM VEHICLE/EQUIPMENT TIRES PRIOR TO EXITING CONSTRUCTION SITE, SUPPLEMENTED BY IMMEDIATE RECOVERY, BY MANUAL OR MECHANICAL MEANS, OF SOIL WHICH MAY BECOME DISCHARGED ONTO PUBLIC ROADWAYS. DUST CONTROL AND/OR COMPACTION VIA ROLLING OF THE DIRT PUBLIC ROAD SURFACE WILL BE IMPLEMENTED AS NEEDED.

CONSTRUCTION ENTRANCE (ALTERNATIVE) (CE)
TEMPORARY EROSION CONTROL MEASURE

PENNSYLVANIA

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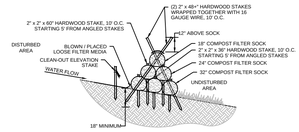
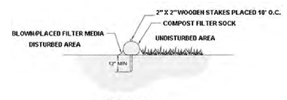
TRANSCONTINENTAL GAS PIPE LINE CORPORATION
STANDARD ENVIRONMENTAL DETAIL
(CE) CONSTRUCTION ENTRANCE

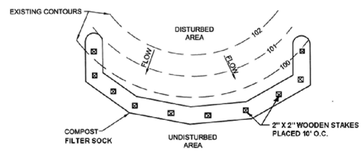
GAS PIPELINE



TRIPLE STACK SOCK TRAP SECTION
N.T.S.



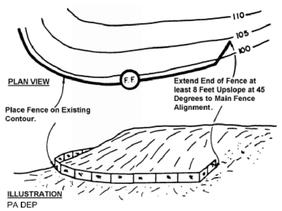
SECTION VIEW
NTS



PLAN VIEW

NOT TO SCALE

FIGURE 4.1
Sediment Barrier Alignment



NOT TO SCALE

NOTES:

1. ALL MATERIAL TO MEET MANUFACTURER SPECIFICATIONS.
2. COMPOST FILTER SOCK FILL TO MEET APPLICATION REQUIREMENTS.
3. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY CONSTRUCTION CONTRACTOR.
4. 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.
5. TRAFFIC SHALL NOT BE PERMITTED TO CROSS FILTER SOCKS.
6. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES 1/2 THE ABOVE GROUND HEIGHT OF THE SOCK AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN.
7. 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 WITH ADDITIONAL SOCK OR ROCK FILTER.
8. BIODEGRADABLE FILTER SOCK SHALL BE REPLACED AFTER 6 MONTHS; PHOTODEGRADABLE SOCKS AFTER 1 YEAR. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
9. 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.

ORGANIC MATTER CONTENT	25% – 100% (DRY WEIGHT BASIS)
ORGANIC PORTION	FIBROUS AND ELONGATED
pH	5.5 – 8.5
MOISTURE CONTENT	30% – 60%
PARTICLE SIZE	30% – 50% PASS THROUGH 3/8" SIEVE
SOLUBLE SALT CONCENTRATION	5.0 dS/m (mmhos/cm) MAXIMUM

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.					

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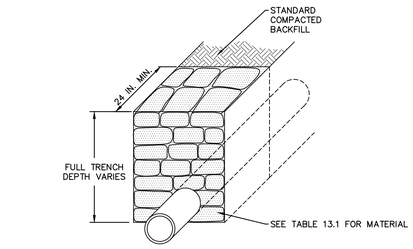
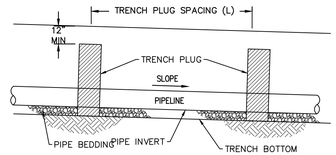
TRANSCONTINENTAL GAS PIPE LINE CORPORATION
STANDARD ENVIRONMENTAL DETAIL
(CFS) COMPOST FILTER SOCK

GAS PIPELINE



SECTION VIEW
NOT TO SCALE



PROFILE VIEW
NOT TO SCALE

TABLE 13.1
MAXIMUM SPACING AND MATERIALS FOR TRENCH PLUGS

TRENCH SLOPE (%)	SPACING L (FT)	TRENCH PLUG MATERIAL FOR FILLED SACKS
<5	1,000	* CLAY, BENTONITE, OR CONCRETE FILLED SACKS
5 – 15	500	* CLAY, BENTONITE, OR CONCRETE FILLED SACKS
15 – 25	300	* CLAY, BENTONITE, OR CONCRETE FILLED SACKS
25 – 35	200	* CLAY, BENTONITE, OR CONCRETE FILLED SACKS
35 – 100	100	* CLAY, BENTONITE, OR CONCRETE FILLED SACKS
>100	50	CEMENT FILLED BAGS (WETTED) OR MORTARED STONE

*TOPSOIL MAY NOT BE USED TO FILL SACKS.

IMPERVIOUS TRENCH PLUGS ARE REQUIRED FOR ALL STREAM, RIVER, WETLAND, OR OTHER WATER BODY CROSSINGS. FOAM TRENCH PLUGS ARE AN APPROVED ALTERNATE E&S BMP.

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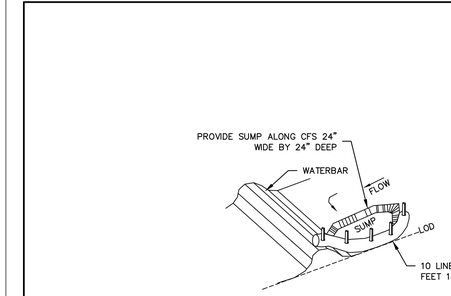
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
STANDARD ENVIRONMENTAL DETAIL
(TP) TRENCH PLUG INSTALLATION



NOTES:

1. 10 LINEAR FEET OF 18 INCH COMPOST FILTER SOCK (CFS) SHALL BE INSTALLED WITH ONE END RESTING ON THE WATERBAR AS PER DETAIL CFS, ALLOWING FOR 8 FEET OF EFFECTIVE LENGTH AND A SPECIFIED FLOW THROUGH RATE OF 15 GALLONS PER MINUTE PER LINEAR FOOT. A PASS THROUGH FLOW OF 0.26 CUBIC FEET PER SECOND CAN BE ACCOMMODATED THROUGH THE FILTER SOCK. THIS FLOW RATE IS ADEQUATE FOR 20,000 SQUARE FEET OF DRAINAGE AREA FOR THE 2–YEAR, 24–HOUR STORM, 5 MINUTE TIME OF CONCENTRATION (RATIONAL METHOD).
2. CONSTRUCTION OF A 24" WIDE AND 24" DEEP SUMP AT THE DISCHARGE END OF THE WATERBAR WILL REDUCE VELOCITY AND PROVIDE A SHEET FLOW CONDITION TO THE CFS. THE SUMP SHALL BE MAINTAINED AND CLEANEDOUT WHEN IT BECOMES A MINIMUM OF 12" DEEP. THE SUMP SHALL BE FILLED AND STABILIZED WHEN THE CFS IS REMOVED AFTER SITE STABILIZATION.
3. TRAFFIC SHALL NOT BE PERMITTED TO CROSS FILTER SOCKS.
4. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES HALF THE ABOVEGROUND HEIGHT OF THE SOCK AND DISPOSED IN ACCORDANCE WITH WILLIAMS STANDARDS. 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 FILTER SOCK SHALL BE REPLACED AFTER 6 MONTHS; PHOTODEGRADABLE SOCKS AFTER 1 YEAR. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

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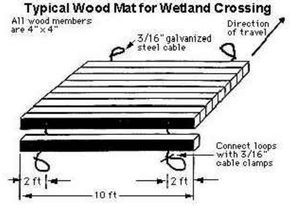
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
STANDARD ENVIRONMENTAL DETAIL
(OS) CFS AT WATERBAR DISCHARGE FOR ABACT LEVEL PROTECTION

FIGURE 3.7
Typical Wood Mat for Wetland Crossing



University of Minnesota FS 07009
A geotextile underlayment shall be used under the wood mat.

NOTE: THIS WILLIAMS STANDARD DETAIL IS BASED ON PADEP FIGURE 3.07.

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TRANSCONTINENTAL GAS PIPE LINE CORPORATION
STANDARD ENVIRONMENTAL DETAIL
(MAT.1) TIMBER MATTING CONSTRUCTION

KEVIN CLARK, P.E.
PENNSYLVANIA PROFESSIONAL ENGINEERS NO.
P.E.NO. _____

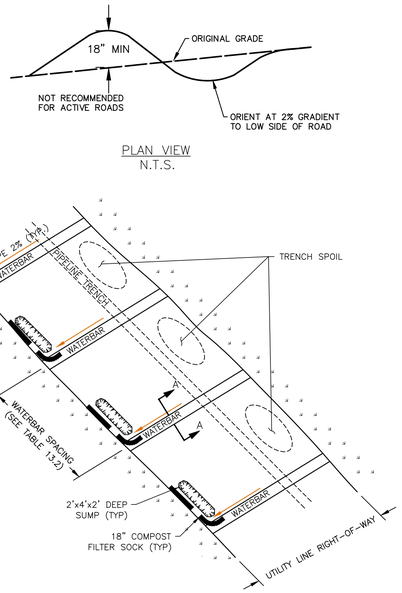
REVISIONS

NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
LEIDY SOUTH PROJECT - HILLTOP LOOP
YOUNG WOMANS CREEK
SITE SPECIFIC CONSTRUCTION PLAN
DETAILS
CHAPMAN TOWNSHIP, CLINTON COUNTY, PENNSYLVANIA

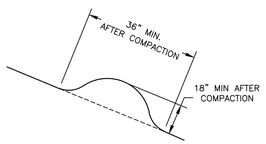
DRAWN BY:	DATE: 7/22/19	ISSUED FOR BID:	SCALE: 1" = 1"
CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	REVISION:
APPROVED BY:	DATE:	DRAWING NUMBER:	SHEET 3 OF 5
WO: 1211227	RID:		

WHM consulting, inc. | BA GROUP



PLAN VIEW
N.T.S.

LAYOUT VIEW
N.T.S.



SECTION A–A

NOTES:

1. DURING CONSTRUCTION, WATERBARS SHALL BE PREPARED AT THE END OF EACH WORK DAY AND PRIOR TO STORM EVENTS.
2. AFTER EARTH DISTURBING WORK HAS BEGUN, WATERBARS SHALL BE INSTALLED AT THE SPACING SHOWN IN THE ABOVE TABLE OR AS SHOWN ON THE DRAWINGS. WATERBARS SHALL BE IMMEDIATELY STABILIZED WITH EROSION CONTROL BLANKET.
3. TEMPORARY AND PERMANENT WATERBARS ARE REQUIRED AT ALL WATERBODY CROSSINGS AND UPSLOPE FROM ALL WETLAND BOUNDARIES.
4. THE WATERBAR OUTLET SHALL BE LOCATED WHERE RUNOFF WILL BE RELEASED ONTO AN EXISTING WELL–VEGETATED AREA. AN OUTLET STRUCTURE (OS) MUST BE INSTALLED AT THE WATERBAR OUTLET.
5. WHEREVER EDIBLE SOILS ARE PRESENT, OR WHERE THERE IS NOT A SUFFICIENT VEGETATIVE FILTER STRIP BETWEEN THE WATERBAR AND A RECEIVING SURFACE WATER, THE WATERBAR SHOULD BE PROVIDED WITH A TEMPORARY PROTECTIVE LINER.

TABLE 3.1 – MAXIMUM WATERBAR SPACING

PERCENT SLOPE	SPACING (FT)
<5	250
5–15	150
>15–30	100
>30	50

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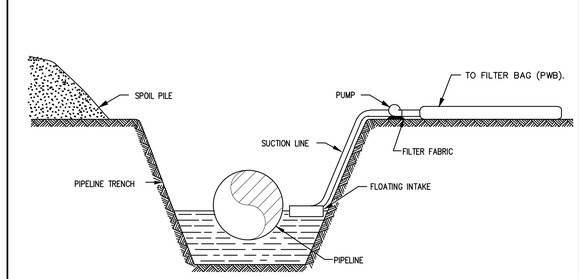
TRANSCONTINENTAL GAS PIPE LINE, LLC
STANDARD ENVIRONMENTAL DETAIL

WB WATERBAR

Williams GAS PIPELINE



ELEVATION
N.T.S.

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. PUMP WATER FILTER BAG (PWB) SHALL BE PLACED ON A WELL VEGETATED AREA AWAY FROM CONSTRUCTION SO THAT FILTERED WATER IS NOT RETURNED TO THE TRENCH.

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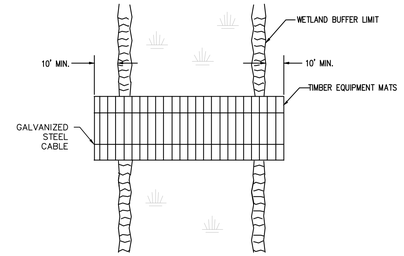
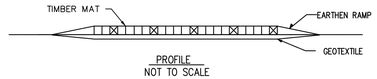
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
STANDARD ENVIRONMENTAL DETAIL

TD TRENCH DEWATERING

Williams



PLAN
NOT TO SCALE



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.
7. A GEOTEXTILE UNDERLAYMENT SHALL BE USED UNDER THE WOOD MAT.

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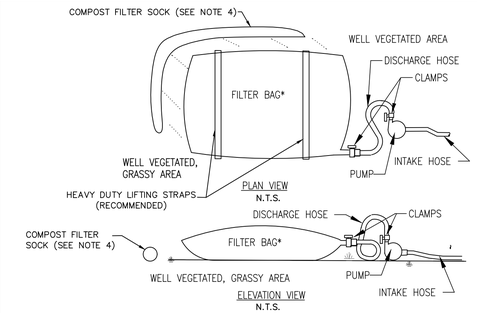
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
STANDARD ENVIRONMENTAL DETAIL

WEC WETLAND EQUIPMENT CROSSING

Williams



PLAN VIEW
N.T.S.

ELEVATION VIEW
N.T.S.

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

NOTES:

1) 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.
2) 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.
3) NO DOWNSLOPE SEDIMENT BARRIER IS REQUIRED FOR MOST INSTALLATIONS. COMPOST BERM OR COMPOST FILTER SOCK SHALL 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.
4) 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.
5) 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.
6) FILTER BAGS SHALL BE INSPECTED DAILY. IF ANY PROBLEM IS DETECTED, PUMPING SHALL CEASE IMMEDIATELY AND NOT RESUME UNTIL THE PROBLEM IS CORRECTED.
7) CONTRACTOR SHALL PROPERLY REMOVE AND PROPERLY DISPOSE OF USED FILTER BAGS UPON COMPLETION OF DEWATERING OPERATIONS.

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TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
STANDARD ENVIRONMENTAL DETAIL

PWB PUMP WATER FILTER BAG

Williams

KEVIN CLARK, P.E.

PENNSYLVANIA PROFESSIONAL ENGINEERS NO.
P.E.NO. _____

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TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
LEIDY SOUTH PROJECT - HILLTOP LOOP
YOUNG WOMANS CREEK
SITE SPECIFIC CONSTRUCTION PLAN
DETAILS
CHAPMAN TOWNSHIP, CLINTON COUNTY, PENNSYLVANIA

Williams

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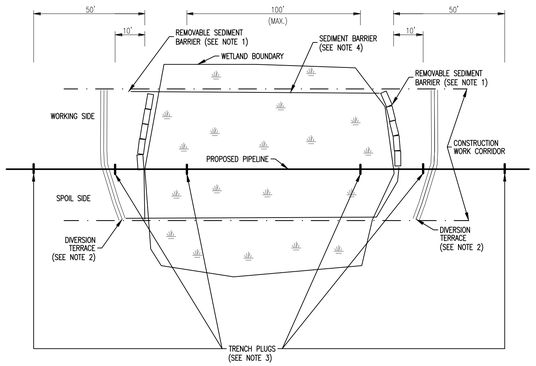

NOTES:

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 TEN (10) FEET FROM THE EDGE OF A WETLAND; FIFTY (50) FEET FROM THE EDGE OF A WETLAND; PLACE A MINIMUM OF ONE (1) TRENCH PLUG AT A MAXIMUM SPACING OF 100 FEET BETWEEN TRENCH PLUGS WITHIN A WETLAND TO PREVENT DIVERSION OF WATER INTO UPLAND PORTIONS OF THE PIPELINE TRENCH AND TO KEEP ANY ACCUMULATED UPLAND TRENCH WATER OUT OF WETLAND. WETLAND CROSSINGS LESS THAN FIFTY (50) FEET DO NOT REQUIRE AN INTERNAL TRENCH PLUG.
4. FOR TYPE II ("SATURATED") AND TYPE III ("FLOODED") WETLANDS, INSTALL SEDIMENT BARRIERS AT WETLAND BOUNDARIES AND ALONG BOTH WETLAND EDGES. FOR TYPE I ("DRY") WETLANDS, 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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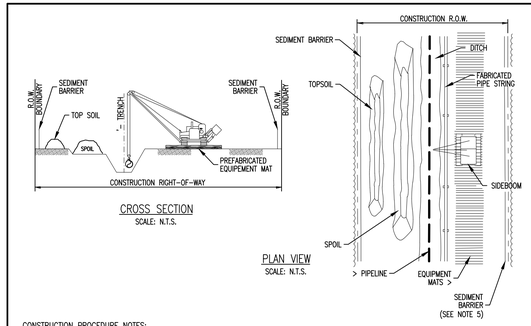
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
STANDARD ENVIRONMENTAL DETAIL

WCC WETLAND CROSSING CONFIGURATION TYPE I, II AND III WETLANDS



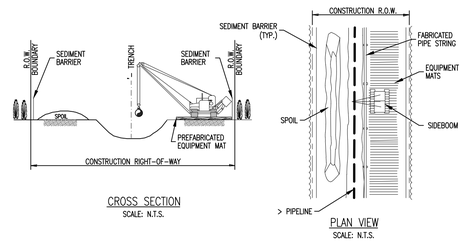
CONSTRUCTION PROCEDURE NOTES:

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 DIVERSION TERRACES 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 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.
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 SAFTY-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 SATURATED TOPSOIL TO ACTUAL DEPTH OR A MAXIMUM DEPTH OF 12 INCHES, AS DETERMINED BY THE COMPANY ENVIRONMENTAL INSPECTOR. TOPSOIL AND SATURATED TOPSOIL SHALL BE STOCKPILED SEPARATELY. 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 PROCEDE WHEN THE PIPE SECTION IS FABRICATED AND READY TO LAY. ONCE TRENCHING COMMENCES, CONSTRUCTION THROUGH THE WETLAND IS TO PROCEDE CONTINUOUSLY UNTIL THE CROSSING IS COMPLETED, BACKFILLED 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 TRENCH, INSTALL TRENCH PLUGS IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS.
12. RESTORE GRADE TO NEAR PRE-CONSTRUCTION TOPOGRAPHY, REPLACE SATURATED TOPSOIL AND TOPSOIL (IF NOT SATURATED) 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.

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
STANDARD ENVIRONMENTAL DETAIL

WCC.1 TYPE I "DRY WETLAND" INSTALLATION PROCEDURE



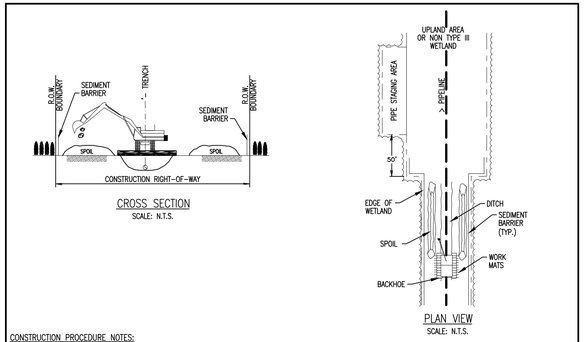
CONSTRUCTION PROCEDURE NOTES:

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 DIVERSION TERRACES 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 WETLAND AND ALONG BOTH WETLAND EDGES.
6. LIMIT PULLING OF TREE STUMPS AND GRADING ACTIVITIES TO DIRECTLY OVER THE TRENCHLINE. 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 PROCEDE WHEN THE PIPE SECTION IS FABRICATED AND READY TO LAY. ONCE TRENCHING COMMENCES, CONSTRUCTION THROUGH THE WETLAND IS TO PROCEDE CONTINUOUSLY UNTIL THE CROSSING IS COMPLETED, BACKFILLED 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. RESTORE GRADE TO NEAR PRE-CONSTRUCTION TOPOGRAPHY AND INSTALL PERMANENT EROSION CONTROL. REMOVE PREFABRICATED MATS FROM WETLANDS UPON COMPLETION. 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.

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
STANDARD ENVIRONMENTAL DETAIL

WCC.2 TYPE II "SATURATED WETLAND" INSTALLATION PROCEDURE



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 DIVERSION TERRACES 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 TRENCHLINE. 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 SAFTY 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 TYPE III 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.

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
STANDARD ENVIRONMENTAL DETAIL

WCC.3 TYPE III "FLOODED WETLAND" INSTALLATION PROCEDURE

KEVIN CLARK, P.E.

PENNSYLVANIA PROFESSIONAL ENGINEERS NO.
P.E.NO. _____

REVISIONS

NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
LEIDY SOUTH PROJECT - HILLTOP LOOP
YOUNG WOMANS CREEK
SITE SPECIFIC CONSTRUCTION PLAN
DETAILS
CHAPMAN TOWNSHIP, CLINTON COUNTY, PENNSYLVANIA

DRAWN BY:	DATE: 7/22/19	ISSUED FOR BID:	SCALE: 1" = 1"
CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	REVISION:
APPROVED BY:	DATE:		
WO: 1211227	RID:	DRAWING NUMBER:	SHEET 5 OF 5

Appendix G

Wetlands Affected by the FM100 Project and Leidy South Project

APPENDIX G

Wetlands Affected by the FM100 Project and Leidy South Project

Facility / Milepost	Wetland ID [a]	Wetland Type [b]	State Wetland Classification	Crossing Length (feet) [c]	Construction Impacts (acres) [d]	Operation Impacts (acres) [e]
FM100 Project						
Line YM58						
0.5	Wetland 005	PEM	Other	291.5	0.4	<0.1
0.7	Wetland 006	PEM	Other	99.1	0.2	<0.1
0.9	Wetland 007a	PFO	Exceptional Value	-	0.2	--
0.9	Wetland 007	PEM	Exceptional Value	587.9	0.8	0.1
1.1	Wetland 007b	PFO	Other	-	<0.1	--
1.1	Wetland 008	PEM	Other	68.1	0.1	<0.1
1.2	Wetland 009	PEM	Exceptional Value	799.2	1.1	0.2
1.2	Wetland 009a	PFO	Exceptional Value	-	0.1	--
1.2	Pond 03	PUB	Exceptional Value	-	<0.1	--
1.3	Wetland 009b	PFO	Other	-	<0.1	--
1.4	Wetland 010a	PFO	Exceptional Value	-	0.2	--
1.4	Wetland 010	PEM	Exceptional Value	826.5	1.2	0.2
1.5	Wetland 010b	PFO	Exceptional Value	-	<0.1	--
1.6	Wetland 011	PEM	Exceptional Value	22.5	<0.1	<0.1
1.6	Wetland 145	PEM	Other	-	<0.1	--
1.6	Wetland 012b	PEM	Other	-	<0.1	--
1.8	Wetland 014	PEM	Exceptional Value	-	<0.1	--
1.8	Wetland 015	PEM	Exceptional Value	-	<0.1	--
2.2	Wetland 016a	PEM	Exceptional Value	103.8	0.2	<0.1
2.2	Wetland 016	PFO	Exceptional Value	-	<0.1	--
2.2	Wetland 016b	PEM	Exceptional Value	192.5	0.2	<0.1
2.8	Pond 06	PUB	Other	-	0.1	--
3	Wetland 018	PEM	Exceptional Value	-	<0.1	--
3.3	Wetland 020a	PFO	Exceptional Value	92	0.2	<0.1
3.3	Wetland 020	PEM	Exceptional Value	388.7	0.5	<0.1
3.4	Wetland 023	PEM	Other	727.4	0.8	0.2
3.6	Wetland 025	PEM	Other	81.2	0.1	<0.1
3.6	Wetland 026	PSS	Exceptional Value	123.7	0.3	<0.1
3.6	Wetland 026a	PEM	Exceptional Value	253.8	0.2	<0.1
3.7	Wetland 027	PEM	Exceptional Value	139.5	0.2	<0.1
4.1	Wetland 028	PEM	Other	258.9	0.3	<0.1
4.3	Wetland 029	PEM	Other	123.5	0.2	<0.1
4.9	Wetland 031	PFO	Other	-	0.1	--
4.9	Wetland 031a	PEM	Exceptional Value	183	0.2	<0.1
6.6	Wetland 035	PSS	Other	-	<0.1	--
6.6	Wetland 034	PSS	Other	-	<0.1	--
6.7	Wetland 039	PEM	Other	-	0.1	--
6.8	Wetland 037c	PSS	Other	66	0.2	<0.1
6.8	Wetland 037b	PEM	Other	-	<0.1	--
6.8	Wetland 041	PEM	Other	-	<0.1	--
6.9	Wetland 042	PEM	Other	-	<0.1	--
7.2	Wetland 045	PEM	Other	-	<0.1	<0.1
7.7	Wetland 049	PEM	Other	-	<0.1	--
7.8	Wetland 051	PEM	Other	247.4	0.3	<0.1
7.9	Wetland 054	PEM	Exceptional Value	36.4	<0.1	<0.1

APPENDIX G

Wetlands Affected by the FM100 Project and Leidy South Project

Facility / Milepost	Wetland ID [a]	Wetland Type [b]	State Wetland Classification	Crossing Length (feet) [c]	Construction Impacts (acres) [d]	Operation Impacts (acres) [e]
8	Wetland 055	PEM	Exceptional Value	37.6	0.1	<0.1
7.62	Wetland 056	PEM	Exceptional Value	-	<0.1	--
9.3	Wetland 059a	PEM	Other	56.8	0.1	<0.1
9.7	Wetland 061	PEM	Other	337	0.5	<0.1
9.9	Wetland 066a	PEM	Other	404	0.5	<0.1
9.9	Wetland 127	PFO	Other	-	0.1	--
10.4	Wetland 067	PEM	Exceptional Value	-	<0.1	<0.1
11.2	Wetland 126	PEM	Exceptional Value	-	<0.1	--
11.2	Wetland 126c	PEM	Exceptional Value	-	<0.1	--
11.2	Wetland 070	PEM	Exceptional Value	-	<0.1	--
11.2	Wetland 071	PEM	Exceptional Value	-	<0.1	--
13.9	Wetland 075	PEM	Exceptional Value	-	<0.1	--
14	Wetland 076	PEM	Exceptional Value	10.5	<0.1	<0.1
14	Wetland 077	PEM	Exceptional Value	32	<0.1	<0.1
14.1	Wetland 078	PEM	Exceptional Value	-	<0.1	--
14.1	Wetland 080	PEM	Exceptional Value	16.5	<0.1	<0.1
14.1	Pond 07	PUB	Exceptional Value	-	<0.1	--
14.1	Wetland 082	PEM	Other	-	<0.1	--
14.3	Wetland 083	PEM	Exceptional Value	82.4	0.1	<0.1
14.5	Wetland 086	PEM	Other	-	<0.1	--
14.5	Wetland 088	PEM	Other	-	0.3	--
15.1	Wetland 091	PSS	Other	617.4	0.8	0.1
15.2	Wetland 091a	PEM	Other	71.6	0.4	<0.1
15.3	Wetland 094	PEM	Other	-	<0.1	--
18	Wetland 096	PEM	Exceptional Value	-	<0.1	--
19	Wetland 101	PEM	Exceptional Value	62	0.1	<0.1
19.2	Wetland 143	PEM	Exceptional Value	44.6	<0.1	<0.1
23	Wetland 142	PSS	Exceptional Value	140.8	0.2	<0.1
23.2	Wetland 141a	PEM	Exceptional Value	195.5	0.3	<0.1
23.2	Wetland 141	PSS	Exceptional Value	32.3	<0.1	<0.1
26.6	Wetland 125	PEM	Other	78.9	0.1	<0.1
26.7	Wetland 124a	PEM	Exceptional Value	18	<0.1	<0.1
PAR-3	Wetland 017	PEM	Other	-	<0.1	--
PAR-3	Wetland 017a	PEM	Other	-	<0.1	--
PAR-5	Wetland 117	PEM	Other	-	<0.1	--
PAR-5	Wetland 118	PEM	Exceptional Value	-	<0.1	--
PAR-5	Wetland 119	PEM	Other	-	<0.1	--
PAR-5	Wetland 119a	PEM	Other	-	0.1	--
PAR-5	Wetland 120	PEM	Other	-	<0.1	--
PAR-5	Wetland 121	PEM	Other	-	<0.1	--
PAR-5	Wetland 121a	PEM	Other	-	<0.1	--
PAR-5	Wetland 122	PEM	Other	-	<0.1	--
PAR-5	Wetland 123	PEM	Other	-	<0.1	--
PAR-5	Wetland 123a	PEM	Other	-	<0.1	--
TAR-7	Wetland 035	PSS	Exceptional Value	-	<0.1	--
TAR-7	Wetland 035a	PEM	Other	-	<0.1	--
TAR-10	Wetland 057	PEM	Exceptional Value	-	<0.1	--

APPENDIX G

Wetlands Affected by the FM100 Project and Leidy South Project

Facility / Milepost	Wetland ID [a]	Wetland Type [b]	State Wetland Classification	Crossing Length (feet) [c]	Construction Impacts (acres) [d]	Operation Impacts (acres) [e]
PAR-12	Wetland 058	PEM	Other	-	<0.1	--
PAR-12	Wetland 058a	PEM	Other	-	<0.1	--
TAR-10	Wetland 159	PEM	Other	-	<0.1	--
TAR-10	Wetland 160	PEM	Other	-	<0.1	--
PAR-12	Wetland 060a	PEM	Other	-	<0.1	--
PAR-12	Wetland 060	PEM	Other	-	<0.1	--
TAR-13	Wetland 061b	PEM	Other	-	<0.1	--
TAR-13	Wetland 061c	PEM	Other	-	<0.1	--
TAR-13	Wetland 062	PEM	Other	-	<0.1	--
TAR-13	Wetland 062A	PEM	Other	-	<0.1	--
TAR-13	Wetland 063	PEM	Other	-	<0.1	--
TAR-13	Wetland 063a	PEM	Other	-	<0.1	--
TAR-13	Wetland 064	PEM	Other	-	<0.1	--
TAR-13	Wetland 065	PEM	Other	-	<0.1	--
TAR-13	Wetland 065a	PEM	Exceptional Value	-	<0.1	--
PAR-14	Wetland 140	PEM	Other	-	<0.1	--
TAR-22	Wetland 089	PEM	Other	-	<0.1	--
TAR-22	Wetland 089a	PEM	Other	-	<0.1	--
Line YM58 Subtotal				**7,979.2**	**13.3**	**1.8**
Line KL Extension						
0.2	Wetland 004b	PEM	Exceptional Value	411.6	0.6	0.1
Line KL Extension Subtotal				**411.6**	**0.6**	**<0.1**
Marvindale Compressor Station						
PAR-1	Wetland 002	PEM	Exceptional Value	-	<0.1	--
PAR-1	Wetland 003	PFO	Exceptional Value	-	<0.1	--
PAR-1	Pond 01	PUB	Exceptional Value	-	<0.1	--
PAR-1	Wetland 004a	PEM	Exceptional Value	-	<0.1	--
PAR-1	Wetland 004	PFO	Exceptional Value	-	<0.1	--
Marvindale Compressor Station Extension Subtotal				**0.0**	**<0.1**	**0.0**
Line YM224 Loop						
1.1	Wetland 112	PEM	Other	8.1	<0.1	<0.1
1.1	Wetland 114	PEM	Other	-	<0.1	--
Line YM224 Loop Subtotal				**8.1**	**<0.1**	**<0.1**
Line FM100 Abandonment [f]						
0	Wetland 149	PSS	Exceptional Value	41.2	<0.1	--
0.2	Wetland 149b	PEM	Exceptional Value	-	<0.1	--
0.2	Wetland 149c	PEM	Exceptional Value	72.5	0.1	--
0.2	Wetland 149d	PSS	Exceptional Value	20.8	<0.1	--
4.8	Wetland 139a	PEM	Exceptional Value	27.3	<0.1	--
4.9	Wetland 139	PEM	Exceptional Value	--	<0.1	--
7.9	Wetland 137	PEM	Exceptional Value	--	<0.1	--
8	Wetland 138	PEM	Exceptional Value	7.3	<0.1	--
11.1	Wetland 135	PEM	Other	41.9	<0.1	--
12	Wetland 134a	PEM	Other	53.7	<0.1	--
Line FM100 Abandonment Subtotal				**285.0**	**0.3**	**0.0**
FM100 Project Subtotal				**8,683.9**	**15.2**	**1.9**

APPENDIX G

Wetlands Affected by the FM100 Project and Leidy South Project

Facility / Milepost	Wetland ID [a]	Wetland Type [b]	State Wetland Classification	Crossing Length (feet) [c]	Construction Impacts (acres) [d]	Operation Impacts (acres) [e]
Leidy South Project						
Hensel Replacement						
AR-189.5	W3-T7a-HR	PEM	Other	N/A[a]	<0.1	0.0
AR-189.5	W4-T7a-HR	PEM	Other	N/A[a]	<0.1	0.0
AR-189.5	W5-T7a-HR	PEM/PFO	Other	N/A[a]	<0.1	<0.1
AR-189.5	W6-T7a-HR	PFO	Other	N/A[a]	<0.1	0.0
189.99	W17-T7-HR	PEM	Other	121.5	0.2	0.0
190.46	W8-T6-HR	PSS	Exceptional Value	2.7	<0.1	0.0
190.66	W1-T7-HR	PEM, PSS, PFO	Exceptional Value	27.4	<0.1	0.0
190.99	W1-T7-HR	PEM/PSS	Exceptional Value	18.1	<0.1	0.0
192.91	W4-T5-HR	PSS	Exceptional Value	63.7	0.1	<0.1
192.95	W4-T5-HR	PEM	Exceptional Value	N/A[a]	<0.1	0.0
193.07[e]	W4-T5-HR	PEM, PSS, PFO	Exceptional Value	493.7	0.7	<0.1
AR-193.2	W4-T5-HR	PEM	Exceptional Value	N/A[a]	<0.1	0.0
193.64	W3-T1-HR	PEM	Other	256.7	0.5	0.0
193.83	W1-T1-HR	PEM	Exceptional Value	187.8	0.4	0.0
Hensel Replacement Subtotal				**1,171.6**	**2.2**	**<0.1**
Hilltop Loop						
183.55	W3-T7-HL	PEM	Other	254.6	0.6	0.0
184.43	W1-T5-HL	PEM, PFO	Other	54.5	0.1	<0.1
184.93	W1-T4-HL	PEM, PFO	Exceptional Value	40.0	0.1	<0.1
185.02	W2-T4-HL	PEM	Exceptional Value	1.8	<0.1	0.0
185.04	W3-T2-HL	PEM	Exceptional Value	8.1	<0.1	0.0
185.05	W5-T2-HL	PFO	Exceptional Value	N/A[a]	<0.1	0.0
185.88	W11-T5-HL	PEM	Other	N/A[a]	<0.1	0.0
Hilltop Loop Subtotal				**359.0**	**0.9**	**<0.1**
Benton Loop						
117.28	W14-T6	PEM	Other	N/A[a]	<0.1	0.0
117.29	W13-T6	PEM	Other	N/A[a]	<0.1	0.0
117.48	W2-T6	PEM	Other	10.7	<0.1	0.0
117.49	W1-T6	PEM	Other	N/A[a]	<0.1	0.0
117.80	W4-T6	PEM	Exceptional Value	211.7	0.4	0.0
117.86	W6-T6	PEM	Other	56.7	<0.1	0.0
118.10	W8-T6	PEM	Other	132.0	<0.1	0.0
118.10	W9-T6	PEM	Other	N/A[a]	<0.1	0.0
118.74	W16-T6	PEM, PFO	Exceptional Value	330.0	0.5	0.0
118.83	W2-T5	PEM	Exceptional Value	19.2	<0.1	0.0
118.86	W4-T5	PEM, PFO	Exceptional Value	N/A[a]	<0.1	0.0
119.10	W2-T4	PEM, PFO	Exceptional Value	404.3	0.7	<0.1
119.53	W1-T2	PEM, PFO	Exceptional Value	412.5	0.6	0.0
120.22	W3-T1	PEM, PSS	Exceptional Value	68.8	0.1	<0.1
Benton Loop Subtotal				**1,645.9**	**2.7**	**<0.1**
Aboveground Facilities						
Compressor Station 607	W2-T1	PEM	Other	N/A	0.1	0.0
Compressor Station 607	W2-T2	PEM	Exceptional Value	N/A	0.2	0.0
Compressor Station 607	W2-T3	PEM	Other	N/A	<0.1	0.0

APPENDIX G

Wetlands Affected by the FM100 Project and Leidy South Project

Facility / Milepost	Wetland ID [a]	Wetland Type [b]	State Wetland Classification	Crossing Length (feet) [c]	Construction Impacts (acres) [d]	Operation Impacts (acres) [e]
Compressor Station 607	W3-T3	PEM	Other	N/A	<0.1	0.0
Aboveground Facilities Subtotal				-	**0.3**	**0.0**
Leidy South Project Subtotal				**3,176.5**	**6.1**	**0.3**
Projects Total				**11,860.4**	**21.5**	**2.3**

[a] Each wetland ID for the FM100 Project represents a wetland type (i.e, PEM, PSS, etc.) within an overall wetland complex; whereas, wetland IDs for the Leidy South Project represent the overall wetland complex.

[b] NWI Classification: PEM = Palustrine Emergent Wetland; PSS Palustrine Scrub-Shrub Wetland; PFO = Palustrine Forested Wetland; PUB = Palustrine Unconsolidated Bottom Wetland.

[c] Crossing Length in feet is based on the distance of wetland crossed by the proposed centerline. This reflects the mileposts between which the wetland would be impacted by construction, including ATWS. The wetland may not be continuously impacted because the wetland boundary may vary in relation to the workspace limit.

[d] Includes all areas affected by construction, including ATWS.

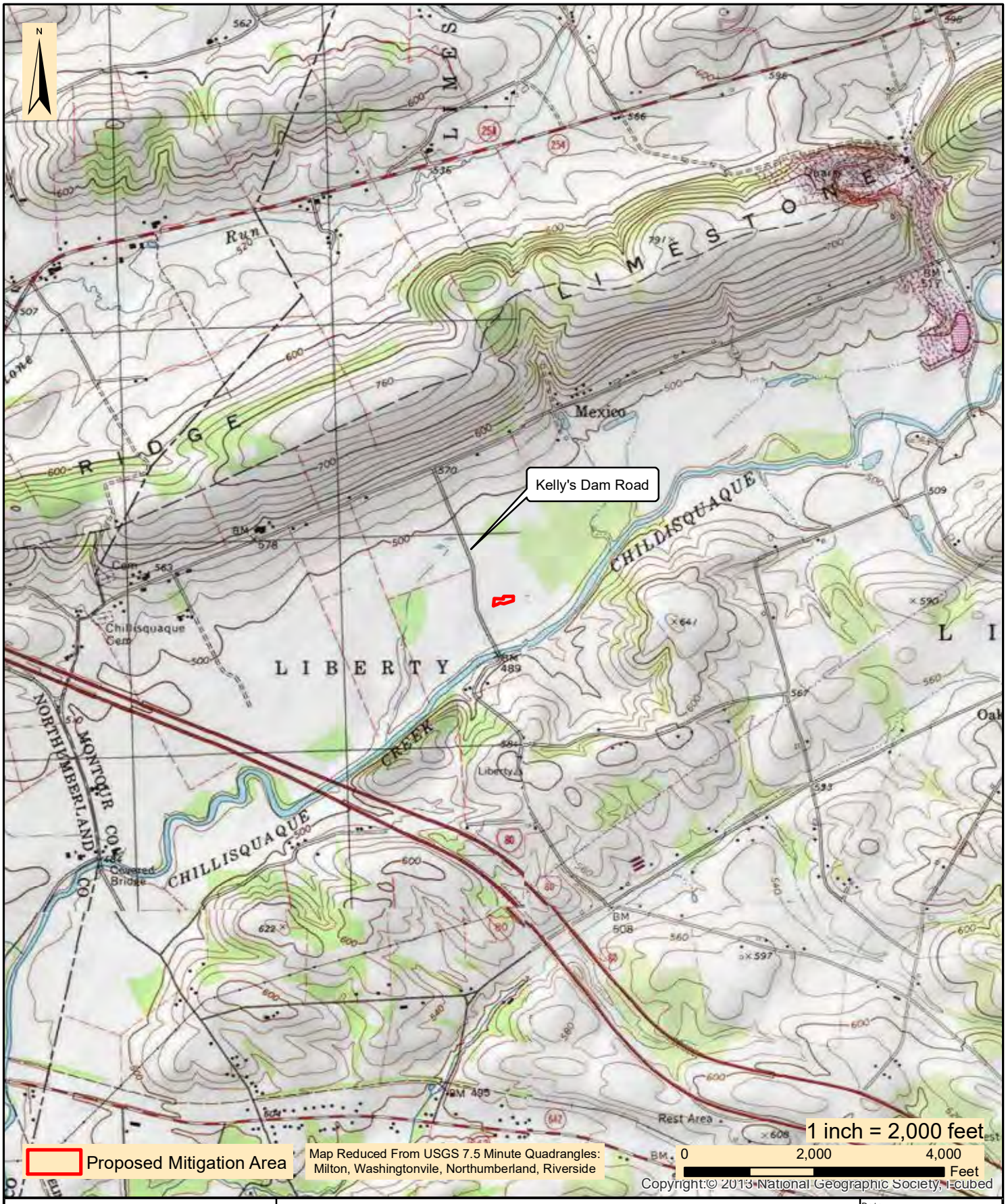
[e] Includes forested wetlands within new permanently maintained right-of-way; all other wetland types would be allowed to revert to preconstruction conditions.

[f] Does not include wetlands between workspaces where no impacts would occur (foot traffic only).

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

Appendix H

Leidy South Project Offsite Wetland Mitigation Site Map



designs, permits, resolutions | consulting, INC.
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State College, PA 16803
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TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC

LEIDY SOUTH PROJECT

COMPENSATORY OFFSITE MITIGATION PLAN

PROJECT LOCATION MAP

LIBERTY TOWNSHIP | MONTOUR COUNTY | PENNSYLVANIA

Date: 08/21/19

WHM Drawing Number: WILLIAMS186A002

Drawn By: PJB

Figure Number: 2

Appendix I

State-Listed Threatened and Endangered Species Identified in the Vicinity of the FM100 Project and Leidy South Project

APPENDIX I

State-listed Threatened and Endangered Species Identified in the Vicinity of the FM100 Project and Leidy South Project

Project/Species Name	State Status	Habitat	Project Component	Field Survey Results	Seasonal Timing Restrictions or Proposed Mitigation
FM 100 PROJECT					
Silver-haired bat [a] *Lasionycteris noctiagans*	Threatened	Roosts in dense foliage, behind loose bark, or in a hollow tree—rarely in a cave; does not hibernate in Pennsylvania and breeding is limited to mountainous sections of the state (PAGC, 2017).	FM100 Abandonment	Surveys not required.	National Fuel would conduct tree clearing activities associated with the FM100 Abandonment between November 1 and March 31 to minimize impacts on the silver-haired bat.
Burbot [b] *Lota lota*	Endangered	Prefer deep, cold waters of lakes and rivers. During late winter and early spring, after spawning, they often migrate from lakes to tributary rivers (PNHP, n.d.[a]).	Line YM58 (crossing of Alleghany River and associated tributaries)	Surveys not required.	National Fuel would not conduct in-stream work in the upper Allegheny River watershed during the burbot spawning season (December 1 to April 1). National Fuel would also conduct work during low flow periods and would implement erosion and sedimentation control measures to avoid impacts to the species.
Blue spotted salamander [b] *Ambystoma laterale*	Endangered	Underground, except during breeding season when they are found in ephemeral/vernal pools (VTFWD, 2019).	Line YM58 (crossing of Alleghany River, Alleghany Portage Creek, Potato Creek)	Two areas of potential breeding habitat and one area of confirmed breeding habitat were identified.	National Fuel would cross potential and confirmed breeding habitat areas via HDD. See species discussion above for additional measures that would be implemented.
Timber rattlesnake [b] *Crotalus horridus*	Species of Concern	Forested areas to forage for small mammals and southerly-facing slopes for hibernating and other thermoregulatory activities (PAFBC, n.d.).	Line YM58, Marvindale Compressor Station, Tamarack Compressor Station, FM100 Abandonment	Two areas of potential habitat identified.	National Fuel would implement measures recommended by the PAFBC. See species discussion above.

APPENDIX I

State-listed Threatened and Endangered Species Identified in the Vicinity of the FM100 Project and Leidy South Project

Project/Species Name	State Status	Habitat	Project Component	Field Survey Results	Seasonal Timing Restrictions or Proposed Mitigation
Elktoe [b] *Alasmidonta marginata*	Rare	Most common in small, shallow rivers with moderately fast current and riffles; preferred substrate is fine gravel mixed with sand (PNHP, n.d.[b]).	Line YM58 (crossing of Potato Creek, Alleghany Portage Creek, Allegheny River)	Presence confirmed at crossings of Potato Creek, Portage Creek, and Allegheny River.	National Fuel would cross Potato Creek, Portage Creek, and Allegheny River via HDD. See species discussion above for additional measures that would be implemented.
Round pigtoe [b] *Pleurobema sintoxia*	Rare	Found in the mud, sand, or gravel of medium to large rivers (PNHP, n.d.[c]).	Line YM58 (crossing of Potato Creek, Alleghany Portage Creek, Allegheny River)	Presence confirmed at Allegheny River crossing. No individuals identified at Potato Creek or Portage Creek crossings.	National Fuel would cross the Allegheny River via HDD. See species discussion above for additional measures that would be implemented.
Wavy-rayed lampmussel [b] *Lamsilis fasciola*	Rare	Riffles of clear, medium to large sized rivers and creeks (PNHP, n.d.[d]).	Line YM58 (crossing of Potato Creek, Alleghany Portage Creek, Allegheny River)	Presence confirmed at Allegheny River crossing. No individuals identified at Potato Creek or Portage Creek crossings.	National Fuel would cross the Allegheny River via HDD. See species discussion above for additional measures that would be implemented.
Creeping snowberry [c] *Gaultheria hispidula*	Rare	Decaying logs, stumps, and moss hummocks in bogs, peaty wetlands, and swamps (PNHP, n.d.[e]).	FM100 Abandonment	No individuals identified.	None
Cranesbill [c] *Geranium bicknellii*	Endangered	Prefers open sites, woodlands, roadsides, fields, and waste places; does especially well in recently burned areas (NatureServe, 2019a).	Line YM58	No individuals identified.	None
Screwstem [c] *Bartonia paniculata*	Proposed rare	Bogs, swamps, and wet meadows (PNHP, n.d.[f]).	FM100 Abandonment	No individuals identified.	None
Soft-leaved sedge [c] *Carex disperma*	Special Concern	Swamps, wet thickets, peaty wetlands, and bogs (PNHP, n.d.[g]).	Tamarack Compressor Station	No individuals identified.	None

APPENDIX I

State-listed Threatened and Endangered Species Identified in the Vicinity of the FM100 Project and Leidy South Project

Project/Species Name	State Status	Habitat	Project Component	Field Survey Results	Seasonal Timing Restrictions or Proposed Mitigation
Bebb's sedge [c] *Carex bebbii*	Endangered (Proposed Threatened)	Sandy flats and depressions, shore lines, meadows, prairies, bogs, fens, cow pastures, and along streams and rivers (NatureServe, 2019b).	Tamarack Compressor Station	No individuals identified.	None
Yellow-fringed Orchid [c] *Platanthera ciliaris*	Species of Concern (Proposed Threatened)	Tolerant of a wide variety of habitats; from wet, humus areas to dry rocky mountain slopes (NatureServe, 2019c).	FM100 Abandonment	No individuals identified.	None
LEIDY SOUTH PROJECT					
Timber rattlesnake [b] *Crotalus horridus*	Species of Concern	Forested areas to forage for small mammals and southerly-facing slopes for hibernating and other thermoregulatory activities (PAFBC, n.d.).	Hensel Replacement, Hilltop Loop, and CS 620	Three active habitat areas (all are gestation habitat) along the Hensel Replacement, and one active habitat areas (denning and gestation habitat) along the Hilltop Loop	Transco would implement measures recommended by the PAFBC. See species discussion above.
White twisted-stalk [c] *Streptopus amplexifolius*	Threatened (Proposed Endangered)	Seepy cliffs and rock outcrops, in cool shaded conditions, often near waterfalls (PNHP, n.d.[h]).	Compressor Station 607	No individuals identified.	None
Swamp currant [c] *Ribes lacustre*	Species of Concern (Proposed Endangered)	Damp soil on rocky slopes and talus areas, moist to seepy rock outcrops and cliffs, and in cool woods and swamps (PNHP, n.d.[i]).	Compressor Station 607	No individuals identified.	None

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Project/Species Name	State Status	Habitat	Project Component	Field Survey Results	Seasonal Timing Restrictions or Proposed Mitigation
Creeping snowberry [c] *Gaultheria hispidula*	Rare	Decaying logs, stumps, and moss hummocks in bogs, peaty wetlands, and swamps (PNHP, n.d.[e]).	Compressor Station 607	No individuals identified.	None
Showy mountain-ash [c] *Sorbus decora*	Endangered	Moist or dry woods, montane woods, rocky slopes, lake and stream shores, thickets (eflora, n.d.).	Hensel Replacement	No individuals identified.	None
Bebb's sedge [c] *Carex bebbii*	Endangered	Sandy flats and depressions, shore lines, meadows, prairies, bogs, fens, cow pastures, and along streams and rivers (NatureServe, 2019b).	Hensel Replacement	No individuals identified.	None
Soft-leaved sedge [c] *Carex disperma*	Rare	Swamps, wet thickets, peaty wetlands, and bogs (PNHP, n.d.[g]).	Hensel Replacement	No individuals identified.	None
Purple bedstraw [c] *Galium latifolium*	Proposed Species of Concern	Dryish to moist woodlands, especially on shale and sandstone substrate (PNHP, n.d,[j]).	Hensel Replacement	One population of purple bedstraw with closest plants located approximately 10 feet upslope of the limits of disturbance	None

[a] Species identified as potentially occurring within the Projects area by the PAGC.
[b] Species identified as potentially occurring within the Projects area by the PAFBC.
[c] Species identified as potentially occurring within the Projects area by the PADCNR.

Appendix J

Land Use Types Affected by Construction and Operation of the FM100 Project and Leidy South Project

APPENDIX J

Land Use Types Affected by Construction and Operation of the FM100 Project and the Leidy South Project [a]

Facility	Open Land		Industrial / Commercial		Forest / Woodland		Agricultural		Wetlands		Open Water		Residential		Total	
	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
FM100 PROJECT																
Pipeline Facilities																
Line YM58																
Pipeline ROW	114.7	93.2	4.1	2.5	97.4	57.7	34.0	24.2	12.8	0.3	1.5	1.1	0.8	0.6	**265.3**	**179.6**
ATWS	1.5	0.0	0.7	0.0	12.1	0.0	15.8	0.0	0.5	0.0	0.6	0.0	0.2	0.0	**31.4**	**0.0**
Aboveground pipeline appurtenances	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	**0.2**	**0.2**
Line YM58 Subtotal	**116.2**	**93.2**	**4.9**	**2.6**	**109.5**	**57.7**	**49.9**	**24.3**	**13.3**	**0.3**	**2.1**	**1.1**	**1.0**	**0.6**	**296.9**	**179.8**
Line YM224 Loop																
Pipeline ROW	5.3	3.9	<0.1	<0.1	5.9	3.7	1.5	1.0	0.2	<0.1	0.0	0.0	0.0	0.0	**13.0**	**8.8**
ATWS	0.2	0.0	<0.1	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.3**	**0.0**
Aboveground pipeline appurtenances	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	**0.2**	**0.2**
Line YM224 Loop Subtotal	**5.6**	**4.0**	**0.2**	**0.1**	**6.4**	**3.7**	**2.1**	**1.1**	**0.2**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**14.5**	**9.0**
Line KL Extension																
Pipeline ROW	1.1	1.4	0.7	0.6	2.6	2.3	0.0	0.0	0.6	<0.1	0.0	0.0	0.0	0.0	**5.0**	**4.4**
ATWS	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**	**0.0**
Aboveground pipeline appurtenances	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**	**0.1**
Line KL Extension Subtotal	**1.2**	**1.4**	**0.8**	**0.7**	**2.6**	**2.3**	**0.0**	**0.0**	**0.6**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**5.2**	**4.5**
Aboveground Facilities																
Tamarack Compressor Station	0.0	0.0	0.0	0.0	4.3	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**4.3**	**4.3**
Marvindale Compressor Station	0.0	0.0	0.5	0.0	11.3	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**11.8**	**3.7**
Marvindale Interconnect	1.8	<0.1	4.5	1.6	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**7.9**	**1.7**
Carpenter Hollow OPP Station	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.2**	**0.2**
Aboveground Facilities Subtotal	**1.9**	**0.2**	**5.1**	**1.7**	**17.2**	**8.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**24.2**	**9.9**
Abandonment Facilities																
Line FM100																
Pipeline ROW	4.8	0.0	0.7	0.0	3.6	0.0	0.0	0.0	0.3	0.0	0.2	0.0	0.0	0.0	**9.6**	**0.0**
ATWS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Costello Compressor Station	0.4	0.0	0.8	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.3**	**0.0**
WHP-MS-4317X Station	0.2	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.5**	**0.0**
Abandonment Facilities Subtotal	**5.4**	**0.0**	**1.6**	**0.0**	**3.9**	**0.0**	**0.0**	**0.0**	**0.3**	**0.0**	**0.2**	**0.0**	**0.0**	**0.0**	**11.4**	**0.0**
Access Roads	31.3	20.7	111.4	52.6	4.1	3.2	1.6	0.2	0.9	<0.1	0.4	0.3	<0.1	0.0	**149.8**	**77.1**
Staging Areas	17.2	0.0	23.5	0.0	1.8	0.0	3.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	**45.7**	**0.0**
FM100 Project Total	**178.8**	**119.5**	**147.5**	**57.7**	**145.5**	**74.9**	**56.7**	**25.6**	**15.3**	**0.6**	**2.8**	**1.4**	**1.1**	**0.6**	**547.7**	**280.3**

APPENDIX J

Land Use Types Affected by Construction and Operation of the FM100 Project and the Leidy South Project [a]

Facility	Open Land		Industrial / Commercial		Forest / Woodland		Agricultural		Wetlands		Open Water		Residential		Total	
	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
LEIDY SOUTH PROJECT																
Pipeline Facilities																
Hensel Replacement [b]																
Pipeline ROW	53.2	2.7	10.3	2.9	6.7	1.3	0.0	0.0	2.1	0.1	0.3	<0.1	0.0	0.0	**72.6**	**7.0**
ATWS	5.9	0.0	11.3	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**20.6**	**0.0**
Hensel Replacement Subtotal	**59.1**	**2.7**	**21.6**	**2.9**	**10.1**	**1.3**	**0.0**	**0.0**	**2.1**	**0.1**	**0.3**	**0.1**	**0.0**	**0.0**	**93.2**	**7.0**
Hilltop Loop																
Pipeline ROW	9.2	1.0	3.3	2.0	12.5	4.0	0.0	0.0	0.6	0.1	0.2	0.0	0.3	0.1	**26.1**	**7.2**
ATWS	6.1	0.0	0.3	0.0	8.7	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	**15.3**	**0.1**
Hilltop Loop Subtotal	**15.3**	**1.0**	**3.6**	**2.0**	**21.2**	**4.0**	**0.0**	**0.0**	**0.7**	**0.1**	**0.2**	**<0.1**	**0.4**	**0.1**	**41.4**	**7.2**
Benton Loop																
Pipeline ROW	19.8	5.4	1.7	0.8	10.1	2.1	7.4	3.0	2.6	0.3	0.1	<0.1	0.1	0.0	**41.8**	**11.6**
ATWS	12.8	0.0	0.2	0.0	4.2	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**21.7**	**0.0**
Benton Loop Subtotal	**32.6**	**5.4**	**1.9**	**0.8**	**14.3**	**2.1**	**11.9**	**3.0**	**2.6**	**0.3**	**0.1**	**<0.1**	**0.1**	**0.0**	**63.5**	**11.6**
Aboveground Facilities																
Compressor Station 605	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Compressor Station 607	14.8	10.0	<0.1	0.0	3.2	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**18.0**	**12.8**
Compressor Station 610	0.0	0.0	33.7	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**34.0**	**0.0**
Compressor Station 620	0.0	0.0	0.1	0.1	0.8	0.0	44.4	24.1	0.0	0.0	0.0	0.0	0.0	0.0	**45.3**	**24.2**
Mainline Valves	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.5**	**0.5**
Aboveground Facilities Subtotal	**15.3**	**10.5**	**33.8**	**0.1**	**4.3**	**2.8**	**44.4**	**24.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**97.8**	**37.5**
Access Roads	1.6	0.4	16.9	7.9	4.7	4.3	<0.1	0.0	0.2	0.1	0.0	0.0	0.0	0.0	**23.5**	**12.7**
Staging Areas	72.8	0.0	8.4	0.0	6.5	0.0	24.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	**111.9**	**0.0**
Leidy South Project Total	**196.7**	**20.0**	**86.2**	**13.7**	**61.1**	**14.5**	**80.4**	**27.1**	**5.8**	**0.6**	**0.6**	**0.0**	**0.5**	**0.1**	**431.3**	**76.0**
Projects Total	**375.5**	**139.5**	**233.7**	**71.4**	**206.6**	**89.4**	**137.1**	**52.7**	**21.1**	**1.2**	**3.4**	**1.4**	**1.6**	**0.7**	**979.0**	**356.3**

[a] The totals shown in this table may not equal the sum of addends due to rounding.

[b] Hensel Replacement includes: Leidy Line D with Associated Abandonment and Removal of Leidy Line A, and Regrading of Existing Two-tone Contour

Note: ATWS = additional temporary workspace; ROW = right-of-way