Federal Energy Regulatory Commission

Office of Energy Projects

November 2016

Tennessee Gas Pipeline Company, L.L.C. **Docket No. CP15-88-000**

ENVIRONMENTAL ASSESSMENT

Abandonment and Capacity Restoration Project

Federal Energy Regulatory Commission
Office of Energy Projects
888 First Street, NE, Washington, DC 20426

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas Branch 3
Tennessee Gas Pipeline Company, L.L.C.
Docket No. CP15-88-000

TO THE PARTY ADDRESSED:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared an environmental assessment (EA) for the Abandonment and Capacity Restoration Project (ACRP or Project) proposed by Tennessee Gas Pipeline Company, L.L.C. (TGP) in the above-referenced docket. TGP requests authorization and a Certificate of Public Convenience and Necessity pursuant to Sections 7(b) and 7(c) of the Natural Gas Act to abandon, construct, modify, and operate natural gas pipeline facilities in Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, and Ohio. The purpose of the Project is to disconnect and abandon pipeline segments from interstate natural gas service and construct and operate new natural gas infrastructure as a replacement to maintain service to existing customers. Following abandonment, TGP intends to sell the pipeline to Utica Marcellus Texas Pipeline LLC (UMTP), an affiliate of TGP, for transportation of natural gas liquids (NGL).

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

The EA addresses the potential environmental effects of the abandonment, construction, modification, and operation of the following facilities associated with the Project:

- abandonment in place and then transfer by sale of about 964 miles of pipeline between Columbiana County, Ohio, and Natchitoches Parish, Louisiana;
- disconnects of the abandoned pipeline and directly associated equipment at 14 existing compressor stations; abandonment in place of 82 existing mainline valves; and 125 sites where taps or crossover/connector lines would be disconnected, abandoned, relocated, or removed;
- construction of 12 short segments of new pipeline to reconnect customer taps to TGP's other existing pipelines (off-right-of-way tap reconnects)

totaling 5.3 miles of new pipeline (between 2 and 16 inches in diameter) in Ohio, Kentucky, Tennessee, and Mississippi;

- construction of four new compressor stations in Jackson, Morgan, Tuscarawas, and Mahoning Counties, Ohio;

- modification of existing Compressor Station 110 in Rowan County, Kentucky and additional modification of Compressor Station 875 (approved as part of the Broad Run Expansion Project, CP15-77) in Madison County, Kentucky;

- construction of 7.7 miles of new 36-inch-diameter pipeline in Carter and Lewis Counties, Kentucky; and

- construction of about 1.0 mile of 30-inch-diameter pipeline replacement in Washington County, Mississippi, and 1.5 miles of 30-inch-diameter pipeline replacements in six sections in Madison County, Kentucky (replacement pipelines).

The FERC staff mailed copies of 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 project area. Paper copy versions of this EA were mailed to those specifically requesting them; all others received a CD version. In addition, the EA is available for public viewing on the FERC's website (www.ferc.gov) using the eLibrary link. A limited number of copies are available for distribution and public inspection at:

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

Any person wishing to comment on the EA may do so. Your comments should focus on the potential environmental effects, reasonable alternatives, and measures to avoid or lessen environmental impacts. The more specific your comments, the more useful they will be. To ensure that your comments are properly recorded and considered prior to a Commission decision on the proposal, it is important that the FERC receives your comments on or before **December 2, 2016**.

For your convenience, there are three methods you can use to submit your comments to the Commission. In all instances, please reference the project docket number (CP15-88-000) with your submission. The Commission encourages electronic filing of comments and has expert staff available to assist you at (202) 502-8258 or efiling@ferc.gov.

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

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

3. You may file a paper copy of your comments by mailing them to the following address:

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

Any person seeking to become a party to the proceeding must file a motion to intervene pursuant to Rule 214 of the Commission's Rules of Practice and Procedures (Title 18 Code of Federal Regulations Part 385.214).[1] Only intervenors have the right to seek rehearing of the Commission's decision. The Commission grants affected landowners and others with environmental concerns intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding that no other party can adequately represent. **Simply filing environmental comments will not give you intervenor status, but you do not need intervenor status to have your comments considered.**

Additional information about the project is available from the Commission's Office of External Affairs, at **(866) 208-FERC,** or on the FERC website (www.ferc.gov) using the eLibrary link. Click on the eLibrary link, click on "General Search," and enter

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

the docket number, excluding the last three digits in the Docket Number field (i.e., CP15-88). Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at FercOnlineSupport@ferc.gov or toll free at (866) 208-3676; for TTY, contact (202) 502-8659. The eLibrary link also provides access to the texts of formal documents issued by the Commission such as orders, notices, and rulemakings.

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

Abandonment and Capacity Restoration Project
Environmental Assessment

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TECHNICAL ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
ACM	asbestos-containing material
ACRP	Abandonment and Capacity Restoration Project
ANHC	Arkansas Natural Heritage Commission
APE	area of potential effect
API	American Petroleum Institute
AQCR	Air Quality Control Region
ATWS	additional temporary workspace
BCR	Bird Conservation Region
BMP	Best Management Practice
BO	Biological Opinion
CadnaA	Computer Aided Noise Abatement
CEQ	Council on Environmental Quality
Certificate	Certificate of Public Convenience and Necessity
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2e}	carbon dioxide equivalent
COE	U.S. Army Corps of Engineers
Commission	Federal Energy Regulatory Commission
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CS	compressor station (tables only)
CWA	Clean Water Act (tables only)
dB	decibel
dBA	decibels on the A-weighted scale
DOT	U.S. Department of Transportation
EA	Environmental Assessment
EI	environmental inspector
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPAct 2005	Energy Policy Act of 2005
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FR	Federal Register
g	acceleration due to gravity
GHG	greenhouse gas
GIS	geographic information system
Goodwin	R. Christopher Goodwin & Associates, Inc.
gpm	gallons per minute
HAP	hazardous air pollutant
HCA	high consequence area
HDD	horizontal directional drilling
hp	horsepower
HUC	hydrologic unit code
IPaC	Information for Planning and Conservation
KAR	Kentucky Administrative Regulations

KDFWR	Kentucky Department of Fish and Wildlife Resources
KGS	Kentucky Geological Survey
KSNPC	Kentucky State Nature Preservation Commission
KYDEP	Kentucky Department for Environmental Protection
L_{dn}	day-night sound level
LDWF	Louisiana Department of Wildlife and Fisheries
L_{eq}	equivalent sound level
L_{max}	maximum instantaneous sound level
LPG	liquefied petroleum gas
MAOP	Maximum Allowable Operating Pressure
MBTA	Migratory Bird Treaty Act
MDEQ	Mississippi Department of Environmental Quality (tables only)
$\mu g/m^3$	micrograms per cubic meter (tables only)
MLV	mainline valve
MMBtu	million British Thermal Units
MMNS	Mississippi Museum of Natural Science
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MP	milepost
NAA	nonattainment areas (tables only)
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NESHAP	National Emission Standards for Hazardous Air Pollutants
NGA	Natural Gas Act
NGL	natural gas liquids
NHD	National Hydrography Dataset (tables only)
NHPA	National Historic Preservation Act
N_2O	nitrous oxide
NO_2	nitrogen dioxide
NOI	*Notice of Intent to Prepare an Environmental Assessment for the Proposed Abandonment and Capacity Restoration Project and Request for Comments on Environmental Issues*
NOx	nitrogen oxides
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSA	noise-sensitive area
NWI	National Wetlands Inventory
O_3	ozone
OAC	Ohio Administrative Code
ODNR	Ohio Department of Natural Resources
OEP	Office of Energy Projects
OH EPA	Ohio Environmental Protection Agency (tables only)
Pb	lead
PCA	priority conservation area
PCB	polychlorinated biphenyl
PEM	palustrine emergent
PFO	palustrine forested
PHMSA	Pipeline and Hazardous Materials Safety Administration
Plan	*Upland Erosion Control, Revegetation, and Maintenance Plan*
PM	particulate matter

PM_{10}	particles with an aerodynamic diameter less than or equal to 10 microns
$PM_{2.5}$	particles with an aerodynamic diameter less than or equal to 2.5 microns
Procedures	*Wetland and Waterbody Construction and Mitigation Procedures*
Project	Abandonment and Capacity Restoration Project
PSD	Prevention of Significant Deterioration
psig	pounds per square inch gauge
PSS	palustrine scrub-shrub
SCADA	Supervisory Control and Data Acquisition
Secretary	Secretary of the Commission
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SPCC	Spill Prevention Control and Countermeasures
Stantec	Stantec Consulting Services, Inc.
T.C.A.	Tennessee Code Annotated
TDEC	Tennessee Department of Environment and Conservation
TGP	Tennessee Gas Pipeline Company, L.L.C.
TNHIP	Tennessee Natural Heritage Inventory Program
tpy	tons per year
TRC	TRC Environmental Corporation
UMTP	Utica Marcellus Texas Pipeline LLC
UMTP Project	Utica Marcellus Texas Pipeline LLC Project
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geologic Survey
VOC	volatile organic compound (tables only)
WHPA	wellhead protection area
WMA	Wildlife Management Area

1.0 PROPOSED ACTION

1.1 Introduction

The Federal Energy Regulatory Commission (Commission or FERC) staff has prepared this Environmental Assessment (EA) to assess the environmental impacts of the natural gas pipeline facilities proposed by Tennessee Gas Pipeline Company, LLC (TGP) in Docket No. CP15-88-000. We[1] prepared this EA in compliance with the National Environmental Policy Act (NEPA) according to the regulations issued by the Council on Environmental Quality (CEQ) at Title 40 Code of Federal Regulations (CFR), Parts 1500–1508 (40 CFR 1500–1508), and the Commission's regulations at 18 CFR 380.

On February 13, 2015, TGP filed an application with FERC under Sections 7(b) and 7(c) of the Natural Gas Act (NGA) and 18 CFR Part 157 seeking authorization and a Certificate of Public Convenience and Necessity (Certificate) from the Commission to abandon, construct, modify, and operate natural gas pipeline facilities in Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, and Ohio. These proposed facilities are referred to as the Abandonment and Capacity Restoration Project (ACRP or Project).

Based on its authority under the NGA and Energy Policy Act of 2005 (EPAct 2005), FERC is the lead federal agency for the Project and for the preparation of this EA, as described in 40 CFR 1501.5. Our principal purposes in preparing this EA are to identify and assess potential impacts on the natural and human environment that could result from implementation of the proposed action; assess reasonable alternatives to the proposed action that would avoid or minimize adverse effects to the environment; and identify and recommend specific mitigation measures, as necessary, to minimize environmental impacts. The EA will be used by the Commission in its decision-making process to determine whether to authorize TGP's proposal.

1.2 Purpose and Need

TGP states that the purpose of the Project is to disconnect and abandon[2] segments of its pipeline system, which would be removed from interstate natural gas service. TGP further proposes as part of the ACRP to construct and operate new natural gas infrastructure as a replacement to maintain service to existing customers affected by the abandonment. TGP further indicates that following abandonment, it intends to sell the pipeline to Utica Marcellus Texas Pipeline LLC (UMTP), an affiliate of TGP.

TGP indicates that after abandonment, its customers would be relieved of the expense of ongoing operations and maintenance of the pipeline, possible future pipeline replacements, and eventual abandonment liability for the abandoned line because such costs are expected to exceed the ongoing costs of operating and maintaining the Project's replacement facilities.

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. Under Section 7(c) of the NGA, the Commission determines whether new interstate natural gas transportation

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

[2] In utility law, the term "abandon" refers to government authorization for a utility to cease provision of a particular service and/or shut down a particular facility.

facilities are in the public convenience and necessity and, if so, grants a Certificate to construct and operate them. The Commission bases its decision on technical competence, financing, rates, market demand, gas supply, environmental impact, long-term feasibility, and other issues concerning a proposed project. Approval would be granted if, after consideration of both environmental and non-environmental issues, the Commission finds the Project is in the public interest.

1.3 Scope of this Environmental Assessment

This EA is an important part of the Commission's decision whether to authorize TGP to construct and abandon the proposed Project. The objectives of this EA are to:

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

As the lead federal agency for the Project, FERC is required to comply with Section 7 of the Endangered Species Act (ESA) and Section 106 of the National Historic Preservation Act (NHPA) on behalf of itself and all cooperating federal agencies. These statutes have been considered in the preparation of this EA. FERC will use this document to consider the environmental impacts that could result if it authorizes the Project.

In addition to FERC, other federal, state, and local agencies may use this EA in approving or issuing permits for all or part of the proposed Project. Permits, approvals, and consultations for the Project are discussed in section 1.11.

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

1.4 Public Review and Comment

On April 17, 2015, the Commission issued a *Notice of Intent to Prepare an Environmental Assessment for the Proposed Abandonment and Capacity Restoration Project and Request for Comments on Environmental Issues* (NOI). The NOI was published in the Federal Register and was mailed to interested parties, including federal, state, and local officials, potentially interested Indian tribes, agency representatives, local libraries and newspapers, and property owners potentially affected by the Project activities. Written comments were requested from the public on specific concerns about the Project or issues that should be considered during preparation of the EA. The NOI also invited agencies with jurisdiction by law or with special expertise to participate in the preparation of the EA as a cooperating agency. No agency expressed an interest in cooperating in the preparation of the EA.

Between February 2015 and October 2016, the Commission received about 476 comment letters. Written comments were received from 4 federal agencies (Bureau of Indian Affairs, U.S. Fish and Wildlife Service [USFWS], National Park Service [NPS], and U.S. Forest Service [USFS]); 8 state agencies; 9 local government bodies; and 14 nongovernmental organizations. The majority of comment letters received (359) were from individuals and businesses.

All written scoping comments are part of the public record for the Project and are available for viewing on the FERC internet website.[3] Table 1.4-1 summarizes the issues identified in comments received during the scoping process. Substantive environmental issues are addressed in applicable sections of the EA.

Table 1.4-1

Issues Identified During the Public Scoping Process

Issue	EA Section Addressing Issue
General Project Description	
Project requires Environmental Impact Statement	1.4
NEPA document should include impacts from the UMTP Project	1.4
NEPA document should analyze the potential for the Project to increase natural gas production	1.4
Geology and Soils	
Concern about contamination of soils	2.2
Water Resources, Fisheries, and Wetlands	
Impacts on groundwater resources and wells	2.2.1
Impacts on water supply	2.2.2
Vegetation	
Forest fragmentation	2.3
Wildlife and Threatened and Endangered Species	
Impacts on wildlife habitat and migratory birds	2.3
Impacts on federal and state special status species	2.4
Land Use, Visual Resources, and Recreation	
Project location near residences	2.5.1
Impacts on agricultural lands	2.5.1
Socioeconomics	
Concern about property values	2.6.4
Impacts on local traffic from construction traffic	2.6.2
Air Quality and Noise	
Impacts on air quality	2.8
Noise from compressor station operation	2.9
Reliability and Safety	
Concerns about increasing pressure in older pipelines, exposed pipelines, and corrosion	2.10
Concerns about repurposing existing pipelines for NGL	2.11

We received comments recommending that an Environmental Impact Statement (EIS), rather than an EA, be prepared to assess the impacts of the Project. This EA addresses the impacts that could occur on a wide range of resources if the ACRP were approved and constructed and concludes that the impacts associated with the ACRP are limited in scope and could be sufficiently mitigated to support a finding of no significant impact. Consequently, an EA is appropriate and sufficient for disclosing impacts.

3 FERC's eLibrary website at http://www.ferc.gov/docs-filing/elibrary.asp, select "General Search" and enter the docket number excluding the last three digits field (i.e., CP15-88). Select an appropriate date range.

The majority of concerns brought up by commenters were related to the UMTP Project and the future use of the abandoned pipeline to transport products other than natural gas. Although TGP has indicated that UMTP intends to use the abandoned pipeline to transport natural gas liquids (NGL), the eventual disposition of the pipeline after abandonment, whether it would be left idle, converted for another use, or eventually sold to another entity, is not part of TGP's proposed action.

We discuss the UMTP Project in more detail in section 1.7.1; however, if the Commission grants the abandonment, the pipeline would no longer be under the Commission's jurisdiction. Any subsequent construction by UMTP or any other entity related to future use of the abandoned pipeline for NGL transportation would also not be under the Commission's jurisdiction. Further, while the abandonment would allow for whatever future use TGP ultimately decides to undertake, the abandonment would not be the cause of the future use as contemplated by CEQ regulations. Therefore, the EA does not address the potential impacts that could occur after the abandonment as indirect effects.[4] However, this EA does disclose available resource impact information for the UMTP Project in section 2.11.4 to inform stakeholders and decision makers. The U.S. Army Corps of Engineers (COE) and state agencies would be responsible for reviewing environmental impacts of the UMTP Project. A minor portion of the UMTP Project facilities lie within the geographic scope of the cumulative impacts analysis for the ACRP and are included in that analysis (see section 2.11).

We received comments requesting that the Commission deny the Project because it would further induce natural gas production that commenters state would be causally related to the Project. As stated above, the ACRP involves no elements that would involve the production or transport of new natural gas supplies. Our authority under NGA relates only to the interstate transportation of natural gas. FERC does not regulate exploration, production, or gathering of natural gas; that is the purview of individual states. The Commission has previously determined in other natural gas proceedings that environmental effects resulting from natural gas production are generally neither caused by a proposed pipeline (or other natural gas infrastructure) project nor are they reasonably foreseeable consequences of our approval of an infrastructure project, as contemplated by CEQ regulations.[5] In fact, the opposite causal relationship is more likely; that is, once production begins in an area, shippers or end users would support the development of a pipeline to move the produced gas. The purpose of the Project is to abandon certain facilities. We find no sufficient causal link between the proposed Project and additional natural gas production, nor do commenters identify a sufficient link. Therefore, additional natural gas production is not considered in this EA as an indirect effect of the proposed action.

1.5 Proposed Facilities for Abandonment and Replacement

The Project would consist of the abandonment of about 964 miles of pipeline and associated facilities and the construction and operation of new and modified pipeline facilities and additional compression to replace the natural gas capacity of the abandoned facilities. The abandonment would require activities at about 160 sites along the pipeline route. Figure 1-1 provides an overview of the Project area.

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4 Indirect effects are "caused by the action and are later in time or farther in distance but are still reasonably foreseeable." 40 C.F.R. § 1508.8 (2016).

5 *See, e.g., Rockies Express Pipeline, LLC*, 155 FERC ¶ 61,018, PP 23-39 (2016).

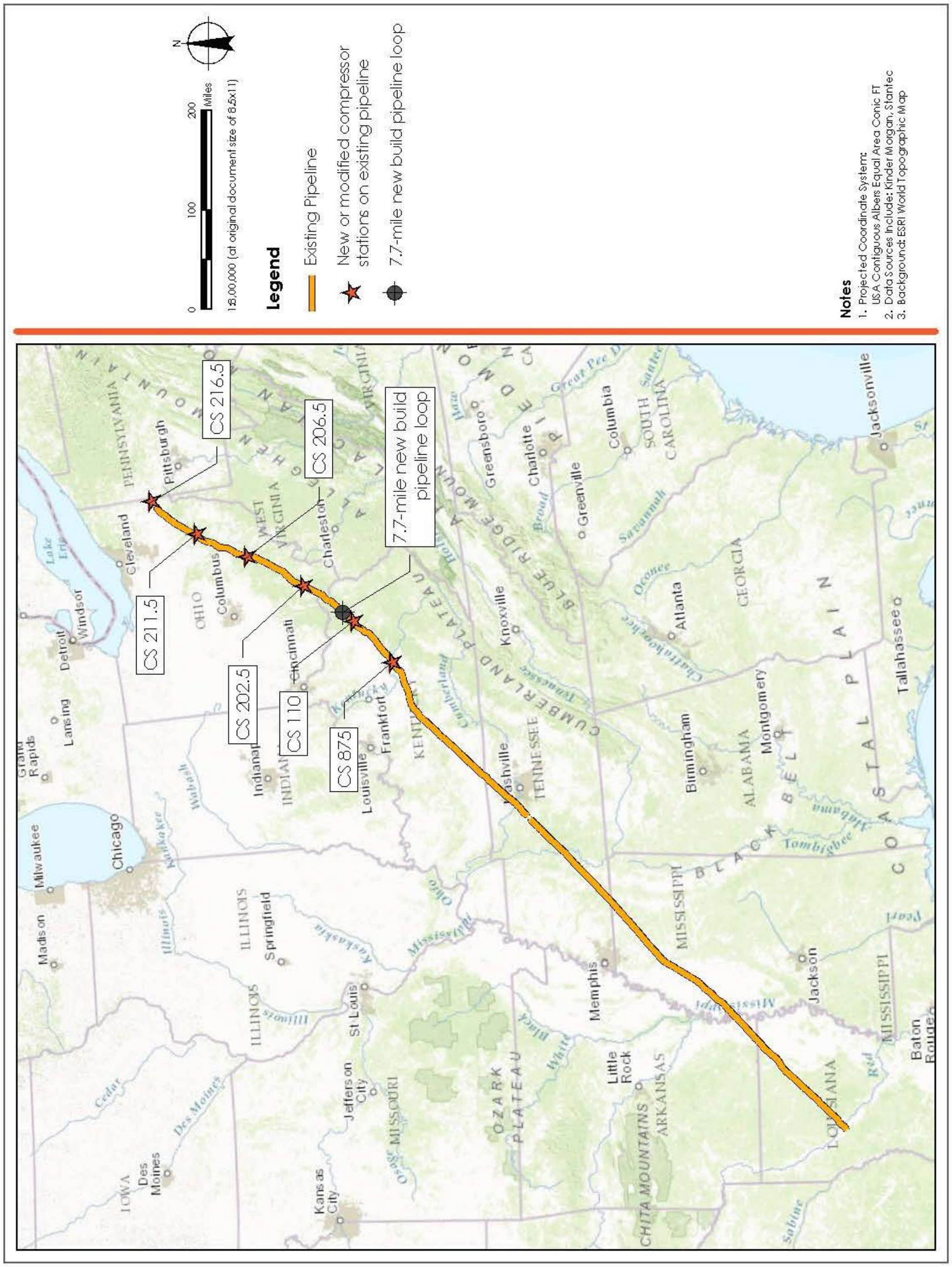

Figure 1-1. Project Overview Map

Activities associated with the abandonment of the pipeline and the necessary modifications to existing aboveground facilities to facilitate the abandonment would include:

- abandonment in place and then transfer by sale of about 964 miles of pipeline between Columbiana County, Ohio, and Natchitoches Parish, Louisiana;
- 14 disconnects of the abandoned pipeline and directly associated equipment at existing Compressor Stations 214, 209, 204, 200, 110, 106, 96, 87, 79, 71, 63, 54, 47, and 40;
- abandonment in place of 82 existing mainline valves (MLVs) associated with the abandoned pipeline;
- 45 sites where taps would be disconnected, abandoned, and relocated (including 12 off-right-of-way tap reconnects); and
- 80 sites where crossover/connector lines that connect the abandoned pipeline to one or more of the adjacent and parallel gas lines would be disconnected and removed (or abandoned in place).

New facilities would include:

- construction of four new compressor stations in Jackson, Morgan, Tuscarawas, and Mahoning Counties, Ohio;
- modification of an existing compressor station in Rowan County, Kentucky;
- modification of an approved compressor station[6] in Madison County, Kentucky;
- construction of 7.7 miles of new 36-inch-diameter pipeline in Carter and Lewis Counties, Kentucky (referred to as the "new-build pipeline"); and
- construction of about 1.0 mile of 30-inch-diameter pipeline replacement in Washington County, Mississippi, and 1.5 miles of 30-inch-diameter pipeline replacements in six sections in Madison County, Kentucky (referred to as the "replacement pipelines").

Appendix A contains general maps showing the locations of the facilities that TGP proposes to abandon and construct. Additional detailed topographic and aerial photograph maps of the Project are available on FERC's eLibrary website.[7] Appendix B shows typical right-of-way configurations and construction techniques that would be used for construction of new facilities. Appendix C contains a table that lists the individual construction and abandonment worksites by milepost (MP) and a brief description. These activities are described in more detail below.

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6 Compressor Station 875 is approved to be built as part of the Broad Run Expansion Project, CP15-77-000.

7 Tennessee's application, including detailed maps, is available on FERC's eLibrary website at http://www.ferc.gov/docs-filing/elibrary.asp by searching Docket No. CP15-88.

1.5.1 Abandonment Activities and Facilities

Pipeline

TGP would abandon in place and then transfer by sale the following pipeline segments:

- 210 miles of 26-inch-diameter pipeline (Line 200-3) from MLV 216 in Columbiana County, Ohio, to Compressor Station 200 in Greenup County, Kentucky;
- 77 miles of 26-inch-diameter pipeline (Line 100-3) from Compressor Station 200 in Greenup County, Kentucky, to Compressor Station 106 in Powell County, Kentucky; and
- 677 miles of 24-inch-diameter pipeline (Line 100-1) from Compressor Station 106 in Powell County, Kentucky, to Compressor Station 40 in Natchitoches Parish, Louisiana.

Off-right-of-way Tap Reconnects

In 12 locations, TGP would disconnect existing customer tap pipelines from the pipeline segment to be abandoned. TGP would then install new small-diameter pipeline to reconnect the tap pipelines to other existing TGP pipelines in the vicinity. New right-of-way would be acquired for the length of these new pipeline segments or "off-right-of-way tap reconnects." The lengths of these 12 new pipeline segments would vary from about 760 feet to over 1 mile. Pipeline diameter would range between 2 and 16 inches. Table 1.5-1 lists the off-right-of-way tap reconnects by county and state.

Table 1.5-1

Off-right-of-way Tap Reconnects

Workspace ID	Length (feet)	Pipeline Diameter (inches)	Nearest Milepost	County/State
OH0030	1,131	4	MP 12.7-211-3	Tuscarawas, OH
OH0110	4,230	3	MP 13.8-205-3	Morgan, OH
KY0080	6,712	2	MP 5.5-109-3	Rowan, KY
KY0170	2,724	2	MP 0.0-103-1	Madison, KY
TN0190	906	2	MP 7.9-79-1D	Hickman, TN
TN0200	1,113	3	MP 8.1-79-1D	Hickman, TN
TN0210/TN0220	757	12	MP 1.9-79-1D	Perry, TN
MS0040	4,489	6	MP 3.5-69-1	Benton, MS
MS0110	790	16	MP 4.4-64-1	Panola, MS
MS0170	2,866	2	MP 0.0-61-1	Quitman, MS
MS0200	1,765	2	MP 4.9-59-1	Tallahatchie, MS
MS0280	2,781	12	MP 3.3-56-1	Sunflower, MS

Activities within Existing Rights-of-way

In 139 locations, TGP would disconnect equipment from the pipeline to be abandoned (see appendix C). All of the following work would be done within the existing pipeline right-of-way or compressor station property:

- 45 tap removals and reconnects;

- 17 disconnections of gas pipeline or "gas disconnects" (including 14 at compressor stations, 2 at the existing pipeline crossing of the Ohio River, and 1 at a site in Mississippi);
- 8 crossover removals and disconnects at river crossings and pig[8] launcher/receivers; and
- 69 crossover removals, disconnect crossovers, or crossover removal and reconnects.

The tap removals and reconnects would require the construction of short pipeline segments (less than 0.1 mile) to reconnect the customer taps to TGP's existing pipeline system. These pipeline segments would be constructed within TGP's existing rights-of-way.

1.5.2 New and Modified Facilities

Compressor Stations

TGP would construct four new compressor stations in Ohio. Compressor Station 216.5 would be in Mahoning County, Compressor Station 211.5 would be in Tuscarawas County, Compressor Station 206.5 would be in Morgan County, and Compressor Station 202.5 would be in Jackson County. Each station would have one natural-gas-driven 20,500 horsepower (hp) compressor unit housed in a new compressor building. Appurtenant facilities at each new compressor station would include a parking area, a compressor station control/auxiliary building, intake and exhaust silencers, a turbine lube oil cooler, a discharge gas cooler, compressor station blowdown silencers, filter-separators with a liquids tank, and electrical power generation.

TGP would also add new natural-gas-driven compressor units to two existing compressor stations. At Compressor Station 110 in Rowan County, Kentucky, two 16,000 hp compressor units would be added for a total of 32,000 additional horsepower. Additionally, one 10,771 hp compressor unit would be added to Compressor Station 875 in Madison County, Kentucky, which would be built as part of the Broad Run Expansion Project (FERC Docket No. CP15-77-000). Appurtenant facilities would be similar to those at the new compressor stations.

At 12 other existing compressor stations, piping and pig launcher/receivers would be connected to existing pipelines after being disconnected from the pipeline that would be abandoned.

New-Build Pipeline

TGP would construct a new 36-inch-diameter, 7.7-mile-long pipeline loop[9] in Carter and Lewis Counties, Kentucky. TGP would connect the new-build pipeline to the existing 100-4 pipeline and relocate an existing pig launcher/receiver from the pipeline to be abandoned to the north end of the new pipeline. The new-build pipeline would closely parallel the route of TGP's existing 100-5 pipeline except between MPs 5.5 and 6.0, where the pipeline would be routed to avoid karst terrain; and between MPs 6.6 and 7.7, where the new pipeline would extend north to connect to TGP's existing 100-7 pipeline.

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[8] A pig is a tool that is used to either clean or inspect the inside of a pipeline.

[9] A loop is a segment of pipeline 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.

Replacement Pipelines

As part of the ACRP, TGP would replace two existing pipeline segments. The purpose of these replacement pipelines would be to allow increased gas throughput in segments where Maximum Allowable Operating Pressure (MAOP) had been reduced in accordance with U.S. Department of Transportation (DOT) regulations published in 49 CFR 192. One replacement pipeline would be near MLV 53 on TGP's existing 30-inch-diameter 100-3 pipeline in Washington County, Mississippi, and would be 1.0 mile long. The second replacement pipeline would consist of six short new segments in Madison County, Kentucky, totaling 1.5 miles. Table 1.5-2 lists the replacement pipeline segments by county and state.

Table 1.5-2

Replacement Pipeline Segments

Workspace ID	Mileposts	Length (miles)	Pipeline Diameter (inches)	County/State
MLV 874 Pipe Replacement –Segment 1	8.2 to 8.7	0.1	30	Madison, KY
MLV 874 Pipe Replacement –Segment 2	11.2 to 11.5	0.3	30	Madison, KY
MLV 874 Pipe Replacement –Segment 3	11.5 to 11.8	0.3	30	Madison, KY
MLV 874 Pipe Replacement –Segment 4	12.0 to 12.4	0.4	30	Madison, KY
MLV 874 Pipe Replacement –Segment 5	12.8 to 12.9	0.1	30	Madison, KY
MLV 874 Pipe Replacement –Segment 6	13.2 to 13.5	0.3	30	Madison, KY
MLV 53 Pipe Replacement	17.8 to 18.8	1.0	30	Washington, MS

1.6 Non-jurisdictional Facilities

Under Section 7 of the NGA, the Commission is required to consider, as part of the decision to approve facilities under Commission jurisdiction, all factors bearing on the public convenience and necessity. Occasionally, proposed projects have associated facilities that do not come under the jurisdiction of the Commission. These "non-jurisdictional" facilities may be integral to the need for the proposed facilities, such as a power plant at the end of a jurisdictional pipeline, or they may be minor, nonintegral components of the facilities under the Commission's jurisdiction. The non-jurisdictional facilities for the Project would include minor facilities necessary to provide power, telephone, and water to the four new compressor stations.

Each new compressor station would require the installation of an electric powerline and potable water line. The construction of these lines within the compressor station boundaries is included in our impact assessment for each compressor station. The impacts associated with construction of the utility lines outside of the compressor station boundaries are included in our cumulative impacts analysis (section 2.11). Information regarding powerlines and water lines is summarized in table 1.6-1.

Table 1.6-1

Non-jurisdictional Power and Water Utilities for New Compressor Stations

Compressor Station (CS)	Facility	Company [a]	Description
CS 202.5	Powerline	AEP/Ohio Power	Approximately 3,600 feet of powerline from existing power facilities along Dan T. Davis Drive north to a transformer at CS 202.5.
	Water	Jackson County Water	Approximately 2,500 feet of water line from existing service line adjacent to Antioch Road south to the property line at CS 202.5. TGP's general contractor would permit and extend the line from the property boundary to the inside the station.
CS 206.5	Powerline	AEP/Ohio Power	Electrical service from a rectifier currently providing power to MLV 207, adjacent to the site.
	Water	West Malta Rural Water District	Water service from an existing water line adjacent to the property line. TGP's general contractor would permit and extend the line from the property line to inside the station.
CS 211.5	Powerline	Guernsey-Muskingum Electric Cooperative	Approximately 3 miles of powerline from an existing service line at the intersection of Watson Creek Road, Rush Church Road, and Crooked Creek Road to the station.
	Water	Twin City Water and Sewer District	Approximately 6,500 feet of water line from an existing line at the intersection of Edie Hill and Newport Lane to the property line at CS 211.5. TGP's general contractor would permit and extend the water supply from the property line to inside the station. After construction, Twin City Water and Sewer District would own the water main. If the water main is not permitted, TGP would permit and construct a well on the property.
CS 216.5	Powerline	Ohio Edison	Electrical service from a service line along Garfield Road adjacent to TGP's property at CS 216.5.
	Water	N/A	Water service would be from existing wells on the property. If use of an existing well is unavailable, TGP would permit and construct a well on the property.

a Company would permit, construct, own, and operate the facility.

1.7 Related Facilities

If the Commission approves the Project, TGP has indicated that it would sell the pipeline to UMTP. UMTP would use the abandoned pipeline for transporting natural gas liquids (NGL), which could include propane, butane, condensate, or gasoline. These actions are not under the Commission's jurisdiction and are not part of the proposed Project; however, in the EA we are providing the public and the Commission with the available information on the associated impacts of the UMTP Project. Some of the impacts of the UMTP Project would be in proximity to the ACRP, which could result in cumulative impacts. However, some impacts would be too far removed to be considered cumulative with the Project. A brief overview of the UMTP Project is given below (see section 1.7.1) and a more detailed description is presented in the cumulative impacts analysis in section 2.11.4.

TGP states that it would perform a number of upgrades and modifications to the abandoned pipeline once TGP receives the requested certificate and abandonment authority but before transferring the abandoned pipeline to UMTP. This work is described in section 1.7.2.

1.7.1 UMTP Project

If the Commission approves the abandonment and construction of new facilities, TGP states that it plans to sell the 964-mile-long abandoned pipeline to UMTP. TGP adds that UMTP would then construct the UMTP Project to transport NGLs from existing processing plants in Ohio to Mont Belvieu, Texas. TGP notes that the UMTP Project would have an initial design capacity of 150,000 barrels per day of NGL, with the ability to deliver up to about 450,000 barrels per day of NGL to facilities on the Gulf Coast. The UMTP Project would also construct new facilities, including:

- construction of about 202 miles of new 24-inch-diameter pipeline (50.4 miles in Louisiana and 151.4 miles in Texas);
- construction at 212 sites where segments of pipe with old connections to existing natural gas pipeline systems would be replaced with straight pipe;
- installation of new liquid MLVs at 35 locations;
- abandonment in place and installation of short new pipeline segments using horizontal directional drilling at the Ohio, Dix, Tennessee, and Red River crossings;
- installation of short pipeline segments at existing TGP Compressor Stations 87, 96, 209, and 214 in order to bypass the compression units that would be disconnected as part of the ACRP;
- construction of the Tuscarawas NGL Storage Facility in Tuscarawas, Ohio (storage and distribution terminal that would receive up to 109.5 million barrels of petroleum liquids annually by pipeline);
- construction of about 6.0 miles of new 24-inch-diameter pipeline near Dickson, Tennessee;
- construction of about 2.3 miles of new 24-inch-diameter pipeline near Snow Lake Shores, Mississippi;
- construction of about 29.1 miles of two new multi-pipeline laterals, known as the Scio-Hopedale Lateral and the Lewis Branch Lateral;
- construction of 4 new meter stations; and
- construction of 23 new NGL pump stations between northern Ohio and Jasper County, Texas.

More information about the UMTP Project and its impacts is provided in section 2.11.

1.7.2 Wrinkle Bends

To prepare the abandoned line for transfer, TGP would remediate sections of the pipeline that were installed using wrinkle bends during the pipeline's construction in the 1950s. Wrinkle bends are no longer used for bending pipe to conform to the contour of the land. TGP would replace about 40 feet of pipe where each wrinkle bend occurs. The affected construction area would be mostly within the existing right-of-way using an area about 75 feet wide by 250 feet long (about 0.4 acre).

TGP estimates that as many as 2,800 wrinkle bend locations may be replaced, resulting in impacts on up to 1,200 acres of existing right-of-way. The actual number of replacements would be determined by a full survey with field verification. TGP would conduct most of this work within existing right-of-way. In some instances, wrinkle bend replacements would require limited work outside of previously disturbed areas. As the locations for remediation of wrinkle bends is unknown, determining the specific resources that may be affected would be speculative at this time. Consequently, impact information for specific resources is not available for analysis in this EA. It is also unknown whether the remediation segments would be close enough to other work proposed under ACRP to be cumulative. However, we have included the estimated footprint with an approximation of impacts in our cumulative impacts analysis (see section 2.11).

1.7.3 Section 2.55(b) Activities

The types of construction activities allowed under Section 2.55(b) of the NGA are replacements that involve only basic maintenance or repair to relatively minor facilities, and where the existing Certificated right-of-way or previously approved workspaces that were used to construct the original facilities are sufficient for these replacement activities. The work must comply with all environmental restrictions of the original Certificate as well as other applicable federal and state laws.

As part of the Project, TGP would construct and operate miscellaneous appurtenances at existing compressor stations and mid-line valves. This work would occur either within fenced compressor station yards or on existing TGP pipeline rights-of-way. Installation of some of the new equipment at the four new compressor stations and some of the work at Compressor Station 110 and Compressor Station 875 are activities that would be classified under Section 2.55(b) of the NGA. This work would include appurtenances such as buildings, cathodic protection systems, and Supervisory Control and Data Acquisition (SCADA) equipment. Connection of the new-build pipeline to the existing 100-4 pipeline also would be classified as a Section 2.55(b) activity. These activities have been included in our environmental analysis and are included in appendix C.

1.8 Land Requirements

The ACRP would require disturbance of about 533 total acres, including about 409 acres of land outside of TGP's existing pipeline right-of-way and about 124 acres of land within its existing right-of-way. Table 1.8-1 presents the land required for abandonment and construction of new facilities.

Table 1.8-1

Summary of Land Requirements Associated with the Project

Activity/Work Location	Land Affected during Construction/Abandonment (acres)	Land Affected during Operation (acres)
Abandonment Actions and Facilities		
Off-right-of-way Tap Reconnects [a]	69.3	45.2
Other Facilities [b]	125.2	102.0 [c]
Subtotal	194.7	147.2
New and Modified Facilities		
New-build Pipeline [a]	124.4	46.6
Pipe and Contractor Yards	46.5	0.0
New Compressor Stations: CS 202.5, CS 206.5, CS 211.5, and CS 216.5	96.4	51.4
MAOP Restoration Replacement Pipelines	24.0	0.0
Modifications to CS 110 and CS 875	27.1	2.7
New and Modified Access Roads	19.9	8.1
Subtotal	314.4	108.8
Project Total	532.3 [d]	256.0 [d]

a Includes additional temporary workspace.

b Includes gas disconnects, tap removals and reconnects, and crossover removals and reconnects.

c In areas where UMTP and ACRP workspaces overlap, TGP included the acreages in the ACRP application as operational impacts. We have taken a conservative approach in assessing these impacts in overlap areas and included these acreages in the Project total.

d Includes about 124 acres that would be within TGP's existing permanent right-of-way.

Reconnecting some taps would require acquisition of new right-of-way. These tap reconnections have been identified as "off-right-of-way tap reconnects." New permanent right-of-way for the off-right-of-way tap reconnects would be 50 feet wide. The construction right-of-way width would vary based on the diameter of the tap pipeline and land type, but would be no greater than 75 feet. Location maps for the off-right-of-way tap reconnects are included in appendix A.

Following compressor station construction, land outside of the operational footprint would be restored to preconstruction conditions. The remaining land would be retained to operate and maintain the facilities.

For the new-build pipeline in Kentucky, TGP would use a 125-foot-wide construction right-of-way. Following construction, the permanent right-of-way would be 50 feet wide and would be maintained in an herbaceous state.

For the replacement pipelines in Kentucky and Mississippi, TGP would use a 75-foot-wide construction right-of-way. Following construction, the permanent right-of-way would be 50 feet wide and would be maintained in an herbaceous state.

TGP would use pipe and contractor yards temporarily during Project construction and would restore these areas to pre-existing conditions after construction, with no permanent impact. These yards are listed in table 1.8-2. The pipe and contractor yard for the new-build pipeline would be about 500 feet south of MP 4.9. Compressor station sites would also be used as contractor staging areas.

Table 1.8-2

Pipe and Contractor Yards

Yard ID	County/Parish	Existing Land Use Classification	Acres
Ohio			
CS 204	Athens	Agricultural, Commercial/Industrial	7.0
CS 209	Guernsey	Agricultural, Commercial	0.7
CS 214	Carroll	Agriculture	1.9
		Ohio Subtotal	**9.6**
Kentucky			
CS 106	Powell	Commercial/Industrial	1.9
CS 110	Rowan	Commercial/Industrial	4.5
ATWS.010	Carter	Open Land	6.7
CS 200	Greenup	Open Land	1.0
		Kentucky Subtotal	**14.1**
Tennessee			
CS 71	Hardeman	Commercial/Industrial	5.1
CS 79	Perry	Open Land	5.0
CS 87	Sumner	Commercial/Industrial	2.3
		Tennessee Subtotal	**12.4**
Mississippi			
CS 54	Washington	Commercial/Industrial	0.8
CS 63	Panola	Open Land	2.5
		Mississippi Subtotal	**3.3**
Louisiana			
CS 40	Natchitoches	Open Land, Commercial/Industrial	3.9
CS 47	Ouachita	Commercial/Industrial	3.2
		Louisiana Subtotal	**7.1**
		Project Total	**46.5**

Additional temporary workspace (ATWS) would be required for construction at areas of steep slopes, at road and waterbody crossings, for safety concerns, and for other potential site-specific constraints. Appendix C lists locations of ATWS. Additional or alternative areas could be identified in the future due to changes in site-specific construction requirements. TGP would be required to file information on each of those areas for review and approval prior to use. ATWS would be returned to pre-construction conditions and land uses following construction.

TGP has identified a total of 14 access roads that would be constructed or improved during construction of the new and modified facilities as shown in table 1.8-3. These include six new roads for accessing the new compressor stations, of which five would also be used permanently for operations. Two existing roads would be improved for modifications at Compressor Station 110; one of these roads would continue to be used during operations. Five existing roads would be improved for temporary use during construction of the new-build pipeline and one new access road would be used both for construction and for permanent access during operation of the pipeline. Existing access road improvements may include grading, matting, and/or top dressing with gravel, as needed, within the previously disturbed road width. TGP would not use access roads for abandonment of facilities. Workspaces would be accessed through public roadways or TGP's existing permanent right-of-way, except for the MLV 874 replacement pipeline in Madison County, Kentucky. TGP would use an existing private unpaved road to access the MLV 874 replacement pipeline. This existing private access road is currently used by TGP to access its existing pipelines and the road would not require improvement.

Table 1.8-3

Proposed Access Roads

Access Road ID (or MP) [a]	County	Access Road Type	Description [b, c]	Land Use	Road Width (feet)	Length (feet)	Acres
Ohio							
CS 202.5 (OH0155)	Jackson	New Permanent	New permanent access to CS 202.5	Open Land/ Agricultural/ Forest	30	2,798	2.8
CS 202.5 (OH0155)	Jackson	New Temporary	New temporary access to workspace for CS 202.5	Open Land	31	475	0.4
CS 206.5 (OH0095)	Morgan	New Permanent	New permanent access to CS 206.5	Agricultural/ Forest	30	321	1.1
CS 211.5 (OH0025)	Tuscarawas	New Permanent	New permanent access to CS 211.5	Agricultural	30	1,900	2.0
CS 211.5 (OH0025)	Tuscarawas	New Temporary	New temporary road to access both workspace and construction area for CS 211.5	Agricultural	30	1,954	1.3
CS 216.5 (OH0003)	Mahoning	New Permanent	New permanent access to CS 216.5	Industrial/ Commercial	30	1,634	2.2
						Ohio Subtotal	**9.8**
Kentucky							
CS 110 (KY0070)	Rowan	Existing Temporary	Improvement to existing road to access workspace area for CS 110	Industrial/ Commercial	20	519	0.6
CS 110 (KY0070)	Rowan	Existing Permanent	Existing permanent access to CS 110	Industrial/ Commercial	20	646	0.0
MP 2.9 [b]	Carter	Existing Temporary	Improvement to existing road to access new-build pipeline work area	Industrial/ Commercial	20	3,044	1.4
MP 3.2	Carter	Existing Temporary	Improvement to existing road to access new-build pipeline work area	Industrial/ Commercial	20	5,132	2.4
MP 3.6	Carter	Existing Temporary	Improvement to existing road to access new-build pipeline work area	Industrial/ Commercial	20	1,383	0.6
MP 5.4	Carter	Existing Temporary	Improvement to existing road to access new-build pipeline work area	Industrial/ Commercial	20	3,720	1.7
MP 6.3	Carter	Existing Temporary	Improvement to existing road to access new-build pipeline work area	Industrial/ Commercial	20	6,823	3.1
MP 7.7	Carter	New Temporary	New temporary road to access new-build pipeline work area	Open Land/ Forest	20	765	0.3
						Kentucky Subtotal	**10.1**
						Project Total	**19.9**

CS = compressor station

a MP for new-build pipeline indicates the point at which the access road connects with the pipeline right-of-way, or closest MP to right-of-way if there is no direct connection.

b Existing roads include farm roads, two-track roads, gravel roads, and driveways. New roads do not have an existing travel footprint.

c Substrate of new and existing access roads includes grass, soil, and gravel.

1.9 Construction Schedule and Workforce

TGP anticipates that construction activities would begin after receipt of the necessary permits and approvals and would last about 2 years.

One construction spread would be used for the new-build pipeline and would require about 120 workers for 6 to 8 months. Compressor station construction would require about 110 workers for 7 to 9 months. Construction activities at the compressor station sites would be generally conducted concurrently, although special trade craft workers may work sequentially on the compressor stations. Construction of each of the off-right-of-way tap reconnects is anticipated to take about 4 to 6 months, and abandonment activities would require 12 to 18 months. TGP has not determined the construction schedule for the replacement pipelines but estimates a construction workforce of 100 for the replacement pipelines. TGP would hire three to five additional permanent staff for operation of the new Project facilities.

1.10 Construction, Operations, and Maintenance Procedures

The Project facilities would be designed, constructed, operated, and maintained in accordance with applicable requirements defined by DOT regulations in 49 CFR 192, *Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards*; by FERC's *Siting and Maintenance Requirements* in 18 CFR 380.15; and by other applicable federal and state safety regulations.

TGP would implement FERC's *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures), with alternative measures, referred to herein as TGP's Plan and Procedures. FERC's Plan and Procedures were developed to minimize the environmental impact of construction and operation of interstate natural gas transmission facilities.[10] TGP would implement the FERC Plan without modification. However, TGP is proposing several modifications or alternative measures to the FERC Procedures. TGP's proposed Procedures and alternative measures are described in section 2.2.3.

TGP would also implement additional construction, restoration, and mitigation plans prepared for the Project. These plans include the following:

- procedures guiding the discovery of unanticipated cultural resources and human remains;
- site-specific residential plans;
- *Plan for the Unanticipated Discovery of Potentially Contaminated Soils or Groundwater*;
- *Invasive Species Management Plan*; and
- *Winter Construction Plan*.

[10] Our Plan and Procedures can be accessed at FERC's website, http://www.ferc.gov/industries/gas/enviro/plan.pdf and http://www.ferc.gov/industries/gas/enviro/procedures.pdf.

We have reviewed TGP's general construction and mitigation plans and find them to be acceptable. Plans not attached to this EA are available for viewing on our website.[11]

1.10.1 Abandonment Activities

Abandonment of the pipelines would, in general, be accomplished in place with minimal ground disturbance. Disconnecting activities would require excavation within defined workspaces. For the purpose of this EA, we assumed the entire portion of each workspace would be affected by ground disturbance.

At each site that requires excavation, vegetation would be cleared and topsoil would be stockpiled. TGP would avoid positioning heavy machinery over existing buried facilities while excavating to expose the target equipment. Table 1.10-1 summarizes the types of activities that would be conducted as part of the pipeline abandonment.

Table 1.10-1

Abandonment Activities

Activity	Description
Gas Disconnect	Once the section is isolated from the active pressurized pipeline, the tee assembly would be cut out and an elbow would be installed or a riser capped in order to isolate the pipeline to be abandoned. Compressor station disconnects would occur within the fenced yard and pipeline disconnects within the right-of-way.
Tap Removal	Once the section is isolated, the tap valve would be cut out and a straight pipe would be installed. Tap removals would occur within the existing right-of-way.
Tap Removal/Reconnect	Once the section is isolated, the tap valve would be cut out and a straight pipe would be installed in its place. A new tap valve would be installed on an adjacent pipeline and the tap connected. At individual sites, additional trenching and installation of pipeline may be required to make the new connections. Reconnection may occur on or off-right-of-way.
Crossover Removal	Once the section is isolated, the tee assembly would be cut out and a straight pipe would be installed in its place. A weld cap may be placed on the riser. Most of this work would be on existing right-of-way.
Crossover Removal/Reconnect	Once the section is isolated, the tee assembly would be cut out and a straight pipe would be installed in its place. An elbow would be installed to reconnect the adjacent pipeline. Most of this work would be on existing right-of-way.

1.10.2 General Pipeline Construction Procedures

Construction procedures would be similar for the new-build pipeline and the new small-diameter on- and off-right-of-way tap pipelines that would be replacements for the taps relocated from the line to be abandoned.

Standard pipeline construction consists of specific activities that make up a linear construction sequence. Figure 1-2 depicts the typical sequence of cross-country pipeline construction. Prior to construction, TGP's survey contractor would stake the pipeline centerline and the limits of the construction right-of-way, ATWS, road crossings, and access roads. Wetland boundaries and other environmentally sensitive areas would also be marked at this time.

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[11] Tennessee's application and supplemental filings are available on FERC's eLibrary website, http://www.ferc.gov/docs-filing/elibrary.asp, by searching Docket No. CP15-88.

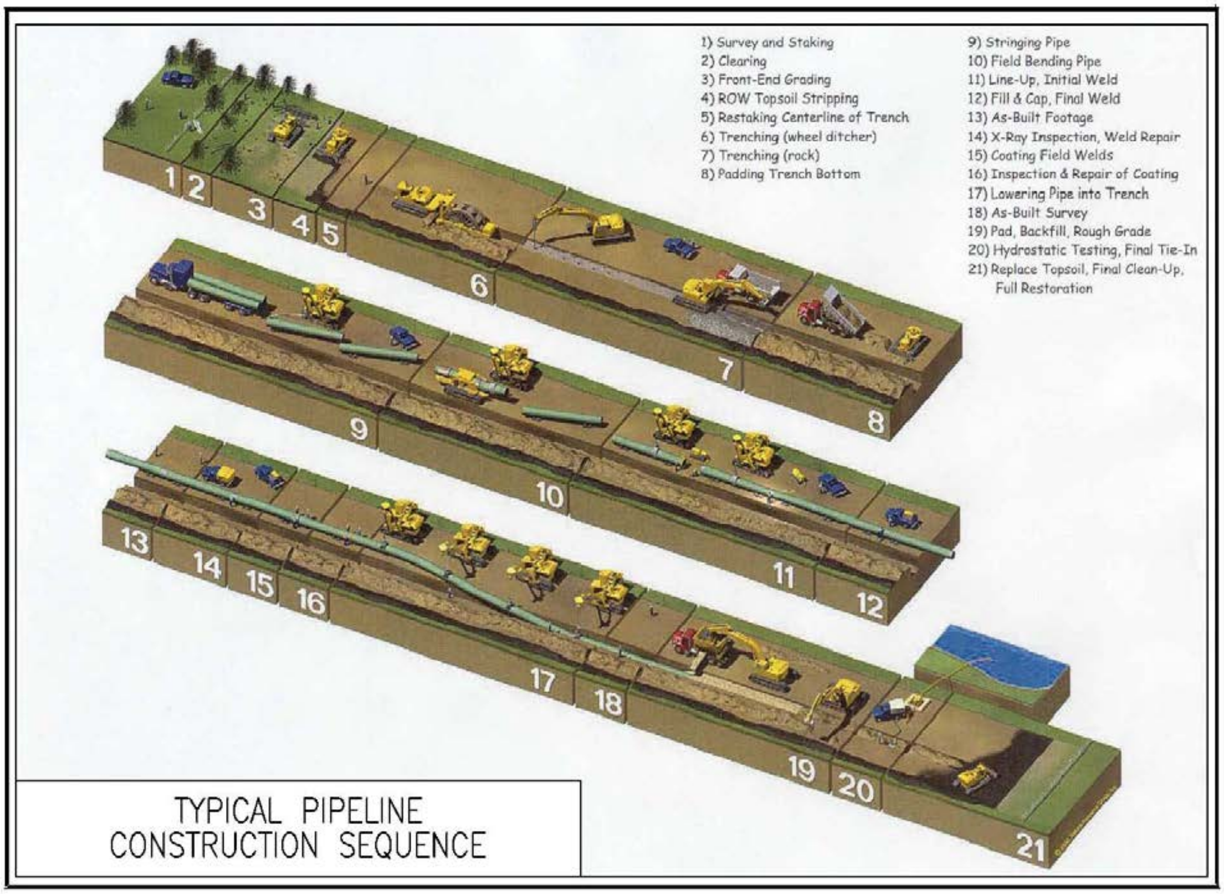

Figure 1-2. Typical Pipeline Construction Sequence

Prior to ground-disturbing activities, TGP's construction contractor would contact the appropriate "one-call" or "811" utility-locating call systems for the Project area to identify underground utilities and foreign pipelines so their locations could be marked. Temporary soil erosion and sedimentation control devices would be installed as needed in accordance with TGP's Plan and Procedures. These erosion and sediment controls would be inspected and maintained throughout construction and restoration of the Project.

A clearing crew would then clear workspaces of vegetation and other obstacles, as needed, using heavy equipment. TGP would minimize tree removal during construction to the extent practicable. Cleared vegetation and stumps would be chipped (except in wetlands), hauled off site to a commercial disposal facility, or otherwise handled per individual landowner agreements. Following clearing, the construction right-of-way and ATWS areas would be graded with bulldozers and backhoes where necessary to provide a level work surface. Topsoil would be segregated within the sites of the new compressor stations, in residential and agricultural areas, and in wetlands in accordance with TGP's Plan and Procedures. Where topsoil segregation is required, TGP would segregate up to 12 inches of topsoil. In accordance with its Plan and Procedures, TGP would stabilize topsoil piles and minimize loss due to wind and water erosion with use of sediment barriers, mulch, temporary seeding, tackifiers, or functional equivalents, where necessary.

Individual sections of pipe (generally in 40-foot lengths) would be trucked to the construction right-of-way and strung along the trench line in a single, continuous line using sideboom tractors. Typically, a track-mounted, hydraulic pipe-bending machine would tailor the shape of the pipe to conform to the contours of the terrain. The sections of pipe would then be welded together into long "strings" and placed on temporary supports. TGP would conduct and inspect welding in compliance with 49 CFR Part 192 and American Petroleum Institute standards. All pipe welds would be inspected visually and radiographically for defects, repaired, if necessary, and coated to prevent corrosion prior to lowering the pipe into the trench.

TGP would trench with crawler-mounted, rotary wheel-type trenching machines or track-mounted excavators. Excavated soils would be stockpiled along the right-of-way, typically on the side of the trench away from the construction traffic and pipe assembly area (the "spoil side"). Where TGP has committed to topsoil segregation as described above, subsoil would be stored adjacent to the trench within the construction right-of-way limits and maintained separately from topsoil piles. The depth of trench excavation would vary depending on the diameter of pipe (24 or 36 inches) and location, but would typically have a depth of about 6 to 7 feet to allow for a minimum of 3 feet of cover over the pipeline, or any associated appurtenances, after construction. This excavation depth exceeds the requirement set forth in 49 CFR Part 192. TGP would provide 5 feet of cover at road and stream crossings and about 4 feet of cover in some cropland areas, depending on the type of crop and based on consultation with the landowner.

Prior to lowering the pipe into the trench, TGP would inspect the trench to ensure that it is free of rocks and other debris that could damage the pipe or its protective coating. The pipe would then be lifted from the temporary supports and lowered into the trench using a number of side-boom tractors. As necessary, trench breakers (stacked sand bags or foam) would be installed in the trench around the pipe in steeply sloped areas to control movement of subsurface water along the pipeline. After lowering-in, final welds would be made in the trench by the tie-in crew. Once the tie-ins are complete, the trench would be backfilled with previously excavated materials. If excavated materials are too rocky to be used as backfill, TGP would obtain more suitable fill material from a commercial borrow area or would mechanically screen the excavated materials to remove rocks. TGP would then backfill the area immediately around and 8 inches above the pipe in the trench. Topsoil would not be used to pad the pipe. TGP would use backhoes, front-end loaders or specialized padding machines for backfilling the trench. Previously graded areas would be returned to original contours as near as practicable with a slight crowning at the top of the trench to allow for settling.

Following backfilling and before they are placed into service, TGP would hydrostatically test new pipeline segments to ensure that they are capable of operating 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. Any leaks detected would be repaired, and the segments that are repaired would be retested. About 2.2 million gallons of water would be needed to test the new-build pipeline. The water would be obtained from a previously permitted source (municipal water, water well, or commercial source) and trucked to the fill points. For hydrostatic testing of the off-right-of-way tap reconnects, TGP would withdraw water from municipal sources except for MS0040 in Benton County, Mississippi, where TGP plans to withdraw water from and discharge it to Reaves Pond. The volumes of water needed to test the off-right-of-way tap reconnects are listed in section 2.2.2. TGP would discharge the water in accordance with applicable permits and its Plan and Procedures.

TGP would begin final cleanup after backfilling and as soon as weather and site conditions permit. Efforts would be made to complete final cleanup (including final grading and installation of permanent erosion control devices) within 20 days after the trench is backfilled. In residential areas, cleanup and restoration would take place within 10 days of backfilling.

During cleanup, TGP would remove construction debris from the right-of-way. Preconstruction contours would be restored as closely as possible to pre-existing conditions. Segregated topsoil would be returned to the stripped area, and permanent erosion controls would be installed. TGP would implement revegetation measures in accordance with permit requirements and its Plan and Procedures, and based on consultations with the local soil conservation authority or other applicable agencies. Private and public property modifications, such as fences, gates, driveways, and roads disturbed by construction, would be restored to original or better condition.

Markers showing the location of the pipeline would be installed at fence and road crossings to identify TGP as the owner and convey emergency information in accordance with applicable government regulations, including DOT safety requirements.

1.10.3 Specialized Pipeline Construction Procedures

Waterbody Crossings

TGP would cross one perennial waterbody using the conventional bore method, which is described below under road crossings. TGP would cross all other perennial waterbodies using a dry open-cut crossing method. Intermittent and ephemeral waterbodies with flow at the time of crossing also would be crossed using a dry open-cut crossing method. Intermittent and ephemeral waterbodies with no discernable flow at the time of crossing would be crossed using standard upland construction methods. TGP does not anticipate using horizontal directional drill methods. Pipelines would have a minimum of 4 feet of cover from the waterbody bottom to the top of the pipeline in normal soils and 2 feet in consolidated rock.

A dry open-cut crossing method involves the installation of a flume pipe(s) and/or dam and pump prior to trenching, to divert the stream flow over or around the construction area. The dam-and-pump method involves installing temporary dams upstream and downstream of the proposed waterbody crossing, typically using sandbags and plastic sheeting. Following dam installation, appropriately sized pumps with hoses would be used to transport the streamflow around the construction work area and trench. Additional pumps would be used to dewater the area between the dams. Intake screens would be installed at the pump inlets to prevent or limit entrainment of aquatic life, and energy-dissipating devices would be installed at the pump discharge point to minimize erosion and streambed scour. Trench excavation and pipe installation would then commence through the dewatered and relatively dry portion of the waterbody channel. After pipe installation, backfilling of the trench, and restoration of the stream banks, the temporary dams would be removed, and flow through the construction work area would be restored. The dam-and-pump method is typically used at waterbodies where pumps and hoses can adequately transfer stream flow volumes from upstream of the work area to downstream of the work area, and there are no concerns with preventing the passage of aquatic organisms.

A flume crossing temporarily directs the flow of water through one or more flume pipes placed over the area to be excavated. Trenching would then occur across the waterbody and underneath the flume pipes without reducing downstream water flow. After pipeline installation, backfilling of the trench, and restoration of the stream banks, the flume pipes would be removed. This crossing method generally minimizes downstream turbidity during trenching by allowing excavation under relatively dry conditions.

Wetland Crossings

TGP would delineate and mark wetland boundaries in the field prior to construction activities. Woody vegetation within the construction right-of-way would be cut at ground level and removed from the wetlands, leaving the root systems intact. TGP would limit pulling of tree stumps and grading activities to the area directly over the trench line unless it is determined that safety-related construction constraints require otherwise. TGP would install temporary sediment control devices as necessary after initial disturbance of wetlands or adjacent upland areas to prevent sediment flow into wetlands in accordance with its Plan and Procedures. These devices would be maintained until revegetation of the wetlands is complete. TGP would install trench plugs as necessary to maintain wetland hydrology. Construction equipment operating in wetland areas would be limited to that needed to clear the right-of-way, dig the trenches, install the pipeline, backfill the trenches, and restore the right-of-way.

TGP would strip topsoil from the area directly over the trench line (except in areas of standing water or in saturated conditions) and stockpile it separately from the subsoil. Following pipeline installation, TGP would backfill the trenches with subsoil and the topsoil would be replaced in accordance with its Plan and Procedures.

Specific wetland crossing procedures would depend on the level of soil stability and saturation encountered during construction. In saturated wetlands, TGP would stabilize the right-of-way using timber mats to allow for stable, safe working conditions. In unsaturated wetlands, TGP would use typical upland construction procedures, but would use mats to minimize disturbance to wetland hydrology and maintain soil structure. Unless soils are saturated or inundated, TGP would segregate up to the top 12 inches of wetland topsoil over the trench line. Trench spoil would be temporarily stockpiled in a ridge along the pipeline trench. Gaps in the spoil pile would be left at appropriate intervals to provide for natural circulation or drainage of water. Before the trench is dug, TGP would assemble the pipeline in a staging area located in an upland area. After the pipeline is lowered into the trench, wide track bulldozers or backhoes supported on timber mats would be used for backfill, final cleanup, and grading. This would minimize the amount of equipment and travel in wetland areas. Floats would be attached to the pipe to achieve positive buoyancy, if warranted. After the pipe is floated into place, the floats would be cut and removed and the pipe would settle to the bottom of the trench. TGP would use excavated material as backfill in the trench. Excess soil would be removed rather than mounded over the pipeline in an effort to maintain groundwater and surface flow patterns within the wetland. After the trench is backfilled, timber mats would be removed during rough grading and final cleanup, and preconstruction contours of each wetland would be restored.

TGP would install permanent erosion control measures in accordance with its Plan and Procedures, and stabilize temporarily disturbed areas within wetlands with a cover species, such as annual ryegrass, as soon as weather conditions permit. The construction right-of-way would then be allowed to return to preconstruction conditions using the original seed stock contained in the conserved topsoil layer.

Rugged and Steep Terrain

Surveys indicate there are a number of areas along the new-build pipeline in Kentucky with steep slopes. During construction in steep slope areas, temporary and permanent trench breakers (sandbags, compacted subsoil, or foam) would be used to minimize the volume and velocity of water flowing in the trench. TGP would also install slope breakers to control the movement of water through and across the right-of-way and reduce erosion.

In areas of steep side slopes, TGP would grade and cut the upslope side of the construction right-of-way. The soils removed from the cut would be used to fill the downslope side of the right-of-way to establish a level surface on which heavy equipment can be safely operated. TGP would take measures to prevent rocks from rolling off the right-of-way, such as using reinforced silt fencing to intercept smaller rocks, making indentations during excavation to prevent large rocks from rolling out of the construction workspace, and stockpiling rock on the upslope side. TGP would retrieve rocks that roll off the right-of-way.

Following pipeline installation and backfilling, TGP would place excavated materials back in the area of the cut, compact the soil to restore the surface of the right-of-way to original contours (as practicable), install permanent erosion control devices if necessary, and stabilize the surface in accordance with TGP's Plan and Procedures. Right-of-way restoration would begin within 10 days of pipeline installation.

Rugged and steep terrain would require the use of ATWS and a construction right-of-way width of 125 feet. A typical right-of-way construction cross-section for steep slope areas is depicted in appendix B.

Residential Areas

In residential areas, TGP would use specialized construction techniques to minimize impacts on the residential units. TGP would notify residents at least 5 days prior to start of construction. Work areas would be fenced and warning signs posted. Mature trees and landscaping would be preserved to the extent possible and dust and litter would be controlled.

TGP has prepared site-specific construction plans for properties with residences within 50 feet of the construction workspace (see section 2.5.1). In these areas, special techniques such as sewer-line or drag-section construction would be used to minimize impacts. The sewer line method would be used to install one joint of pipe at a time, with the welding, x-ray, and coating activities all conducted in the open trench. At the end of each day, TGP would backfill the newly installed pipe or cover the trench with steel plates or timber mats. The drag-section construction method involves installing a prefabricated length of pipe containing several segments. The pipe would be dragged into the trench and backfilled or covered with steel plates or timber mats at the end of each day.

The trench would be open only during working hours, as negotiated with the landowners, and steel plates would be temporarily placed over the trench. Within 10 days of the pipe being laid, the trench would be backfilled. Within 10 days of backfilling, weather permitting, final cleanup, grading, and installation of permanent erosion control devices would be completed. Lawns would be raked and restored per landowner agreements, and ornamental shrubs replaced when possible. Private property that was removed for construction would be replaced, and sidewalks, driveways, and roads would be restored to original or better condition.

With landowner approval, TGP would test water wells within 200 feet of construction workspaces before and after construction. If a well is damaged during construction, TGP would work with the landowner to repair, replace, or remediate the well.

Agricultural Areas

Construction in agricultural areas would be conducted in a manner similar to conventional pipeline construction. However, TGP would implement additional measures to conserve topsoil. Up to 12 inches of topsoil, unless otherwise specified by the landowner, would be segregated from subsoil. TGP would store topsoil and subsoil in separate windrows along the construction right-of-way to prevent soil mixing. Subsoil would be used to initially backfill the trench, and then the topsoil would be reapplied to the top of the trench and the graded right-of-way. TGP would remove rocks from the top 12 inches (topsoil layer) or from the existing subsoil horizon to a level such that the construction right-of-way is similar to surrounding areas. After trench backfill is complete and prior to topsoil replacement, subsoil compaction would be eliminated using a deep shank heavy-duty subsoiler. All excess rock would be removed from the surface of the subsoil or handled in accordance with individual landowner agreements prior to topsoil replacement.

Road Crossings

TGP would cross roads using open cut or conventional bore methods. Most roads along the proposed pipelines and one waterbody would be crossed via conventional bore. Conventional boring entails digging bore pits on each side of the crossing. On one side, a boring machine with an auger is used to drill a hole beneath the feature to be crossed and install the pipe. Once the pipe is installed, the pits are backfilled with the soil that was removed and the bore pit locations are restored.

Shallow Bedrock and Blasting

If shallow bedrock is encountered during trenching, TGP would use a variety of methods to remove the rock, depending on its hardness, fracture susceptibility, and location. Softer rock can be excavated conventionally by a backhoe or ripped by a bulldozer. More competent rock may require hammering with a pointed backhoe attachment or a pneumatic rock hammer, followed by backhoe excavation. TGP does not anticipate that blasting would be needed for the Project, but if blasting is required, TGP would implement its blasting plan, as described further in section 2.1.1.

Foreign Utility Crossing

The proposed pipeline loops would cross an existing natural gas pipeline, a gas main, a water line, a sanitary sewer line, and an overhead electric transmission line. The pipelines would typically be installed under existing pipelines, water lines, or sewer lines to maintain the required depth of cover over the pipelines along with a safe separation between the lines during construction and operation. ATWS for topsoil and spoil storage would likely be required for these types of crossings due to the increased depth of excavation. ATWS would also be required at existing pipeline crossings, including crossovers of the pipelines with which the proposed loops would be collocated, to provide workaround space to avoid driving and operating equipment over active pipelines. To install the pipeline underneath an overhead electric transmission line, alternating current mitigation would be used, which includes grounding all equipment, monitoring induced currents, and marking the location of overhead lines with appropriate signage.

1.10.4 Aboveground Facilities

At the new compressor station sites, survey crews would stake construction limits and buffer zones, and areas that would not be disturbed by construction. Vegetation within work areas would be removed and the site would be graded. Topsoil from work areas would be segregated and protected during construction. As stipulated in TGP's Plan, temporary erosion control would be installed immediately following initial ground disturbance.

TGP would excavate foundation sites with piles and pour reinforced concrete foundations to support the new compressor units and buildings. Once the foundations are completed, TGP would erect buildings and install piping and electrical conduit systems. Some of the buildings would be built onsite, and others would be prebuilt, modularized buildings brought to the site and installed on the constructed foundations. Buildings and utilities would be weatherized after installation.

TGP would hydrostatically test the compressor station piping before the final connection to its existing natural gas pipeline system. Test water would be obtained from a municipal or commercial water source, trucked to the site, and stored in tanks. Pipeline connections would also be tested and site cleanup would commence. Except where cut and fill is required, work areas would be graded to match preconstruction contours and drainage patterns. TGP would reseed areas disturbed by construction with turf seed mix and install permanent erosion control measures following its Plan and Procedures. Excess materials would be disposed of at a licensed commercial disposal facility in accordance with applicable laws.

TGP would check and test all controls, safety equipment, and systems (including emergency shutdown, relief valves, gas and fire detection, engine over speed, and vibration) before placing them into service.

Construction procedures for the modifications to existing compressor stations would be similar to the construction procedures for new compressor stations, except that existing compressor station modifications would not require vegetation clearing. The new equipment would be installed within the existing boundaries of Compressor Stations 110 and 875. Equipment would be shipped to the site by truck, offloaded and positioned on the foundation, leveled, grouted, and secured. TGP would store equipment within the existing compressor station fence.

1.10.5 Environmental Compliance Inspection and Monitoring

In preparing construction drawings and specifications for the Project, TGP would incorporate the mitigation measures identified in its permit applications, and additional requirements of federal, state, and local agencies, as appropriate. TGP would provide the construction contractors with copies of its Plan and Procedures and applicable environmental permits, as well as copies of “approved for construction” environmental construction alignment sheets and construction drawings and specifications.

TGP would conduct training for its construction personnel, including environmental inspectors (EIs), contractors, and their employees, regarding proper field implementation of its Plan and Procedures and other project-specific plans and mitigation measures. The training would cover Project environmental documents and all project-specific conditions contained in the Commission Order and other applicable federal, state, and local permits and approvals, as appropriate.

TGP would employ at least eight EIs to oversee and document environmental compliance, including one lead EI, one EI for the new-build pipeline, and one EI for each compressor station. The number of EIs to monitor each abandonment work site daily has not yet been determined. The EIs would have authority to stop activities that violate the measures set forth in the Project documents and authorizations and would have the authority to order corrective action. FERC staff or its contractors would also conduct routine inspections during construction to determine compliance with the Commission’s Orders and to inspect the construction conditions of the Project facilities.

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

1.10.6 Operations and Maintenance

The replacement facilities would be owned, operated, and maintained by TGP. All natural gas facilities would be operated and maintained in compliance with DOT regulations (49 CFR 192); applicable conditions of the Certificate Order for the Project; and federal, state, and local regulations. Facilities would be periodically inspected and maintained. Standard TGP compressor station operation procedures include activities such as:

- calibration, maintenance, and inspection of equipment;
- pressure, temperature, and vibration data monitoring;
- traditional landscape maintenance; and
- periodic checks of safety and emergency equipment and cathodic protection systems.

The compressor stations would also be linked to a central control system through a SCADA system that monitors the TGP system 24 hours per day, 365 days per year. TGP would also regularly inspect the new pipeline right-of-way and repair and clean the pipeline as needed.

1.11 Consultations, Approvals, and Permits

Table 1.11-1 lists the federal and state regulatory agencies that have permit or approval authority or consultation requirements and the status of that review for portions of the Project. TGP would be responsible for obtaining all necessary permits, licenses, and approvals required for its Project.

Table 1.11-1

Permits, Approvals, and Consultations for the Project

Agency	Permit/Approval/Consultation [a]	Status
Federal		
FERC	NGA, Section 7(c), Certificate of Public Convenience and Necessity NGA, Section 7(b), Authorization to Abandon	Application submitted 2/13/2015. Docket No. CP15-88-000
COE	Rivers and Harbors Act, Section 408 (33 United States Code 408), Alteration of a COE Civil Works Project	
Vicksburg District	Section 408 permits required for five construction workspaces in the Vicksburg District that are within 1,500 feet of a COE-maintained levee	Application submitted in December 2015
COE	Clean Water Act (CWA), Section 404, Nationwide Permit 12 Pre-construction Notification	
Huntington District		Application submitted 2/13/2015; update submitted 11/13/2015
Pittsburgh District		Application submitted 2/13/2015
Louisville District		Application submitted 2/13/2015; update submitted 11/13/2015. TGP would obtain permits for the replacement pipelines prior to construction.
Nashville District		Nationwide Permit 12 issued May 2015
Memphis District		Nationwide Permit 12 issued May 2015
Vicksburg District		Application submitted 2/13/2015. TGP would obtain permits for the replacement pipelines prior to construction.
USFWS	ESA Section 7 Consultation Migratory Bird Treaty Act Consultation	
Pennsylvania Field Office		Project Coordination Report revised and submitted 11/18/2015; coordination ongoing
Ohio Field Office		Project Coordination Report revised and submitted 11/18/2015; coordination ongoing
West Virginia Field Office		Project Coordination Report revised and submitted 11/18/2015; coordination ongoing
Tennessee Field Office		Project Coordination Report revised and submitted 11/18/2015; coordination ongoing
Kentucky Field Office		Project Coordination Report revised and submitted 11/18/2015; coordination ongoing.
Arkansas Field Office		Project Coordination Report revised and submitted 11/18/2015; coordination ongoing
Mississippi Field Office		Project Coordination Report revised and submitted 11/18/2015; coordination ongoing. Activities for the pipeline replacements would be covered by TGP's programmatic agreement with USFWS Jackson office, dated 12/21/2015
Louisiana Field Office		Project Coordination Report revised and submitted 11/18/2015; coordination ongoing
Tennessee Valley Authority	Section 26(a) waterbody crossing permit	Permit received 4/7/2015 Review concurrent with Tennessee Aquatic Resource Alteration Permit

Table 1.11-1

Permits, Approvals, and Consultations for the Project

Agency	Permit/Approval/Consultation [a]	Status
Ohio		
Ohio Environmental Protection Agency	Minor New Source Review Air Permits Application for Permit to Install/Operate Compressor Stations 202.5, 206.5, 211.5, 216.5	Submitted 2/11/2015; permit received 4/22/2015
	Hydrostatic Test Water Discharge General Permit	Pending
	CWA Section 401 Water Quality Certification and Isolated Wetlands Permit	Pending
Ohio Department of Natural Resources	Letter of Permission for Blasting in Waters of the State (if required)	Pending
	Water Withdrawal Facility Registration (>100,000 gallons per day)	Pending
	State Protected Species Consultations	Pending
Ohio State Historic Preservation Office	NHPA Section 106 Consultation	Cultural Resources Survey Report submitted 2/26/2015; Concurrence received 9/2/2015; Addendum Survey Report submitted 10/27/2015; Concurrence received 12/30/2015; Second Addendum Survey Report submitted 11/23/2015; Additional survey recommendations and treatment plans submitted 2/23/2016, 3/28/2016, and 5/11/2016; Unanticipated Discovery Plan submitted 3/7/2016; Concurrence pending.
Ohio County Permits		
Scioto, Athens, and Tuscarawas Counties	Floodplain Permits	Pending
Kentucky		
Kentucky Department of Environmental Protection	Air Permit (Compressor Station 110)	Application submitted 2/11/2015
	Air Permit (Compressor Station 875)	Application submitted 1/30/2015
	CWA Section 401 Water Quality Certification (Kentucky Division of Water)	Pending
	Authorization for Temporary Water Withdrawal (Kentucky Division of Water)	Pending
	Floodplain Construction Permit/Permit to Construct Across or Along a Stream	Pending
	Hydrostatic Test Water Discharge Permit	Pending
Kentucky Heritage Council	NHPA Section 106 Consultation	Archaeology Report and addenda submitted 2/27/2015, 10/27/2015, 12/29/2015, and 1/26/2016; Concurrence received 7/23/2015, 1/11/2016, and 2/26/2016, respectively, with concurrence pending on latest report; Architectural Report and addendum report submitted 2/27/2015 and 12/29/2015; Concurrence on both reports received 3/4/2016; Avoidance and treatment plans submitted 2/23/2016 and 3/28/2016; Partial concurrence received 4/8/2016; Unanticipated Discovery Plan submitted 3/7/2016; Additional survey recommendations submitted 3/28/2016; Concurrence pending.

Table 1.11-1

Permits, Approvals, and Consultations for the Project

Agency	Permit/Approval/Consultation [a]	Status
Tennessee		
Tennessee Department of Environment and Conservation	CWA Section 401 Water Quality Certification Aquatic Resource Alteration Permit	Permit received 4/7/2015
	General National Pollutant Discharge Elimination System Permit for Discharges of Hydrostatic Test Water	Pending
	Water Withdrawal Registration	Pending
Tennessee Wildlife Resources Agency	State Protected Species Consultation	Report submitted 7/9/2015
Tennessee Historical Commission	NHPA Section 106 Consultation	Cultural Resources Report and addenda submitted 2/26/2015 and 11/25/2016; Concurrence received 3/19/2015 and 12/3/2015; Unanticipated Discovery Plan submitted 3/7/2016; Concurrence received 3/16/2016; Additional survey recommendations submitted 3/28/2016; Concurrence received 4/27/2016.
Tennessee County Permits		
Dickson County	Floodplain permit	Pending
Cheatham County	Local land-disturbing permit; floodplain permit	Pending
Sumner County	Utility land disturbance permit; Stormwater Pollution Prevention Plan	Pending
Mississippi		
Mississippi Department of Environmental Quality	CWA Section 401 Water Quality Certification	Application submitted 2/13/2015
	Hydrostatic Test Water Discharge and Withdrawal Notices of Intent	Pending
Mississippi Department of Archives and History	NHPA Section 106 Consultation	Cultural Resources Report and addenda submitted 2/26/2015, 10/27/2015, and 11/25/2015; Concurrence received 3/24/2015, 11/19/2015, and 12/17/2015, respectively; Unanticipated Discovery Plan submitted 3/7/2016; Concurrence received 5/17/2016; Additional survey recommendations submitted 3/28/2016; Concurrence pending.
Arkansas		
Arkansas Department of Environmental Quality	CWA Section 401 Water Quality Certification	Application submitted 2/13/2015
	Hydrostatic Test Water Discharge Permit	Pending
	Short Term Activity Authorization	Pending
Arkansas Natural Resource Commission	Water Withdrawal Registration	Pending
Arkansas State Historic Preservation Office	NHPA Section 106 Consultation	Cultural Resources Report and addenda submitted 2/26/2015, 10/27/2016, and 3/1/2016; Concurrence received 3/24/2015, 12/4/2016 and 3/7/2016, respectively; Unanticipated Discovery Plan submitted 3/7/2016; Concurrence received 3/14/2016.
Southeast Arkansas Levee District	Levee crossing permit for ACRP activity AR0010	Permit Application Submitted to Levee District 1/19/2016.

Table 1.11-1

Permits, Approvals, and Consultations for the Project

Agency	Permit/Approval/Consultation [a]	Status
Louisiana		
Louisiana Department of Environmental Quality	CWA Section 401 Water Quality Certification	Application submitted 2/13/2015
	Hydrostatic Test Water Discharge Permit	Pending
Louisiana Office of Cultural Development, Division of Historic Preservation and Division of Archaeology	NHPA Section 106 Consultation	Cultural Resources Report and addenda submitted 2/26/2015, 10/27/2015, and 11/25/2016; Concurrence received 6/25/2015, 11/10/2015, 12/4/2015, respectively; Unanticipated Discovery Plan submitted 3/7/2016; Concurrence received 5/4/2016.

a TGP would be responsible for obtaining all permits and approvals required to construct and operate the projects, regardless of whether or not they appear in this table.

2.0 ENVIRONMENTAL ANALYSIS

Construction and operation of the Project would have temporary, short-term, long-term, and permanent impacts. For purposes of the discussion in this EA, temporary impacts are defined as occurring only during the construction phase. Short-term impacts are defined as lasting up to 3 years. Long-term impacts would eventually recover, but would require more than 3 years. Permanent impacts are defined as lasting throughout the life of the Project.

As described in section 1.5, new replacement facilities for the Project would consist of four compressor stations in Ohio, modifications at compressor stations in Kentucky, construction of a 7.7-mile-long pipeline in Kentucky, and two replacement pipelines. Abandonment activities would occur at about 150 sites in six states along the 964-mile-long pipeline. Abandonment activities would include 12 off-right-of-way tap reconnects consisting of new pipeline segments varying in length from 760 feet to over 1 mile. The other abandonment activities typically would affect between 0.5 and 1.0 acre at each discrete location and would occur entirely or mostly within the existing pipeline right-of-way. We have generally considered these other abandonment activities collectively in our environmental review.

2.1 Geology and Soils

2.1.1 Geology

Geologic Setting

The new-build pipeline would be in the Eastern Kentucky Coal Field physiographic region of Kentucky (Kentucky Geological Survey [KGS], 2012a). The Eastern Kentucky Coal Field region is part of a larger physiographic region called the Cumberland Plateau that extends from Pennsylvania to Alabama. The interior of the Eastern Kentucky Coal Field region is dominated by forested hills and is highly dissected by V-shaped valleys (KGS, 2012b). The new pipeline would overlie the Mississippian Borden Formation and Mississippian Newman Limestone. The Borden Formation includes shales, siltstones, and sandstones. These geologic units are found beneath a thin veneer of topsoil and unconsolidated material with depths varying between 1 and 10 feet.

Compressor Station 202.5 would be in the Appalachian Plateau physiographic region of Ohio (Ohio Department of Natural Resources [ODNR], 1998a). The compressor station site overlies the Pennsylvanian Allegheny and Pottsville Groups, Undivided, consisting of shale and siltstone. The bedrock unit is overlain by soils and unconsolidated materials with a depth of up to 5 feet.

Compressor Station 206.5 would be in the Appalachian Plateau physiographic region of Ohio (ODNR, 1998a). About two-thirds of the compressor station site overlies the Pennsylvanian Monongahela Group and one-third overlies the Conemaugh Group. The Monongahela Group consists of nonmarine cyclic sequences of sandstone, siltstone, red and gray shale, limestone, and coal. The Conemaugh Group consists of mostly nonmarine cyclic sequences of red and gray shale, siltstone, and sandstone, with thin limestones and coals (U.S. Geological Survey [USGS], 1968). The bedrock units are overlain by soils and unconsolidated materials with a depth of up to 5 feet.

Compressor Stations 211.5 and 216.5 would be in the Appalachian Plateau physiographic region of Ohio (ODNR, 1998a) and overlie the Pennsylvanian Allegheny and Pottsville Groups, Undivided, consisting of shale and siltstone (USGS, 2005).

Compressor Station 875 would be in the Knobs physiographic region of Kentucky and overlies the Ordovician Drakes and Ashlock Formations and Quaternary alluvium. The Drakes Formation underlies about the eastern two-thirds of the site and has multiple members consisting of dolomite, mudstone, and limestone. The Ashlock Formation underlies about the western one-third of the site and has multiple members consisting of limestone, dolomite, and shale. The alluvium is found at the surface on about 1 percent of the western portion of the site and consists of light-brown silt and clay, locally containing limestone and shale pebbles and cobbles (University of Kentucky, 2014a). The Drakes and Ashlock Formations are overlain by at least 5 feet of soils and unconsolidated materials.

Existing Compressor Station 110 is in the Eastern Kentucky Coal Field physiographic region of Kentucky (KGS, 2012b). The compressor station is underlain by the Mississippian Borden Formation (described above) and Quaternary alluvium. The new aboveground facilities at Compressor Station 110 would be constructed entirely within the Quaternary alluvium.

The pipeline and associated facilities to be abandoned begin in the Appalachian Plateau Province of eastern Ohio. The topographic relief varies from 300 to 750 feet and is predominantly characterized by shale. The topography gradually becomes flatter, and gently rolling plains are common as the Project area transitions to the Kentucky and the Mississippian Plateau province, where limestone becomes the characteristic rock type. The MLV 53 replacement pipeline would be within alluvium in this province. In Tennessee, the Project area crosses into the Interior Low Plateaus and Highland Rim province, which is characterized by hilly topography. Clays, sands, chert, and limestones are common. From Tennessee into Mississippi and Louisiana, the Project area crosses the Coastal Plain Province, which is characterized by low hills and lowlands. The MLV 874 replacement pipeline would overlie limestone within the Mississippi Alluvial Plain Section of the Coastal Plain Province. Finally, the Project area crosses the Mississippi Alluvial Plain Province consisting of the floodplain and delta formed by sediments from the Mississippi River.

The geologic settings for the off-right-of-way tap reconnects are described in table 2.1-1.

Table 2.1-1

Geologic Conditions for Off-right-of-way Tap Reconnect Locations

Off-right-of-way Tap Reconnect	County, State	Physiographic Region	Geologic Formation	Rock Type
OH0030	Tuscarawas, OH	Appalachian Plateau	Conemaugh Group	Siltstone
OH0110	Morgan, OH	Appalachian Plateau	Monongahela Group	Shale
KY0080	Rowan, KY	Eastern Kentucky Coal Field	Alluvium	Sand
KY0170	Madison, KY	Eastern Kentucky Coal Field	Ashlock Formation, Grant Lake and Calloway Creek	Limestone
TN0190	Hickman, TN	Central Basin	St. Louis Limestone and Warsaw Formation	Clay or Mud
TN0200	Hickman, TN	Central Basin	Fort Payne Formation	Chert
TN0210/ TN0220	Perry, TN	Western Highland Rim	Fort Payne Formation	Chert
MS0040	Benton, MS	Tombigbee Hills	Tallahata Formation and Neshoba Sand	Claystone
MS0110	Panola, MS	Loess Bluffs or Brown Loam Hills	Koscuisko Formation	Claystone
MS0170	Quitman, MS	Delta or Yazoo-Mississippi Basin	Quaternary Alluvium	Alluvium
MS0200	Tallahatchie, MS	Delta or Yazoo-Mississippi Basin	Quaternary Alluvium	Alluvium
MS0280	Sunflower, MS	Delta or Yazoo-Mississippi Basin	Quaternary Alluvium	Alluvium

Sources: ODNR (1998a), KGS (2012b), TNLandforms (2015), Faulkner (2015)

Mining and Petroleum Resources

Table 2.1-2 lists mines and oil and gas wells that would be within 0.25 mile of the Project (ODNR, 2015a; Commonwealth of Kentucky, 2014). One active crushed stone mine would be about 1,250 feet from MP 7.1 of the new-build pipeline, and a mine of unknown resource would be about 1,050 feet from Compressor Station 216.5. An active surface coal, clay, and sandstone mine is within the proposed Compressor Station 216.5 site, and most of the site is mapped as a historical surface coal mine. No material is currently produced at the mine with active status, and TGP is in the process of obtaining the mineral rights. TGP does not have proposed or future plans for operating a mine at this site. An active surface coal mine is located about 256 feet west of Compressor Station 211.5. The eastern edge of the mine property is bordered by a road, which would prevent further expansion toward the compressor station. The compressor station facilities would be more than 1,000 feet from the mine property. No other mines, sand/gravel pits, borrow pits, or quarries were identified within 0.25 mile of the compressor station sites, off-right-of-way tap reconnects, replacement pipelines, or other sites where ground disturbance would occur for abandonment activities.

Table 2.1-2

Mining and Petroleum Resources within 0.25 Mile of the ACRP

Resource	Nearest Project Component	County, State	Distance from Project Workspace (feet)	Status
Gas well	CS 202.5	Jackson, OH	804	Active
Gas well	CS 211.5	Tuscarawas, OH	1,267	Active
Oil well	CS 211.5	Tuscarawas, OH	1,288	Active
Gas well	CS 211.5	Tuscarawas, OH	1,229	Active
Gas well	CS 211.5	Tuscarawas, OH	310	Active
Coal mine	CS 211.5	Tuscarawas, OH	256	Active
Coal, clay, sandstone mine	CS 216.5	Mahoning, OH	0	Active
Mine, unknown type	CS 216.5	Mahoning, OH	1,056	Active
Oil and gas well	New-build Pipeline, MP 4.9	Carter, KY	423	Abandoned
Mountain Materials "RA" Quarry, crushed stone	New-build Pipeline, MP 7.1	Carter, KY	1,243	Active

Sources: ODNR (2015a), Commonwealth of Kentucky (2014)

Six oil and gas wells were identified within 0.25 mile of construction workspace for the compressor stations, new-build pipeline, and off-right-of-way tap reconnects. The closest would be an abandoned well 423 feet from the new-build pipeline at MP 4.9 and an active natural gas well 310 feet from Compressor Station 211.5.

We conclude that none of the mines or oil and gas wells identified within 0.25 mile of the Project would interfere with construction or operation of the Project. Numerous mines and oil and gas facilities and resources are present throughout the Project area; therefore, the placement of the Project facilities would not preclude or markedly impact future development of mining or oil and gas facilities in the region.

Geologic Hazards and Impact Mitigation

Geologic hazards are natural physical conditions that could result in damage to land and/or structures, and injury to the public. Potential geologic hazards are seismic related, such as earthquakes, surface faulting, or soil liquefaction; landslides; land subsidence; and flash flooding.

Earthquakes

Although the earthquake risk is generally low throughout the Project area, the proposed Project activities are in areas with historic seismic activity. Notable earthquakes that have occurred in the Project area include a magnitude 4.0 earthquake that occurred about 50 miles northeast of the Compressor Station 211.5 site in 2011, and a magnitude 5.0 earthquake that occurred in Ohio in 1986 about 75 miles north of the Compressor Station 211.5 site (USGS, 2016a). Kentucky's largest recorded earthquake (magnitude 5.2, Intensity VII) occurred in 1980 about 32 miles southwest of the Compressor Station 875 site. Other notable earthquakes in Kentucky include a magnitude 4.0 in western Kentucky in 2003, a magnitude 3.7 in eastern Kentucky in 2004, and a magnitude 4.2 in eastern Kentucky in 2012 (USGS, 2016a). Tennessee's largest earthquake (magnitude 5.0, Intensity VII) occurred in 1865 about 200 miles west of the off-right-of-way tap reconnects in Perry and Hickman Counties. In addition, a magnitude 4.5 earthquake occurred in eastern Tennessee in 1928 (USGS, 2016a). Mississippi's most notable earthquake was a magnitude 4.6 earthquake that occurred in 1931 about 15 miles southeast of the off-right-of-way tap reconnect in Tallahatchie County (USGS, 2016a).

Seismic risk can be quantified by the motions experienced by the ground surface or structures during a given earthquake as expressed in terms of g (the acceleration due to gravity). The USGS has developed a series of maps for the entire United States that describes the likelihood for shaking of varying degrees to occur in a given area (USGS, 2008). Table 2.1-3 provides the seismic hazard potential for each compressor station, the new-build pipeline, and each off-right-of-way tap reconnect as determined from the USGS seismic hazard maps. The hazard is shown as the peak ground acceleration in percent of g for an earthquake with a 2 percent probability of exceedance in 50 years. Values for the project area range from 4 percent g in areas of low seismic risk to 25 percent g in areas of moderate seismic risk.

Table 2.1-3

Seismic Hazard Potential

Facility	County, State	Peak Ground Acceleration [a] (percent g)
Compressor Stations		
CS 202.5	Jackson, OH	7
CS 206.5	Morgan, OH	4–6
CS 211.5	Tuscarawas, OH	4–6
CS 216.5	Mahoning, OH	8
CS 110	Rowan, KY	10
CS 875	Madison, KY	8
New-build Pipeline	Carter and Lewis, KY	6–10
Replacement Pipelines		
MLV 53	Madison, KY	10–13
MLV 874	Washington, MS	6–10
Off-right-of-way Tap Reconnects		
OH0030	Tuscarawas, OH	4–6
OH0110	Morgan, OH	4–6
KY0080	Rowan, KY	8–10
KY0170	Madison, KY	8
TN0190	Hickman, TN	14–16
TN0200	Hickman, TN	14–16
TN0210/TN0220	Perry, TN	25
MS0040	Benton, MS	25
MS0110	Panola, MS	25
MS0170	Quitman, MS	25
MS0200	Tallahatchie, MS	18
MS0280	Sunflower, MS	18

a 2 percent probability of exceedance in 50 years

To minimize the potential hazards associated with earthquakes, TGP would design new facilities at the compressor stations in accordance with current International Building Code guidelines for facilities in seismic zones, which would minimize life-threatening structural damage during an earthquake. No earthquake-related minimization measures are proposed for the new-build pipeline, replacement pipelines, or off-right-of-way tap reconnects. Because of the low potential for seismic activity and because TGP would incorporate design measures to minimize damage during an earthquake, we conclude that earthquakes would not pose a significant risk to the Project.

Surface Faulting

Surface faulting is displacement of the earth's surface due to slip along a fault. The Utah Geological Survey has developed guidelines for the analysis of the risks of surface fault rupture (Utah Geological Survey, 2004). It recommends establishing a 1,000-foot setback on either side of mapped faults that have a risk of movement (i.e., faults that have had movement within the last 10,000 years). For conservative analysis, we examined quaternary faults (i.e., those faults less than 1.6 million years old) within 0.5 mile of the Project sites.

According to the USGS Quaternary Fault and Fold database, no quaternary faults have been mapped within 0.5 mile of the sites for Compressor Stations 110, 202.5, 206.5, 211.5, or 216.5; the new-build pipeline; or the off-right-of-way tap reconnects (USGS, 2006). Further analysis of local geologic mapping for these sites did not reveal any quaternary faults (KGS, 2004 and 2007; ODNR, 2015b; State of Tennessee, 2015; Mississippi Department of Environmental Quality, 2009).

According to the USGS Quaternary Fault and Fold database, Compressor Station 875 would be within the mapped Kentucky River Fault System (USGS, 2006); however, this database does not present the location of individual faults. Local geologic mapping by the KGS does not indicate any quaternary faults within 0.5 mile of the Compressor Station 875 site (KGS, 2004).

We conclude that surface faulting would not pose a significant risk to the Project.

Soil Liquefaction

Soil liquefaction occurs when loose (low density or uncompact) sandy, water-saturated soils temporarily lose their strength and liquefy during strong ground shaking due to earthquakes or other rapid loading. Based on a review of the USGS Soil Amplification/Liquefaction Potential Map (USGS and Association of Central United States Earthquake Consortium State Geologists, 1999), the sites for the compressor stations, new-build pipeline, and off-right-of-way tap reconnects are in areas considered to have a low potential for liquefaction. Likewise, the replacement pipelines are within areas of relatively low seismic risk that would not be prone to liquefaction. Therefore, we conclude that soil liquefaction would not pose a significant risk to the Project.

Landslides

Landslides involve the down slope movement of earth materials under the force of gravity due to natural or man-made causes. Natural causes of landslides might include slope destabilization resulting from adverse bedrock conditions, steep slopes, groundwater, and soil characteristics.

The topography along the new-build pipeline route is generally hilly (USGS, 2015a). No landslides have been documented within 0.5 mile of the site (University of Kentucky, 2014b). However, the USGS landslide overview map characterizes the area as having a high incidence of landslides, where 15 percent or more of the area has experienced landslides in the past (USGS, 2015b).

The new-build pipeline would cross areas of steep terrain where some slopes exceed 50 percent. TGP would use a construction right-of-way width of 125 feet to provide safe construction surfaces, room for transit of construction equipment, and adequate spoil storage. Table 2.1-4 lists the areas along the new-build pipeline that would require steep slope construction. Steep slope construction methods are described in section 1.10.3.

Table 2.1-4

Steep Slope Construction Areas Along the New-build Pipeline

Begin Milepost	End Milepost	Distance (miles)
0.0	1.1	1.1
1.2	3.8	2.6
3.9	4.9	1.0
4.9	5.5	0.6
6.0	6.3	0.3
6.4	6.7	0.3
Total		5.9

TGP would survey the pipeline route to identify areas that could be susceptible to landslides and that could require mitigation during construction and/or operation. In addition to implementing the restoration measures in its Plan, TGP proposes the following landslide mitigation measures:

- Install trench breakers according to the details provided in TGP's Standard Construction Specifications and Procedures. The trench breakers would help prevent groundwater from traveling along the trench, which could undermine the pipeline and cause slope failures.
- Install temporary and/or permanent slope breakers diagonally across the right-of-way on slopes to control erosion by reducing and shortening the length and concentration of runoff. The degree of slope, soil characteristics, runoff area, and location of suitable outlets would determine the number and shape of slope breakers installed.
- Install erosion and sedimentation controls within and at the limits of the Project workspace, at the base of slopes adjacent to road crossings, and at side slope and downslope boundaries of the construction area (where runoff is not otherwise directed by a slope breaker/water bar/terrace), and as necessary to prevent siltation within ponds, wetlands, or other waterbodies adjacent to/downslope of the construction right-of-way.
- Place temporary and/or permanent trench plugs consisting of compacted subsoil, sandbags, or foam (depending on the nature of use) following excavation. Trench plugs would limit the length of concentrated flow within the excavated trench, and installation would be coordinated with installation of slope breakers to effectively control water through/across the right-of-way.
- If necessary, install underdrains on steep slopes, perpendicular to contours, including lateral intercept pipes across the pipeline trench and a header pipe to convey the water downslope. The underdrains would be installed in undisturbed soil uphill of the pipeline. All excess water conveyed by the underdrain pipes would be discharged into a riprap outlet protection and then to a stable area. TGP would be required to request approval prior to conducting any activities outside the Certificated right-of-way.
- Inspect the right-of-way periodically during construction and immediately following significant storm events to ensure proper function of landslide mitigation measures and develop any modifications, if necessary.

Based on topography and information from the USGS landslide database, the replacement pipeline locations have a low risk of landslides and mitigation would not be necessary. At the Compressor Station 875 site, the topography is generally hilly on the eastern portion, with some slopes greater than 8 percent, and is generally flat on the western portion (USGS, 2015a). The Geotechnical Engineering Report prepared for the site indicates that the site would have a low potential for slope instability issues (Terracon, 2015). Existing Compressor Station 110 sits in a flat river valley; however, hilly terrain is found immediately northwest of the site (USGS, 2015a) and would not be subject to landslides. The topography at the Compressor Station 216.5 site is flat (USGS, 2015a). The USGS landslide overview map characterizes the area as having a low incidence of landslides, where 1.5 percent or more of the area has experienced landslides in the past (USGS, 2015b).

The topography at the Compressor Station 202.5 and 206.5 sites is moderately hilly (USGS, 2015a). At the Compressor Station 211.5 site, the topography is flat with hilly areas directly east of the site (USGS, 2015a). The USGS landslide overview map characterizes the areas around these compressor station sites as having a high susceptibility to landslides, where 15 percent or more of the area would be expected to experience landslides in the future (USGS, 2015b).

TGP would implement the revegetation and erosion control measures in its Plan to stabilize slope surfaces at the compressor station sites. Because TGP would implement mitigation measures to minimize the risk of slope failure in areas with landslide potential, we conclude that landslides would not pose a significant risk to the Project.

Land Subsidence

Ground subsidence and earth fissures are often caused by groundwater withdrawals as the declining water table causes aquifer sediments to compact. Ground subsidence may also result from oil and natural gas extraction, underground mining, and the presence of karst topography. Karst topography and sinkholes typically form from dissolution of carbonate rocks such as limestone and dolomite, which underlie several areas in West Virginia, Kentucky, and Tennessee.

No wells would be installed at any of the Project sites, and no large-scale groundwater withdrawal is expected to occur near any of these sites. As shown in table 2.2-1, one active gas well is near the Compressor Station 202.5 site, and four active oil or gas wells are near the Compressor Station 211.5 site. In addition, two active mines are within 0.25 mile of the Compressor Station 216.5 site. Land subsidence associated with oil and gas wells has not been a historic issue in the area and is not anticipated to be an issue moving forward.

The coal, clay, and sandstone mine adjacent to the Compressor Station 216.5 site and the coal mine near the Compressor Station 211.5 site are both surface mines without any underground components and therefore would not pose a risk a subsidence from collapsing mine shafts. However, fill consisting of mine spoil may be present at the Compressor Station 216.5 site. TGP stated it would conduct geotechnical investigations as applicable at the compressor station sites prior to construction. Geotechnical investigations are used to identify soil correction or other measures such as pilings that may be needed to ensure that buildings and equipment are properly supported. Therefore, to adequately assess the impacts from possible mine spoil fill underlying the proposed Compressor Station 216.5, **we recommend that:**

- **<u>Prior to construction at Compressor Station 216.5</u>, TGP should file with the Secretary of the Commission (Secretary) the geotechnical investigation report for the compressor station site, stamped and sealed by the professional engineer-of-record registered in the state of Ohio. This report should include an evaluation of**

the site suitability for Compressor Station 216.5 and provide mitigation recommendations if necessary.

A review of USGS mapping of the proposed compressor station sites and modified compressor stations did not reveal any mapped karst features (USGS, 2014a). The underlying geologic formations at the sites for Compressor Stations 110, 202.5, 211.5, and 216.5 consist of sandstone, siltstone, and shale, which are not associated with karst features. The geologic formations underlying the Compressor Station 206.5 site include dolomite and limestone, which have the potential for karst features, but karst features are not known in this area. The replacement pipelines also are not located in areas with karst features.

The new-build pipeline would pass through several areas that have been mapped as having karst potential (USGS, 2014a). In addition, off-right-of-way tap reconnect KY0170 is underlain by limestone, which has the potential for karst features. GeoConcepts Engineering, Inc. performed a karst terrain survey and assessment of the new-build pipeline route using published literature, databases, mapping, and aerial photography, followed by a field survey. The karst survey identified a surface karst feature consisting of a closed depression between MPs 5.6 and 5.7. To avoid this closed depression, TGP modified the route of the new-build pipeline as filed with the Commission on January 28, 2016.

TGP states that the class of pipe that would be used for the new-build pipeline could span 150 feet without support, which would allow time to respond to the development of slowly forming sinkholes or depressions during operation. TGP proposes the following karst mitigation measures if surface karst features are identified during pipeline construction:

- backfill any identified sinkholes or depressions to stabilize the work zone and create a base for restoration, or fill with compaction grouting if backfilling is unsuccessful;
- reroute the pipeline to avoid the hazard if a sinkhole forms or is encountered that cannot be remediated;
- refrain from discharging hydrostatic test water near any identified karst features to avoid creating further dissolution; and
- routinely survey the pipeline route for new sinkhole or depression formation during operations, as required by the DOT.

We conclude that with our recommendation and implementation of TGP's mitigation measures, subsidence would not have a significant adverse impact on the Project.

Flash Flooding

According to flood maps produced by the Federal Emergency Management Agency, none of the compressor station sites is within a floodplain. The new-build pipeline would cross floodplains at four locations, and three off-right-of-way tap reconnects would cross floodplains. One segment of the MLV 874 replacement pipeline would be within a floodplain. Ground-disturbing Project activities associated with abandonment of facilities would take place at 10 additional locations in floodplains. Pipeline facilities would be buried at depths to protect them from potential scour that could occur during flooding. Therefore, we conclude that flash flooding would not pose a risk at these sites. Floodplains are discussed further in section 2.2.2.

Blasting

TGP does not anticipate the need for blasting for any Project components based on its experience in the Project area. Where shallow bedrock is encountered, TGP would use a variety of methods to remove the rock depending on its hardness, fracture susceptibility, and location (see section 1.10.3). However, should blasting be required, all blasting activities would comply with federal, state, and local regulations governing the safe storage, handling, firing, and disposal of explosive materials. In addition, TGP would prepare a blasting plan prior to construction to minimize the effects of blasting and ensure safety during blasting operations. Based on these factors, we conclude that blasting would not significantly affect environmental resources.

2.1.2 Soils

Soil types that occur in the Project area were identified by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Major Land Resource Areas classification and the Soil Survey Geographic Database (NRCS, 2015a). Soils in the Project area are highly variable. Several general soil characteristics have the potential to affect, or be affected by, construction and operation of the Project. These include prime farmland, soil erosion, revegetation potential, shallow depth to bedrock, and hydric soils. No soils in the Project area were identified as having severe compaction potential or poor drainage potential. Table 2.1-5 summarizes soil characteristics and limitations for the individual ACRP activities that would require a relatively large amount of ground disturbance including compressor station sites, the new-build pipeline, and off-right-of-way tap reconnects.

Table 2.1-5

Soil Characteristics and Limitations for the ACRP (acres)

Component	Prime Farmland [a]	High Compaction Potential	High Erosion Potential	Poor Revegetation Potential	Shallow Bedrock
Compressor Stations					
CS 110	0.0 [b]	0.0	0.0	0.0	0.0
CS 875	4.5	0.0	18.3	0.0	0.0
CS 202.5	0.2	0.0	10.2	0.0	0.0
CS 206.5	12.9	0.0	13.8	0.0	0.0
CS 211.5	21.2	0.0	21.2	0.0	N/A [c]
CS 216.5	0.0 [b]	0.0	0.0	<0.1	N/A
Compressor Station Total	38.8	0.0	63.5	<0.1	0.0
New-build Pipeline	18.7	0.0	45.3	32.4	102.3 [d]
Replacement Pipelines					
MLV 53	5.3	3.6	1.3	3.1	N/A [c]
MLV 874	10.4	0.0	2.7	0.0	9.8
Replacement Pipeline Total	15.7	3.6	4.0	3.1	9.8
Off-right-of-way Tap Reconnects					
OH0030	2.3	0.0	2.1	0.0	0.2
OH0110	6.9	0.0	2.9	1.2	8.4
KY0080	14.7	0.4	9.4	0.0	11.8
KY0170	3.2	0.0	0.0	0.0	5.9
TN0190	0.0	0.0	0.0	0.2	0.2
TN0200	0.0	0.0	0.0	0.4	0.4
TN0210/TN0220	0.0	0.0	0.0	0.2	2.0
MS0040	5.8	0.0	7.0	0.0	0.0
MS0110	0.0	0.0	1.6	0.1	0.0
MS0170	5.6	0.2	4.9	0.2	0.0
MS0200	2.7	0.7	2.8	0.0	0.0
MS0280	4.1	3.5	3.6	0.0	0.0
Off-right-of-way Tap Reconnects Total	45.3	4.8	34.3	2.3	28.9

a Includes prime, statewide, local, and unique farmland.

b Soil survey results indicate prime farmland soils at CS 110 and CS 216.5; however, this area has already been removed from farming.

c N/A = data not available or undefined.

d Shallow bedrock data for some soils along the new-build pipeline were unavailable or not defined.

Source: NRCS (2015a)

Prime Farmland

The USDA defines prime farmland as “land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses” (NRCS, 2015b). For this Project, prime farmland includes USDA designations of “prime farmland,” “prime farmland if drained,” and “prime farmland of local significance” independent of whether these areas are or have been used for agricultural purposes (NRCS, 2015b). It does not include land that has been developed and is not available for agricultural use.

Construction impacts on soils classified as prime farmland would include about 18.7 acres for the new-build pipeline, 15.7 acres for the replacement pipelines, and 45.3 acres for the off-right-of-way tap reconnects. TGP would employ several methods to maintain fertility and protect agricultural lands that may be affected by pipeline construction, including stockpiling topsoil from actively cultivated croplands. The entire topsoil layer, to a maximum depth of 12 inches, from the pipeline trench would be excavated and stored separately to preserve soil fertility. Additionally, drain tile and irrigation systems may be encountered during Project construction. TGP would protect the functionality of such systems during construction, and if any damage occurred during construction of the Project, the systems would be repaired and restored to their original condition. Agricultural activities would be allowed in the permanent right-of-way after construction is complete.

At the compressor station sites, a total of about 38.8 acres of soils classified as prime farmland would be affected and would not be available for future agricultural use. Other ground disturbing activities associated with the ACRP would be within TGP's existing right-of-way and would not result in new impacts on soils classified as prime farmland.

Soil Compaction

About 4.8 acres of soils along the off-right-of-way tap reconnects and 3.6 acres of soils along the replacement pipelines are classified as having a high compaction potential. To minimize the potential for soil compaction, TGP would use measures contained in its Plan and Procedures. To reduce the potential for rutting and compaction, TGP would minimize activity during periods of soil saturation and implement its *Winter Construction Plan* to address freeze/thaw soil conditions. Additionally, mats or geotextile fabric would be used, where appropriate, to reduce the potential for compaction.

We have reviewed TGP's *Winter Construction Plan* and find it acceptable. The key elements of the Winter Construction Plan include:

- use of special snow plowing equipment that would prevent mixing of snow and underlying soil;
- storage of snow over the trenchline prior to excavation to prevent deep frost penetration of the soil;
- clearing of snow from roads without blocking driveways or other access points;
- coordination with individual landowners on a site-specific basis if snow storage adjacent to the construction right-of-way is desired;
- minimization of the amount of open trench and use of safety fencing where snow may cover an open trench;
- suspension of backfill and topsoil replacement if not feasible due to frozen conditions;
- use of mulch and erosion control devices to stabilize topsoil and subsoil piles; and
- delaying final cleanup activities until soils have thawed.

Severe Erosion Potential

Soil disturbance can increase wind and water erosion of exposed soils. About 45.3 acres of soils along the new-build pipeline, 4.0 acres of soils along the replacement pipelines, 63.5 acres of soils at the new and modified compressor station sites, and 34.3 acres of soils along the off-right-of-way tap reconnects are rated as having a high susceptibly to erosion. TGP would implement the erosion and sediment control and revegetation measures contained in its Plan and Procedures to minimize erosion and off-site sediment migration, including:

- restoring construction work areas to preconstruction contours;
- grading disturbed areas within 20 days and revegetating within 6 days of final grading;
- installing and maintaining proper erosion and sedimentation control measures during construction to reduce the velocity of and redirect stormwater runoff; and
- avoiding construction during times of unusual soil saturation, heavy rainfall, and snow melt.

Poor Revegetation Potential

Successful restoration and revegetation are important for maintaining soil productivity and protecting the underlying soil from potential damage, such as erosion. The revegetation potential of soils that would be disturbed by the Project is based on the slope and the percentage of coarse rock fragments in the surface layer. A total of 32.4 acres of soils along the new-build pipeline; 3.1 acres of soils along the replacement pipelines, less than 0.1 acre of soils at the Compressor Station 216.5 site; and 2.3 acres of soils along the off-right-of-way tap reconnects are rated as having poor revegetation potential. In addition, revegetation may be more difficult in areas that are considered to have poor drainage and shallow depth to bedrock. TGP would revegetate previously vegetated areas that would not be occupied by buildings or covered with gravel upon the completion of construction in accordance with NRCS recommendations for seedbed preparation, seed mix, and application methods and rates.

Shallow Depth to Bedrock

Shallow and hard bedrock can restrict excavation and may require special mechanical means or possibly blasting to achieve required design depths (see the discussion of blasting in section 2.1.1). Areas of shallow bedrock are present along the new-build pipeline route and several of the off-right-of-way tap reconnects. As described in section 2.1.1, TGP does not anticipate blasting for the Project, but would implement a blasting plan, if necessary, that complies with the requirements in TGP's Plan.

Soil Contamination

No known areas of soil contamination are within the Project area, with the exception of existing compressor stations, where TGP completed remediation and removed polychlorinated biphenyl (PCB) contaminated materials and soil. However, residual PCB contamination remains in some areas. Activities proposed as part of the ACRP include disconnections of pipelines at 14 existing compressor stations. PCB contamination was identified and remediated at each of these compressor stations. TGP identified two existing compressor stations (Compressor Stations 110 and 79) where proposed activities would likely overlap areas of previously remediated PCB contamination. We have assumed that ACRP activities at Compressor Station 106 would also overlap PCB remediation areas. TGP also identified five compressor stations (Compressor Stations 214, 209, 204, 87, and 40) where proposed activities would possibly overlap areas of previously remediated PCB contamination. TGP has specified measures to be followed when working in areas of remediated PCB contamination, which include:

- notifying the appropriate TGP environmental, health, and safety representatives prior to excavating, sampling, or conducting other intrusive activities in the immediate vicinity of identified PCB-containing soils and remediated drainlines or drainline components;

- notifying and obtaining approval from the appropriate state department (such as the Kentucky Department for Environmental Protection (KYDEP) prior to earth disturbing activities in PCB-affected areas;
- segregating, stockpiling, and covering soils excavated from identified PCB areas;
- returning excavated soils to the same excavation location, ensuring that the top 1 foot of soil is segregated from other excavated soil and replaced in the top 1 foot of the excavation during backfilling;
- sampling and analyzing excavated soils prior to disposal at an offsite facility; and
- documenting the extent of excavations, analytical results, and disposal methods.

The construction of the new-build pipeline, off-right-of-way tap reconnects, and replacement pipelines would not affect soils that have been affected by past use of PCBs. If contaminated soils are unexpectedly encountered during construction, TGP would implement its *Plan for the Unanticipated Discovery of Potentially Contaminated Soils or Groundwater*.[12]

Contamination from spills or leaks of fuels, lubricants, or coolant from construction equipment could adversely affect soils. The effects of contamination are typically minor because of the low frequency and small volumes of spills and leaks. TGP would implement state-specific *Spill Prevention Control and Countermeasures (SPCC) Plans* that specify prevention and cleanup procedures for spills or leaks of fuel, lubricants, coolants, or solvents. The SPCC Plans would be prepared prior to construction. In addition, TGP would follow the measures in its Procedures to reduce the risk of impacts on soils from spills, which include:

- training personnel on the operation and maintenance of equipment to prevent the accidental discharge or spill of fuel, oil, and lubricants;
- regularly inspecting and maintaining equipment that must be fueled and/or lubricated;
- ensuring that fuel trucks transporting fuel to onsite equipment travel only on approved access roads;
- using secondary containment for bulk storage of hazardous materials;
- ensuring that each construction crew has on hand sufficient supplies of spill and leak response materials;
- reporting spills to the appropriate state and federal agencies; and
- ensuring that all materials, cleanup wastes, and recovered spill materials are transported to an approved disposal facility licensed to accept such waste.

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[12] TGP's draft *Plan for the Unanticipated Discovery of Potentially Contaminated Soils or Groundwater* was filed as Attachment 1-10a to the January 28, 2016 supplemental filing available on the FERC's eLibrary at http://www.ferc.gov/docs-filing/elibrary.asp by searching Docket No. CP15-88.

Conclusions for Soils

As described above, general construction activities such as clearing, grading, excavating, and moving construction equipment would affect soil resources. We conclude that implementation of the measures in TGP's Plan and Procedures as well as TGP's *Winter Construction Plan* and SPCC Plans would minimize and mitigate impacts on soil resources and provide for the timely stabilization of disturbed areas. Therefore, the Project would mostly have only minor and temporary effects on soils. Although the Project would permanently affect 38.8 acres of soils classified as prime farmland for construction of the compressor stations, other prime farmland is available in the area of each compressor station site. Therefore, the impacts on prime farmland would not be significant.

2.2 Water Resources and Wetlands

2.2.1 Groundwater

Existing Groundwater Resources

The principal aquifers underlying the Project area for the compressor stations, new-build pipeline, off-right-of-way tap reconnects, and replacement pipelines consist of bedrock and alluvial aquifers that range in age from Silurian to Quaternary (see table 2.2-1). The principal aquifers underlying the other ground disturbing activities, generally from north to south, are Pennsylvanian, Mississippian, Silurian-Devonian and Ordovician, Black Warrior River, Mississippi Embayment System, and Mississippi River Alluvial Aquifers.

Table 2.2-1

Aquifers and Typical Well Yields

Facility	Aquifer	Well Yields (gpm)
Compressor Stations		
CS 202.5, CS 206.5, CS 211.5, CS 216.5	Pennsylvanian	1-25
CS 110	Mississippian	1-40
CS 875	Silurian-Devonian	2-20
New-build Pipeline	Mississippian	1-40
Replacement Pipelines		
MLV 53	Mississippi River Alluvial Aquifer	500-5,000
MLV 874	No Principal Aquifer	--
Off-right-of-way Tap Reconnects		
OH0030, OH0110	Pennsylvanian	1-20
KY0080	Mississippian	1-40
KY0170, TN0190, TN0200	No Principal Aquifer	--
TN0210/TN0220	Silurian-Devonian	2-20
MS0040, MS0110	Mississippi Embayment System	100-2,000
MS0170, MS0200, MS0280	Mississippi River Alluvial Aquifer	500-5,000

Sources: USGS (1995, 1998, and 2015c)

The Pennsylvanian Aquifer underlies eastern portions of Ohio and Kentucky. The aquifer consists of sandstones, which are used as a source of water except where they are overlain by Quaternary sand and gravel aquifers of the surficial aquifer system in the valleys of the Ohio River and its tributaries. Rocks within the aquifer are grouped into Upper Pennsylvanian aquifers and Lower-Middle

Pennsylvanian aquifers. The aquifers contain hard water, and common well yields in Ohio range from 1 to 25 gallons per minute (gpm) but may exceed 100 gpm (USGS, 1995).

The Mississippian Aquifer is the principal aquifer in eastern Kentucky and Tennessee and is also present in Ohio. This aquifer consists of interbedded sandstone and carbonate rocks, with the carbonate rocks being the more productive zones. Water from this aquifer is of good quality and used for public water supply (USGS, 1995). Well yields from the Mississippian aquifer in Kentucky commonly range from 1 to 40 gpm but may exceed 50 gpm (USGS, 1995).

Carbonate rocks of Devonian, Silurian, and Ordovician age are the principal aquifers in large areas of central Kentucky and Tennessee. The Ordovician rocks crop out in the central part of these areas and lie beneath Silurian, Devonian, and younger rocks on the perimeter of the areas. The carbonate-rock aquifers consist of almost pure limestone and minor dolomite, and are interlayered with confining units of shale and shaly limestone. These aquifers are overlain by and separated from the Mississippian aquifers by a confining unit of Upper Devonian shale. Some Ordovician units within the region are confined, have poor water quality, or are particularly deep and are not considered principal aquifers. Well yields from the limestone and dolomite aquifers in rocks of Devonian, Silurian, and Ordovician age commonly range from 2 to 10 gpm in Kentucky and 1 to 20 gpm in Tennessee. Well yields may exceed 300 gpm (USGS, 1995).

The Black Warrior River Aquifer, present in a small area of western Tennessee, is a component of the Southeastern Coastal Plain Aquifer System. The Black Warrior River Aquifer consists of Late Cretaceous sands of fluvial and deltaic origin, interbedded with clay and minor gravel. The geologic units that compose the aquifer are primarily the Tuscaloosa and the Eutaw Formations and the Coffee Sand. Wells generally yield less than 50 gpm but may locally yield as much as 300 gpm (USGS, 1995).

The Mississippi Embayment Aquifer System is the most extensive aquifer system in Louisiana, Mississippi, and Arkansas. It also extends into parts of western Tennessee and western Kentucky. Sedimentary rocks that compose the aquifer system crop out mostly as parallel bands, dividing the system into six regional aquifers: the Upper Claiborne, Middle Claiborne, Lower Claiborne-upper Wilcox, Middle Wilcox, Lower Wilcox, and McNairy-Nacatoch. Regional confining units separate some parts of the aquifer system. The southward-dipping strata of the Mississippi Embayment Aquifer System are hydraulically connected to the Mississippi River Alluvial Aquifer, which overlies the central portion of the system. Water quality in the Mississippi Embayment Aquifer is excellent, with generally less than 200 milligrams per liter dissolved solids. Wells in this aquifer system range in depth from less than 100 feet to more than 1,700 feet, and well yields range widely between 100 and 2,000 gpm (USGS, 1995).

The Mississippi River Alluvial Aquifer is present as a band in the Mississippi Embayment Aquifer System that underlies the floodplains of the Mississippi, Atchafalaya, Red, and Ouachita River valleys in Mississippi, Arkansas, and Louisiana. The alluvium, of Holocene and Pleistocene age, consists of upward-fining sequences of gravel, sand, silt, and clay. The aquifers are confined by layers of silt and clay of varying thicknesses and extent. The primary water use is for agriculture. Water quality is hard to very hard, and the fresh water interval ranges from 20 to 500 feet thick. Wells typically yield at least 500 gpm, with some yielding 1,000 to as much as 5,000 gpm (USGS, 1998).

Sole-source Aquifers and Wellhead Protection Areas

A sole-source aquifer is an aquifer designated by the U.S. Environmental Protection Agency (EPA) as the “sole or principal source” of drinking water for a given service area. This designation applies to aquifers that supply 50 percent or more of the drinking water for an area and for which no reasonably available alternative sources exist should the aquifer become contaminated. No sole-source aquifers would be crossed by the Project.

Wellhead protection areas (WHPA) are designated surface and subsurface zones surrounding public water supply wells or well fields. These zones are identified in an effort to prevent contaminants from entering groundwater and compromising the quality of public drinking water. Two abandonment activities in Mississippi would be within WHPAs (Pipeline and Hazardous Materials Safety Administration [PHMSA], 2014a). A crossover removal at workspace MS0290 in Bolivar County would intersect one WHPA, and a gas disconnect at workspace MS0320 in Washington County would intersect two WHPAs.

Public and Private Supply Wells

Table 2.2-2 lists identified public water supply wells that would be within 400 feet of the Project and private water supply wells that would be within 200 feet of the Project. An inactive well would be 1 foot from the construction area at existing Compressor Station 110. The closest potentially active well would be 63 feet from the construction right-of-way for the new-build pipeline. No springs would be within 150 feet of the Project (USGS, 2015c).

Table 2.2-2

Public Wells within 400 feet and Private Wells within 200 feet of the Project

Well ID	Facility ID/Location	Parish or County, State	Distance from Construction Workspace (feet)	Description
Compressor Stations				
00043202	CS 110	Rowan, KY	1	Private – Inactive Residence
New-build Pipeline				
00021669	MP 6.7	Carter, KY	113	Private – Plugged and Decommissioned Residence
00021670	MP 6.7	Carter, KY	63	Private – Plugged and Decommissioned Residence
Replacement Pipelines				
MS-GW-00266	MP 1.0	Washington, MS	193	Private
Off-right-of-way Tap Reconnect				
13500138	TN0210/TN220	Perry, TN	82	Not available
Other Ground-Disturbing Activities [a]				
073-6454Z	LA0050	Ouachita, LA	155	Public – Domestic
151D0026	MS0320	Washington, MS	63	Not available
133G2019, 133G2029	MS0270	Sunflower, MS	121	Irrigation
133E0127	MS0260	Sunflower, MS	116	Domestic

a See appendix C for a description of activities corresponding to each Facility ID.
Source: USGS (2015c), MDEQ (2016)

Contaminated Groundwater

No known areas of contamination are within the Project area, with the exception of existing compressor stations owned by TGP where TGP completed remediation and removed PCB-contaminated materials and soil. These areas and measures to avoid or minimize impacts associated with constructing in areas that could contain PCBs are described in section 2.1.2. In addition, should TGP encounter contaminated groundwater, it would implement its *Plan for the Unanticipated Discovery of Potentially Contaminated Soils or Groundwater*.

Groundwater Impacts and Mitigation

Project activities have the potential to affect overland water flow and recharge of shallow aquifers temporarily. Vegetation clearing, soil compaction, trench excavation, and dewatering could hinder the infiltration of water into the ground and affect local vegetation and hydrology, but these minor impacts would be temporary. The Project is located in generally flat to rolling terrain with few steep slopes. However, in areas of pipeline construction where slopes exceed 5 percent, TGP would use trench breakers to slow the flow of water along the backfilled trench, and to reduce the likelihood of the trench acting as a conduit for groundwater migration. If excavation dewatering is necessary, TGP would discharge water in a relatively flat upland area for evaporation and infiltration back to the water table. In accordance with TGP's Plan and Procedures, TGP would prevent silt-laden water from trench dewatering from flowing into waterbodies or wetlands. TGP has stated that if the water must be discharged to a surface waterbody, crews would control the discharge rate to reduce the potential for erosion, and would use appropriate filtration to control suspended solids. Discharging silt-laden water into a surface waterbody is not allowed by our Plan and Procedures, and TGP has not demonstrated that it could sufficiently filter the dewatering discharge. Therefore, we have included a recommendation in section 2.2.3 that TGP confirm in its Procedures that it would not discharge water from trench dewatering to any waterbody.

Based on available state databases, nine public and private water supply wells would be in or near the construction workspace of the Project. Additional wells may be present that are not included in the state databases. TGP would make reasonable efforts to confirm the presence of wells near the construction right-of-way with current landowners throughout the Project, and would survey wells that are adjacent to the right-of-way during the final design. Wells within 150 feet of the construction area would be staked and flagged for visibility. For wells that may be inside or adjacent to a work area, TGP would adjust the workspace, where possible, to avoid the well or would coordinate with the landowner (and FERC as necessary) for minor right-of-way realignment. If any wells remain in the final construction area, TGP would stake and flag each well and surround it with a silt fence.

Before and after construction, TGP would test the flow rates of water wells within 150 feet of construction if allowed by the affected landowner(s). In addition to flow rates, water quality testing should be offered to establish an appropriate baseline to evaluate any well owner complaints and assess construction impacts. Therefore, **we recommend that**:

- **<u>Prior to construction</u>, TGP should file with the Secretary the location, by milepost, of all private wells within 150 feet of construction workspaces:**
  - **a. TGP should conduct, with the well owner's permission, pre- and post-construction monitoring of well yield and water quality for these wells; and**
  - **b. <u>within 30 days of placing the facilities in service</u>, TGP should file a report with the Secretary discussing whether any complaints were received concerning well yield or water quality and how each complaint was resolved.**

Groundwater could be affected by accidental spills or leaks of fuels, lubricants, and coolant from construction equipment. By implementing proper storage, containment, and handling procedures, however, the potential hazard would be greatly minimized or avoided. TGP would adhere to the provisions contained in its SPCC Plans and Procedures to protect groundwater resources, including the WHPAs at workspaces MS0290 and MS0320. Measures that TGP would implement to minimize potential impacts on water resources from accidental spills of fuels, solvents, and lubricants include those described in section 2.1.2 for reducing risk for impacts on soils, as well as the following:

- ensuring all equipment is parked overnight and/or fueled at least 100 feet from a waterbody or in an upland area at least 100 feet from a wetland boundary;
- using secondary containment for pumps operating within 100 feet of a waterbody or wetland;
- inspecting equipment for leaks regularly and repairing identified leaks promptly; and
- maintaining a 400-foot setback from community and municipal wells and a 200-foot setback from private wells for hazardous materials storage, and equipment and vehicle maintenance and refueling activities.

We conclude that the above measures are adequate to protect groundwater resources in WHPAs; however, TGP has not consulted with the local agencies responsible for the WHPAs to determine if they recommend any alternative measures. Therefore, **we recommend that:**

- **<u>Prior to construction at workspaces MS0290 and MS0320</u>, TGP should file with the Secretary documentation of consultation with the local agencies responsible for WHPAs regarding mitigation measures for protection of the WHPAs at these workspaces.**

In general, blasting activities have the potential to damage nearby water supply wells or springs. TGP does not anticipate conducting blasting activities for the Project; however, if blasting is required, small charges with localized effects would be used. TGP would prepare and implement a blasting plan to prevent damage to aboveground and underground structures, impacts on groundwater resources, and the scattering of loose rock. TGP would test groundwater supply wells within 200 feet of blasting activities for total suspended solids before and after blasting if requested by the landowner. TGP would adhere to all local, state, and federal regulations applicable to controlled blasting and blast vibration limits with regard to structures and underground utilities while performing these activities.

Based on our recommendation and TGP's implementation of mitigation measures and TGP's Procedures, we conclude that construction and operation of the Project would not have significant impacts on groundwater resources in the Project area.

2.2.2 Surface Water

Existing Surface Water Resources

A total of 53 waterbodies would be within the construction workspace of compressor stations, new-build pipeline, replacement pipelines, or off-right-of-way tap reconnects. These include 17 perennial, 22 intermittent, and 14 ephemeral waterbodies (see appendix D). Of the 53 waterbodies, 5 would be within the construction workspace of the compressor stations or associated access roads, 14 would be crossed by the new-build pipeline, 1 would be crossed by an access road for the new-build pipeline, 7 would be crossed by the replacement pipelines, 19 would be crossed by the off-right-of-way tap reconnects, and 7 would be within the construction workspace of the new-build pipeline or off-right-of-way tap reconnects but not crossed by the pipelines.

Executive Order (EO) 11988 *Floodplain Management*, issued on May 24, 1977, requires Executive agencies to avoid adverse effects on the 100-year floodplain, when possible. It also states that growth and development within the floodplain should not be encouraged, unless no alternatives exist, and that functions and habitat associated with floodplains should be protected.

Floodplains crossed by the new-build pipeline and abandonment activity workspaces are listed in table 2.2-3. According to EO 11988, when new structures are to be located in a floodplain, those structures should be elevated above the base flood level rather than filling in land wherever practicable. The new-build pipeline would be installed underground below potential scour depths. A portion of a temporary workspace for the new pig launcher/receiver at the northeastern terminus of the new-build pipeline would be within the 100-year floodplain of Brushy Creek. However, with the potential exception of perimeter fencing, no permanent, aboveground structure would be constructed within the floodplain. TGP would stabilize the site using standard construction methods, including geotextile fabric and rock. Between MPs 11.2 and 11.5, parts of Segment 2 of the MLV 874 replacement pipeline would be within a floodplain. No above grade appurtenances would be within the floodplain. TGP would install four tap removal/reconnects (see table 2.2-3) within floodplains and these facilities would have above grade components; however, their footprint would be small and their locations are largely dictated by the existing pipeline infrastructure. TGP would obtain necessary floodplain permits from the state or county, depending on the location of the work (see table 1.11-1). No compressor station facilities would be constructed in floodplains.

Table 2.2-3

Floodplains Crossed by the Project

Facility	County, State	Associated Waterbody
New-build Pipeline		
MP 4.9 – 4.9	Carter, KY	Long Fork
MP 6.7 – 6.8	Carter, KY	Brushy Creek
MP 6.9 – 7.0	Carter, KY	Brushy Creek
MP 7.2 – 7.6	Carter, KY	Brushy Creek
Replacement Pipelines		
MLV 874, Segment 2	Madison, KY	Tates Creek
Off-right-of-way Tap Reconnects		
KY0080	Rowan, KY	Little Brushy Creek, Big Brushy Creek
OH0110	Morgan, OH	Smith Run
MS0280	Sunflower, MS	Unnamed Tributary to Porter Bayou
Other Ground Disturbing Activities		
KY0002 Gas Disconnect	Greenup, KY	Grays Branch
KY0010 Crossover Removal	Greenup, KY	Grays Branch
KY0020 Tap Removal/Reconnect	Greenup, KY	Grays Branch
KY0040/KY0050 Crossover Removal	Carter, KY	Grassy Creek
MS0270 Crossover Removal	Sunflower, MS	Jones Bayou
MS0310 Tap Removal/Reconnect	Washington, MS	Main Channel
MS0320 Gas Disconnect (CS 96)	Washington, MS	Ditch No.6
OH0200 Gas Disconnect	Scioto, OH	Ohio River
TN0250/TN0260 Crossover Removal, Tap Removal/Reconnect	Perry, TN	Lick Creek
TN0340/TN0350 Tap Removal/Reconnect	McNairy, TN	Hendrix Branch Tributary 1

Source: Federal Emergency Management Agency (2015, 2016)

The Project would not affect major waterbodies (waterbodies that are wider than 100 feet) or navigable waters (Section 10 Rivers and Harbors Act waters). TGP would disconnect the 200-3 pipeline crossing the Ohio River on either side of the river and no in-water work would occur. The approximate distances between the Ohio River and the proposed workspaces are 640 feet, 1,130 feet, and 1,430 feet (USGS, 2015c and 2015d).

Section 303(d) of the Clean Water Act requires all states to submit a list every 2 years for EPA approval of all surface waters in the state for which beneficial uses, such as drinking, recreation, aquatic habitat, and industrial use, are impaired by pollutants. Three waterbodies crossed by the Project are listed as impaired (EPA, 2015). These include two perennial waterbodies (Smith Run and an unnamed waterbody) that would be within the construction area for an off-right-of-way tap reconnect and one unnamed intermittent waterbody that would be within the construction area for a tap removal. Mitigation for impacts on these waterbodies would be the same as the mitigation for impacts on other waterbodies as described below in "Impacts and Mitigation." No impaired waterbodies or waterbodies with a state water quality classification are listed in Carter and Lewis Counties, Kentucky, where the new-build pipeline would be constructed (Kentucky Energy and Environment Cabinet, Division of Water, 2013). No National Wild and Scenic Rivers or waters of exceptional value have been identified near the Project (National Wild and Scenic Rivers System, 2015).

Based on the Kentucky Geography Network (Commonwealth of Kentucky, 2015), no known potable water intakes would be within 3 miles downstream of any waterbody crossing for the new-build pipeline. TGP identified one potable water intake 1.1 miles downstream of where Off-right-of-way Tap Reconnect OH-0030 would cross an apparent intermittent tributary to Stillwater Creek; however, no waterway features were observed during a field survey at the crossing location. No other potable surface water intakes would be within 3 miles downstream of waterbody crossings or other in-water work associated with any other Project facilities.

Based on the PHMSA's Drinking Water Unusually Sensitive Areas database, the Project would cross a number of municipal or sensitive watershed areas (PHMSA, 2014a). These include one area that would be crossed by the new-build pipeline, three areas that would intersect with compressor station sites, and 31 areas that would overlap with other components of the Project.

Surface Water Impacts and Mitigation

Project activities with the potential to impact surface waters include construction of the compressor stations, new-build pipeline, replacement pipelines, and abandonment activities, including off-right-of-way tap reconnects. Construction activities may result in erosion or sedimentation into nearby waterbodies that can increase turbidity and affect water quality.

Construction of the access road at Compressor Station 202.5 would result in permanent impacts on one ephemeral stream (CS202.5_ST02) and one intermittent stream (CS202.5_ST05). An additional ephemeral stream (CS202.5_ST03) would be within the permanent easement for the access road but would not be permanently affected. TGP would install a culvert to maintain existing drainage associated with CS202.5_ST02.

The Compressor Station 206.5 site would be graded so that all surface water would flow to the stormwater management area. The flow would then be released off-site. The grading would result in permanent fill of intermittent waterbody OH0095_ST02, which consists of two branches within the site boundary of Compressor Station 206.5; these branches are headwaters that become a single waterbody that flows to the east off-site. No fill material would be brought from off-site and no grading or filling would occur outside the site boundary. The direct, permanent impacts on waterbodies at Compressor Station 206.5 would be less than 0.03 acre.

At existing Compressor Station 110, an intermittent tributary to the Estep Branch would be crossed for the disconnection of a gas pipeline (gas disconnect) using open cut methods. Impacts would be similar to those for the waterbody crossings associated with the pipeline facilities.

As described in section 1.10.3, during pipeline construction TGP would cross waterbodies with flow at the time of crossing using dam and pump or flume crossing methods. Intermittent and ephemeral waterbodies with no discernable flow at the time of crossing would be crossed using standard upland construction procedures. TGP does not anticipate using horizontal directional drill methods. In general, TGP would minimize crossing length by constructing waterbody crossings so they are as perpendicular to the channel as engineering and routing conditions allow. In-water work, disturbance to the streambed, removal of riparian vegetation, and diversion of streamflow during waterbody crossings would temporarily impact water quality by increasing turbidity. These impacts would be minimized by using dry crossing methods when flow is present and implementing the measures in TGP's Procedures. Use of TGP's Procedures would also minimize impacts to, and further degradation of, impaired waters. TGP would restore streambeds and banks to pre-construction contours or a stable incline. In some cases, if flow conditions prevent stabilization with vegetation, stream banks would be stabilized using engineering controls such as riprap or as directed by federal, state, or local permit conditions. TGP would revegetate stream banks with herbaceous species, and trees and shrubs would re-establish through natural succession.

All new facilities that would be sited in floodplains occupy a minimal portion of the overall flood storage capacity of the affected floodplain. Consequently, we conclude that impacts on floodplains would be indiscernable.

Refueling of vehicles and storage of fuel, oil, or other hazardous materials near surface waters and spills from equipment working in waterbodies could create a potential for contamination, which, if a spill were to occur, could degrade downstream water quality. TGP would minimize potential impacts related to spills by implementing its SPCC Plans and its Procedures, as previously described for groundwater. In addition, each state crossed by the Project requires a state-specific stormwater pollution prevention plan for earth disturbing activities in that state.

Hydrostatic Testing

TGP would conduct hydrostatic testing to verify the integrity of the pipeline facilities before placing them into service. Table 2.2-4 provides the quantity of water required for each pipeline segment or facility and the permitting agency.

Table 2.2-4

Hydrostatic Test Water Quantities and Permitting Agencies

Facility/Workspace	Quantity of Water Required (gallons)	Permitting Agency
Compressor Stations		
CS 216.5	80,000	Ohio Environmental Protection Agency (OH EPA)
CS 211.5	80,000	OH EPA
CS 206.5	80,000	OH EPA
CS 202.5	80,000	OH EPA
CS 110	75,000	Kentucky Department for Environmental Protection (KYDEP)
CS 875	50,000	KYDEP
New-build Pipeline	2.2 million	KYDEP
Replacement Pipelines		
MLV 53	180,609	MDEQ
MLV 874	278,287	KYDEP
Off-right-of-way Tap Reconnects		
MS0040	54,572	Mississippi Department of Environmental Quality (MDEQ)
MS0110	105	MDEQ
MS0170	446	MDEQ
MS0200	232	MDEQ
MS0280	14,823	MDEQ
KY0080	1,339	KYDEP
KY0170	1,701	KYDEP
TN0190	132	Tennessee Department of Environment and Conservation (TDEC)
TN0200	281	TDEC
TN0210/TN0220	4,652	TDEC
OH0030	660	OH EPA
OH0110	1,550	OH EPA

TGP would hydrostatically test the new-build pipeline in Kentucky as one segment. This testing would involve filling the pipeline with water, pressurizing it, and then checking for pressure losses due to pipeline leakage. About 2.2 million gallons of water would be required for the hydrostatic testing. TGP would not withdraw water from surface waterbodies for hydrostatic tests for the pipeline or compressor stations. Water would be obtained from a previously-permitted source (municipal water, water well, or commercial source) where the withdrawal has already been accounted for. Water would be hauled to the fill points from the water source.

TGP would use Greenville, Mississippi, municipal water to test the MLV 53 replacement pipeline. TGP would test the MLV 874 replacement pipeline in six segments using Richmond, Kentucky, municipal water.

For hydrostatic testing of the off-right-of-way tap reconnects, TGP would withdraw water from municipal sources except at Off-right-of-way Tap Reconnect MS0040, where TGP proposes to withdraw water from and discharge it to Reaves Pond. If sufficient water is not available due to seasonal fluctuations, property owner permission, or newly identified potential ecological impacts, then TGP would obtain the water from a previously permitted source and haul it to the fill point.

The Project facilities would be constructed using new steel pipe that would be free of chemicals or lubricants and none of the hydrostatic test water would be chemically treated. TGP would comply with applicable federal, state, and local permit requirements pertaining to the tests.

In accordance with TGP's Procedures, hydrostatic test water would be discharged in a vegetated upland, away from wetlands and waterbodies, through straw bale filters or fabric filter bags to minimize scour and sedimentation. This water would infiltrate into the soil and recharge the local groundwater system. TGP would comply with the hydrostatic test water discharge requirements of the Ohio Environmental Protection Agency, KYDEP, Mississippi Department of Environmental Quality, and Tennessee Department of Environment and Conservation (TDEC). We conclude that the use and discharge of hydrostatic test water would not result in significant impacts on water resources in the Project area.

Construction Permits

TGP would complete Project activities subject to the Clean Water Act through compliance with COE Section 404 Nationwide Permit 12 for Utility Line Discharge, including applicable state and regional conditions, and Section 401 water quality certifications. The permit table in section 1.11 lists the states to which TGP has submitted applications for Section 401 water quality certifications. No Section 10 authorization is required from the COE because no navigable waterways (as defined by the Rivers and Harbors Act) would be crossed by the proposed construction. TGP would comply with applicable Section 401 water quality certification requirements and Section 404 permit requirements. TGP has submitted Pre-construction Notifications to the appropriate COE districts as required for coverage under Nationwide Permit 12.

With implementation of TGP's mitigation measures, our recommendation, and TGP's Procedures to avoid or minimize impacts on waterbodies, we conclude that Project impacts on surface water resources would not be significant.

2.2.3 Wetlands

Both the COE and the EPA define wetlands as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (COE, 2009; EPA, 2016a). To be considered a wetland, an area must show hydrophytic vegetation, hydric soils, and wetland hydrology under normal conditions (COE, 2007). FERC's Procedures define wetlands as "any area that is not in actively cultivated or rotated cropland and that satisfies the requirements of the current federal methodology for identifying and delineating wetlands."

The Project falls within four COE Districts: Huntington, Vicksburg, Memphis, and Louisville. COE-jurisdictional wetlands at the Off-right-of-way Tap Reconnect MS0040 would be permanently affected; therefore, TGP submitted a Pre-construction Notification to the Vicksburg District of the COE on February 13, 2015.

Of the states where wetlands would be crossed by the Project, only Ohio has state-specific wetland classifications. The Ohio Environmental Protection Agency uses the Ohio Rapid Assessment Method for determining the appropriate category of a particular wetland under the Wetland Antidegradation Rule, Ohio Administrative Code (OAC) Rule 3745-1-54.

Existing Wetland Resources

TGP conducted wetland delineations at locations proposed for construction by the Project in November 2013 and July to November 2014. For discrete workspaces, including compressor station sites, delineations were conducted within the proposed construction location boundary. For new pipeline, delineations were conducted within a 250-foot-wide survey corridor centered on the proposed new-build pipeline and within a 100-foot-wide corridor for the off-right-of-way tap reconnect pipelines. TGP identified wetlands based on field surveys, National Wetlands Inventory (NWI) data, aerial maps, and soils maps.

The USFWS wetland classification system described by Cowardin et al. (1979) was used to classify the wetlands that would be affected by the Project. Wetlands were identified as palustrine emergent (PEM) and palustrine forested (PFO). In addition, PFO wetlands within maintained permanent pipeline right-of-way would be converted to palustrine scrub-shrub (PSS) and PEM. These wetland types are defined as follows:

- PEM: Non-tidal wetlands characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. Usually dominated by perennial plants. Representative species include green bulrush (*Scirpus atrovirens*), common rush (*Juncus effusus*), reed canarygrass (*Phalaris arundinacea*), and rice cutgrass (*Leersia oryzoides*).
- PFO: Freshwater wetlands dominated by woody vegetation greater than 20 feet in height. Dominant species include mature canopy trees. Representative species include green ash (*Fraxinus pennsylvanica*), silver maple (*Acer saccharinum*), and red maple (*Acer rubrum*).
- PSS: Freshwater wetlands dominated by woody vegetation less than 20 feet in height. Species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. Representative species include slippery elm (*Ulmus rubra*), black willow (*Salix nigra*), and sweetgum (*Liquidambar styraciflua*).

Impacts and Mitigation

Table 2.2-5 summarizes the impacts on wetlands that would be in the construction workspaces for the Project. The Project activities would temporarily affect about 5.6 acres of wetlands during construction. About 4.2 acres of wetlands would be permanently affected. The permanent impacts would include permanent fill of 0.1 acre of PEM wetland at Compressor Station 206.5 and all impacts on PFO wetlands (4.1 acres within the construction right-of-way of the new-build pipeline and two off-right-of-way tap reconnects) because of the long recovery time associated with forested wetlands. We have reviewed the areas where the pipeline would cross forested wetlands and determined that avoiding the wetlands would result in greater overall environmental impacts.

Table 2.2-5

Wetlands within ACRP Construction Workspaces

Wetlands ID	Type	Permanent Impacts (acres)	Temporary Impacts (acres)	MP or Workspace ID	Crossing Length (feet) [a]
Compressor Stations					
OH0095_WL02	PEM	0.10	0.10	CS 206.5	-
New-build Pipeline					
KY-CA-00.00_WL01	PFO	0.01 [b]	0.01	MP 2.6	0
KY-CA-00.00_WL02	PEM	0.00	0.05	MP 3.5	27
Replacement Pipelines					
MLV 53 WL_01	PEM	0.00	0.41	MP 17.8	165
Off-right-of-way Tap Reconnects					
MS0040_WL02	PFO	3.8 [b]	3.8	MS0040	2,243
MS0040_WL01	PFO	0.35 [b]	0.35	MS0040	0
OH0110E_0110W_WL01	PEM	0.00	0.36	OH0110	210
MS0280N_WL01	PEM	0.00	0.02	MS0280	13
Other Abandonment Activities					
LA0110_0120_WL01	PEM	0.00	<0.01	LA0110	21
LA0110_0120_WL02	PEM	0.00	0.01	LA0110	0
LA0220_WL01	PEM	0.00	0.02	LA0220	16
LA0250_WL01	PEM	0.00	0.02	LA0250	0
AR0010S_WL01	PEM	0.00	0.09	AR0010	46
MS0150_WL01	PEM	0.00	0.10	MS0150	49
MS0210_WL01	PEM	0.00	0.03	MS0210	8
MS0290_WL01	PEM	0.00	0.02	MS0290	0
TN0370N_WL01	PEM	0.00	0.04	TN0370	0
KY0010_WL01	PEM	0.00	0.09	KY0010	42
KY0110_WL01	PEM	0.00	0.03	KY0010	8
KY0310E_WL01	PEM	0.00	0.03	KY0310	13
OH0180_WL01	PEM	0.00	0.01	OH180	0
Totals [c]		**4.2**	**5.6**		**2,861**

a Crossing length of zero indicates that a wetland would be within the construction right-of-way but would not be crossed by the pipeline.

b Includes conversion of PFO wetland to PEM wetland in the permanently maintained right-of-way for the Project as well as impacts on PFO in the temporary workspace that would require a long recovery time.

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

TGP would minimize potential adverse impacts on wetlands using minimization measures and best management practices (BMP) in its Plan and Procedures. These measures include expediting construction in and around wetlands, restoring wetlands to their pre-project configurations and contours, segregating topsoil during excavation if possible, permanently stabilizing upland areas near wetlands as soon as possible after backfilling, inspecting the right-of-way periodically during and after construction, and repairing any erosion control or restoration features until permanent revegetation is successful. TGP would comply with the applicable permit conditions issued by federal, state, and local permitting agencies.

Impacts from operation of the Project would be limited to periodic maintenance activities and excavation that may be required for repairs. TGP would comply with applicable Nationwide Permit 12 and regional conditions and applicable state and local permit requirements.

Per COE requirements, the permanent loss of wetlands may require that TGP provide compensatory mitigation. TGP is consulting with the COE to address the wetland impacts and verify that TGP's mitigation plan adequately satisfies COE requirements. Given the relatively small area of disturbance, we conclude that the Project would not have significant adverse impacts on wetlands.

Alternative Measures to the FERC's Procedures

As discussed in section 1.10, TGP has requested several alternative measures to the FERC's Procedures. These alternative measures are described in table 2.2-6.

Table 2.2-6

TGP's Requested Alternative Measures to FERC's Procedures

Section	Alternative Measure	Acceptable	Explanation
V.B.2.a: Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from water's edge, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land.	TGP would use ATWS within 50 feet of waterbodies.	Yes	TGP provided explanations of the conditions for ATWS within 50 feet of a waterbody. We agree that these ATWS are necessary.
V.B.11 and VI.B.4: Trench Dewatering. Dewater the trench (either on or off the construction right-of-way) in a manner that does not cause erosion and does not result in silt-laden water flowing into any waterbody.	TGP stated that if water from trench dewatering must be discharged to a surface waterbody, crews would control the discharge rate to reduce the potential for erosion, and would use appropriate filtration to control suspended solids.	No	TGP has not provided adequate details regarding its filtration methodology for us to determine that filtration of dewatering discharge would be practical and sufficient to prevent silt-laden water from entering waterbodies.
VI.A.3: Limit the width of the construction right-of-way to 75 feet or less. Prior written approval of the Director is required where topographic conditions or soil limitations require that the construction right-of-way width within the boundaries of a federally delineated wetland be expanded beyond 75 feet.	TGP proposes a construction right-of-way width greater than 75 feet through two wetlands because of steep slopes and the necessity for side-hill construction.	No	TGP has not provided adequate justification that a wider construction right-of-way is necessary at these locations.
VI.B.1.a: Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from wetland boundaries, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land.	TGP would use ATWS within 50 feet of wetlands and within wetlands.	Yes	TGP provided explanations of the conditions for ATWS within 50 feet of or within a wetland. We agree that these ATWS are necessary.
VI.D.1: Do not conduct routine vegetation mowing or clearing over the full width of the permanent right-of-way in wetlands.	TGP proposes to continue full right-of-way width maintenance in wetlands over the pipelines that would be newly constructed for continuity.	No	TGP indicates that having discontinuous maintenance procedures for various parts of a contiguous permanent right-of-way would pose significant operational challenges. We have reviewed this exception to our Procedures and conclude that it is not adequately justified and, therefore, not approved.

TGP has identified several areas associated with pipeline construction where ATWS would be needed within 50 feet of a waterbody or wetland (see table 2.2-7). Of these ATWS areas, one is needed for the construction yard, including pipe and material storage, one is adjacent to the tie-in point, and several are in areas needed for waterbody crossings. Additionally, five ATWS associated with the off-right-of-way tap reconnects would be needed within 50 feet of a wetland. We have reviewed these ATWS and agree that they are justified.

Table 2.2-7

Additional Temporary Workspace within 50 Feet of Waterbodies and Wetlands

Milepost/Worksite	Distance (feet)	Wetland or Waterbody	Site-specific Justification
New-build Pipeline			
MP 4.9	8	National Hydrography Dataset (NHD) Perennial Stream [a]	Area needed for construction yard, including pipe and other material storage. [b]
MP 6.7	41	Field Delineated Stream or River (KY-CA-.001_ST01)	Area needed for stream or river crossing; unable to avoid.
MP 6.9	0	Intersects Field Located Stream or River (KY-CA-.001_ST01)	Right-of-way crosses KY-CA-.001_ST01. ATWS needed for the waterbody crossing; adjacent to area of reduced right-of-way width, location constrained by structures; unable to avoid.
MP 7.1	32	Field Located Stream or River (KY-CA-.001_ST01)	Area needed for stream or river crossing; unable to avoid.
MP 7.6	44	NHD Stream or River (KY-CA-.001_ST01)	KY-CA-.001_ST01 is adjacent to the tie-in point; therefore, TGP is unable to move the ATWS greater than 50 feet from the waterbody.
MP 7.6	27	Field Located Stream or River (KY-CA-.001_ST01)	ATWS adjacent to planned temporary bridge crossing; unable to move.
Off-right-of-way Tap Reconnects			
MS0040 - MS-69-002 - SV 69D 101.1	0	Field-delineated wetland (MS0040_WL02)	ATWS location was shifted along the construction right-of-way to be greater than 50 feet from MS0040_ST04. Area needed for construction. Predominant vegetation in area is wetlands; so unable to avoid.
MS0040 - MS-69-002 - SV 69D 101.1	0	Field-delineated stream or river (MS0010_ST03)	MS0010_ST03 crossed by existing and proposed right-of-way. ATWS is adjacent to but does not cross MS0010_ST03. Area needed for construction near pipeline inflection in area with predominant wetlands and streams.
MS0040 - MS-69-002 - SV 69D 101.1	39	Field-delineated wetland (MS0040_WL02)	Area needed for construction near pipeline inflection. Predominant vegetation in area is wetlands.
KY0080 - KY-109-002A - SV 109C 101.3	0	NHD stream or river (KY0080_ST01)	Associated with a bored crossing of a paved road. Unable to relocate as it is directly associated with the bore for the road crossing.
KY0080 - KY-109-002A - SV 109C 101.3	42	NHD stream or river (KY0080_ST02) [a]	Not field verified due to lack of access; however, TGP is conservatively planning that it would need to be within 50 feet and is requesting approval. Where practicable, TGP would realign ATWS to be further than 50 feet prior to construction to avoid impacts.
KY0080 - KY-109-002A - SV 109C 101.3	9	National Wetlands Inventory wetland [a]	Not field verified due to lack of access; however, TGP is conservatively planning that it would need to be within 50 feet and is requesting approval. Where practicable, TGP would realign ATWS to be farther than 50 feet prior to construction to avoid impacts.

a Waterbody based on publicly available information. While TGP would, where practicable, realign ATWS to avoid impacts to waterbodies, there is the potential that this location could remain within 50 feet for the reasons noted under site-specific justification. Once precise information is available, this ATWS may be further adjusted.

b Shifting the space to greater than 50 feet from the perennial stream would require clearing trees to provide adequate space, and implementation of standard BMPs would minimize impacts on the stream. Therefore, the current configuration offers the least environmental impact.

Section VI.A.3 of FERC's Procedures requires prior written approval of the Director of OEP where topographic conditions or soil limitations require that the construction right-of-way width within the boundaries of a federally delineated wetland be expanded beyond 75 feet. Two wetlands would be crossed by the new-build pipeline; a PFO wetland (KY-CA-00.00_WL01) located within the temporary work area at MP 2.6 and a PEM wetland (KY-CA-00.00_WL02) along the pipeline centerline at MP 3.5. TGP has requested approval to use a construction right-of-way greater than 75 feet at these locations because of the presence of steep slopes and the necessity for side-hill construction. Although steep slopes are adjacent to both locations, TGP has not provided sufficient evidence that it could not reduce the construction right-of-way width to 75 feet through either wetland.

We have reviewed TGP's requested alternative measures to FERC's Procedures and find the ATWS proposed within 50 feet of wetlands or waterbodies to be acceptable. However, we do not find the proposals to use a construction right-of-way width greater than 75 feet through two wetlands, maintain the full right-of-way width in wetlands, or discharge water into waterbodies to be adequately justified or protective of the environment. Based on our review of TGP's requested modifications to our Procedures, **we recommend that**:

- **<u>Prior to construction</u>, TGP should file with the Secretary, for review and approval by the Director of the Office of Energy Projects (OEP), its project-specific Procedures that incorporate:**

  a. the site-specific alternative measures listed in table 2.2-6 of the EA, including use of specific ATWS within 50 feet of certain waterbodies;

  b. confirmation that TGP will not perform routine vegetation maintenance over the full right-of-way width;

  c. confirmation that TGP will not use a construction right-of-way width greater than 75 feet in wetlands; and

  d. confirmation that TGP will not discharge water from trench dewatering to any waterbody.

With implementation of TGP's mitigation measures, our recommendations, and TGP's Procedures (revised per our recommendation), we conclude that Project impacts on water resources and wetlands would not be significant.

2.3 Vegetation, Fisheries, and Wildlife

2.3.1 Vegetation

Existing Vegetation Resources

TGP identified vegetation cover types that would be affected by the Project during site-specific field surveys. We categorized several broad vegetation cover types that generally include similar vegetation communities across the ecoregions that the Project would cross. These cover types include open upland, open wetland, upland forest, wetland forest, and developed areas. Table 2.3-1 presents these vegetation cover types and descriptions of typical vegetation communities found within these cover types.

Table 2.3-1

Vegetation Cover Types Associated with the Project

Vegetation Cover Type	Vegetation Communities	Description
Open upland	Agricultural land (active hayfields and cultivated land), utility rights-of-way, open field, pasture, vacant land, herbaceous and scrub-shrub uplands, golf courses, municipal land	Agricultural lands: corn, soybeans, wheat, sugarcane, sorghum, sweet potato, turfgrass, and sod production species
		Native grassland: little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), and forbs
		Shrubland: herbaceous grassland species (bluegrass [*Poa* sp.], barnyardgrass [*Echinochloa* sp.], bristlegrass [*Setaria* sp.]) and small woody species (hawthorn [*Crataegus* sp.], sumac [*Rhus* sp.], *Rubus*, poison ivy [*Toxicodendron radicans*], and juniper [*Juniperus* sp.]) colonizing grasslands or areas that have been out of cropland production for an extended period
		Pasture: grassland consisting of both native and nonnative species; at times intermixed with shrubland; composed of goldenrod [*Solidago* sp.], ironweed [*Vernonia* sp.], rosette grass [*Dichanthelium* sp.], *Setaria*, *Paspalum*, Johnsongrass [*Sorghum halepense*], bristlegrass, wildrye [*Elymus* sp.], annual ragweed [*Ambrosia artemisiifolia*], common timothy [*Phleum* sp.], and barnyardgrass
		Fallow fields: recently abandoned cropland that is no longer in production characterized by early successional species such as annual ragweed, goldenrod, asters [*Aster* sp.], white mulberry [*Morus alba*], Johnsongrass, *Lespedeza*, barnyardgrass, and clover
Open wetland	Emergent wetland and scrub-shrub wetland	Emergent wetland and scrub-shrub wetland: *Carex*, *Cyperus*, *Ligustrum*, poison ivy, *Ludwigia*, and *Osmunda* species
Upland forest	Natural forests and woodlands; commercial forests	Unmanaged forest: oak [*Quercus* sp.], pine [*Pinus* sp.], hemlock [*Tsuga* sp.], hickory [*Carya* sp.], sweetgum [*Liquidambar styraciflua*], beech [*Fagus grandifolia*], cottonwood [*Populus*], maple [*Acer*], sugarberry [*Celtis laevigata*], pecan [*Carya illinoinensis*], and elm [*Ulmus*]
		Commercial (managed) forest: pine species
Wetland forest	Forested wetlands	Bottomland: willow [*Salix* sp.], cottonwood, sugarberry, sycamore [*Platanus occidentalis*], green ash [*Fraxinus pennsylvanica*], pecan, elm, oak, sweetgum, hickory, bald cypress [*Taxodium distichum*], water tupelo [*Nyssa aquatica*], palmetto [*Sabal* sp.], Spanish moss [*Tillandsia usneoides*], and river birch [*Betula nigra*]
Developed	Industrial/commercial and residential	Industrial/commercial: unvegetated, graveled, paved, bare ground
		Residential: early successional species or landscaped/ornamental species such as *Paspalum*, Bermudagrass [*Cynodon dactylon*], Johnsongrass, and fescue

Sensitive Vegetation Communities

The ACRP would not affect any documented unique or protected vegetation types, plant communities, or specimen trees. The Project may affect managed or sensitive wildlife habitats, including Tier 1 priority conservation areas (PCAs) in Kentucky, and natural communities in Louisiana, Mississippi, and Tennessee. Managed and sensitive wildlife habitats are discussed further in section 2.3.3.

Impacts on federally listed species habitat and consultation with the appropriate USFWS field offices are discussed in section 2.4. Impacts on threatened, endangered, and other special status plant species or their habitat also are discussed in section 2.4.

Noxious and Invasive Species

Invasive plant species are nonnative plants that have been introduced into an ecosystem, either directly or indirectly, and pose a major threat to agriculture and/or natural ecosystems. Noxious species have the potential to rapidly dominate and out-compete native species, potentially resulting in large-scale ecosystem impacts (Quinn et al., 2013). A federal noxious weed list is maintained for each state (NRCS, 2015c). During surveys, TGP noted the presence of noxious weeds in the Project area, the most common of which were Japanese honeysuckle (*Lonicera japonica*), Johnsongrass (*Sorghum halepense*), Chinese lespedeza (*Lespedeza cuneata*), kudzu (*Pueraria lobata*), tall fescue (*Schedonorus arundinaceus*), and Chinese privet (*Ligustrum sinense*). The abundance and density of noxious weeds was greatest in areas that had been disturbed in the past or that have a high disturbance frequency, such as roadsides, fence lines, fallow fields, abandoned residential areas, and disturbed forests.

Impacts and Mitigation

The Project would impact 532.3 acres of vegetation during construction, of which 255.8 acres would be affected during operation. Table 2.3-2 summarizes the construction and operational impacts of the Project facilities on each vegetation community type. Impacts on wetlands are discussed in section 2.2.3.

Table 2.3-2

Construction and Operation Impacts on Vegetation Cover Types in the Project Area (acres)

Facility	Upland Forest		Wetland Forest		Open Upland		Open Wetland		Developed Areas		Total	
	Const	Oper	Const	Oper	Const	Oper	Const	Oper [a]	Const	Oper	Const	Oper
Compressor Stations												
Ohio												
CS 216.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.0	13.3	22.0	13.3
CS 211.5	0.3	0.2	0.0	0.0	19.8	12.9	0.0	0.0	1.1	0.8	21.2	13.9
CS 206.5	4.6	3.9	0.0	0.0	25.0	5.7	0.1	0.1	0.0	0.0	29.7	9.7
CS 202.5	7.2	7.0	0.0	0.0	16.3	7.5	0.0	0.0	0.0	0.0	23.5	14.5
Kentucky												
CS 110	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	2.7	3.5	2.7
CS 875	0.0	0.0	0.0	0.0	23.6	0.0	0.0	0.0	0.0	0.0	23.6	0.0
Compressor Station Total	**12.1**	**11.1**	**0.0**	**0.0**	**84.7**	**26.1**	**0.1**	**0.1**	**26.6**	**16.8**	**123.5**	**54.1**
New-build Pipeline Total	**79.7**	**30.9**	**<0.1**	**0.0**	**41.9**	**14.5**	**<0.1**	**0.0**	**2.1**	**0.9**	**123.7**	**46.3**
Replacement Pipelines												
Kentucky	0.0	0.0	0.0	0.0	11.9	0.0	0.0	0.0	2.9	0.0	14.9	0.0
Mississippi	0.0	0.0	0.0	0.0	8.7	0.0	0.4	0.0	0.1	0.0	9.2	0.0
Replacement Pipelines Total	**0.0**	**0.0**	**0.0**	**0.0**	**20.6**	**0.0**	**0.4**	**0.0**	**3.0**	**0.0**	**24.0**	**0.0**
Off-right-of-way Tap Reconnects												
Ohio	3.5	0.8	0.0	0.0	3.4	1.7	0.4	0.3	4.9	4.4	12.2	7.2
Kentucky	3.1	1.9	0.0	0.0	11.4	6.4	0.0	0.0	8.9	6.7	23.4	15.0
Tennessee	3.4	1.8	0.0	0.0	0.9	0.6	0.0	0.0	1.9	1.8	6.2	4.2
Mississippi	2.4	0.1	4.3	2.6	2.3	0.2	0.0	0.0	18.5	15.8	27.5	18.7
Off-right-of-wayTap Reconnects Total	**12.4**	**4.6**	**4.3**	**2.6**	**18.0**	**8.9**	**0.4**	**0.3**	**34.2**	**28.7**	**69.3**	**45.1**
Access Roads Total	**1.4**	**1.4**	**0.0**	**0.0**	**6.2**	**4.5**	**0.0**	**0.0**	**12.3**	**2.2**	**19.9**	**8.1**
Pipe and Contractor Yards Total	**0.1**	**0.0**	**0.0**	**0.0**	**22.8**	**0.0**	**0.0**	**0.0**	**23.6**	**0.0**	**46.5**	**0.0**
Other Workspaces Total	**1.8**	**0.0**	**0.0**	**0.0**	**16.8**	**1.0**	**0.5**	**0.5**	**106.2**	**100.7**	**125.3**	**102.2**
Project Total	**107.5**	**48.0**	**4.3**	**2.6**	**211.0**	**55.0**	**1.4**	**0.9**	**208.0**	**149.3**	**532.3**	**255.8**

Const = Construction, Oper = Operation. Impacts on waters are not included in this table but are included in the table of land uses in appendix F.

Construction impacts reflect the sum of all acres affected by temporary construction and permanent operations; totals may not add up due to rounding.

Table 2.3-1 includes descriptions of vegetation communities within each cover type.

a Operation impacts in this column represent wetlands that occur within the permanent right-of-way or operational footprint, and may not match the permanent impact acreage reported in table 2.2-5.

Construction activities would result in vegetation removal through clearing and grading. Construction impacts would be temporary to permanent depending on the type of vegetation cover affected and the operational use of the land. The relative degree of construction impacts in areas that are not permanently converted to industrial land (i.e., temporary workspaces) would depend on the type and amount of vegetation affected and the rate at which the vegetation would regenerate after construction. Operation of the aboveground facilities would result in the permanent conversion of existing cover types to industrial uses. Existing land cover types in the operational rights-of-way for pipelines would also be permanently converted to and maintained as an herbaceous cover type through revegetation following construction and by maintenance mowing.

Construction would disturb about 111.8 acres of forested cover types (upland and wetland). Removal of forest could result in forest habitat fragmentation, edge effects, and an increased potential for invasive species establishment (Harper et al., 2005; Motzkin et al., 1999). The removal of mature trees could also result in secondary impacts such as increased erosion, increased light penetration, change in air temperature, and loss of soil moisture (Matlack, 1993; Murcia, 1995). The clearing of forest in temporary workspaces that are then revegetated would result in a long-term decrease in the quality of wildlife habitat because it would take decades for trees to return to maturity.

Construction would also disturb about 420.5 acres of non-forested vegetation cover types (211.0 acres of open upland, 1.4 acre of open wetland, and 208.0 acres of developed areas), about 164.4 acres of which would be within the permanent operational footprint. Construction activities would result in the short-term alteration and loss of vegetation, and could result in increased soil erosion and changes to surface water flow and infiltration. In general, the disturbance of non-forested areas within temporary workspaces would be considered short-term and impacts would be minor because vegetation would be capable of recovering relatively quickly after restoration and revegetation. After the proposed mitigation steps described below are implemented, herbaceous and scrub/shrub vegetation within restored and revegetated temporary workspaces would likely regenerate within two to five growing seasons.

TGP would reduce impacts on vegetation by using (and improving, as necessary) existing roads where practical and by locating new access roads in disturbed areas such as agricultural cover types. Following construction, TGP would revegetate temporary workspaces according to measures outlined in TGP's Plan and Procedures. In general, temporary workspaces would be restored and revegetated to their original vegetative cover type in accordance with TGP's Plan, and TGP would develop seed mixes and seeding rates according to NRCS guidelines. The revegetation and restoration methods would also take into account the preferences of affected landowners or lessees, and the requirements stipulated by permit conditions. For example, TGP would implement rehabilitation guidelines as stated in the Kisatchie National Forest Land and Resource Management Plan and would adhere to "Restoration of Disturbed Areas" Guidelines for workspaces LA0200, LA0210, and LA0220 within the Kisatchie National Forest to limit impacts on sensitive Kisatchie National Forest species (see section 2.4.3).

The operational easement for the proposed pipelines would be revegetated after construction. A 10-foot-wide corridor over the pipeline would be maintained by mowing in areas with an herbaceous cover type.

Disturbance related to construction and maintenance activities in both forested and open upland areas would have the potential to introduce and increase the spread of noxious weed species, particularly in areas where vegetation is cleared. Activities in disturbed areas can spread weed species quickly because those same species can establish quickly and more effectively than native species. Once spread or newly established, noxious weed infestations can become permanent if left uncontrolled. To manage invasive plant species and noxious weeds, TGP would implement the integrated pest management measures in its *Invasive Species Management Plan.* This plan, filed as a draft, provides species-specific treatment recommendations and timing considerations, and outlines a 5-year monitoring plan. Management actions would include herbicide applications, manual removal, and mechanical (mowing) removal. TGP has indicated that it would provide a final *Invasive Species Management Plan* prior to the start of construction. **We recommend that**:

- **Prior to construction, TGP should file its final *Invasive Species Management Plan* with the Secretary for review and written approval by the Director of OEP.**

2.3.2 Fisheries

As discussed in section 2.2.2, the Project would cross 53 waterbodies, including 17 perennial and 36 intermittent or ephemeral waterbodies. Only the perennial waterbodies are fish bearing. Fifty-three of the perennial waterbodies are classified as warmwater fisheries and three are not classified (see appendix D). Warmwater species include fish such as bass, crappie, sunfish, catfish, suckers, minnows, perch, and darters (OAC 3745-1-02). Temperatures in warmwater streams can range from 70 to 90 °F in the summer months (Tennessee Wildlife Resources Agency, 2015).

Fisheries of Special Concern

State waters in Ohio, Tennessee, Kentucky, and Mississippi are classified according to their designated uses (i.e., aquatic life, water supply, or recreation). Appendix D identifies the designated uses and fisheries classifications for the waterbodies crossed and affected by the Project. The Project would not cross any waterbodies that have special use designations or that provide essential fish habitat or habitat for any other fisheries of special concern. Section 2.4 provides additional information on special status species, including mussels, in the Project area and correspondence with federal and state agencies.

Impacts and Mitigation

Construction activities at and near waterbodies that may affect fisheries include the withdrawal and discharge of hydrostatic test water, in-water work, streambed and bank disturbance, and riparian vegetation removal. Impacts on federally listed aquatic species are discussed in section 2.4, and surface water impacts are discussed in section 2.2.2.

As described in section 2.2.2, the only location where hydrostatic test water would be withdrawn from and discharged to surface water is at Reaves Pond for Off-right-of-way Tap Reconnect MS0040 in Benton County, Mississippi. The volume of water that would be used is about 54,500 gallons. TGP would use a screened intake to prevent fish entrainment according to TGP's Plan and Procedures. The hydrostatic test water would not be chemically treated, and the pipes would be free of chemicals or lubricants that could contaminate the water.

As discussed in section 2.2.2, temporary impacts on waterbodies would result from activities associated with construction of Compressor Station 110 in Rowan County, Kentucky; the new-build pipeline in Carter and Lewis Counties, Kentucky; the pipeline replacements in Madison County, Kentucky, and Washington County, Mississippi; and the off-right-of-way tap reconnects in Rowan County, Kentucky, and Morgan County, Ohio. Construction across waterbodies could result in short-term increases in turbidity and sedimentation. In addition, depending on the crossing methods, aquatic species may be affected or displaced. TGP would use dry crossing methods (i.e., dam and pump, or flume) in perennial waterbodies, which would generally reduce turbidity and sedimentation during construction. The dam and pump method would result in a temporary barrier to fish movement, which could result in changes to behavior, increase the stress rates, or cause injury. If used, the flume crossing method would allow fish to travel around the work area, although fish might expend additional energy in doing so.

However, to the extent possible, TGP would conduct work across waterbodies within 24 hours, minimizing these effects. TGP would cross intermittent and ephemeral waterbodies when dry using the conventional open-cut method outlined in its Plan and Procedures and in accordance with applicable federal and state permit conditions.

TGP would minimize impacts on fish that may be present at perennial waterbody crossings by conducting in-stream work from June 1 to November 30 as required by its Procedures or during the in-water work period recommended by the applicable state agency. TGP is in the process of consulting with state agencies regarding the timing of in-water work for the Project. Both the ODNR and Kentucky Department of Fish and Wildlife Resources (KDFWR) provided timing windows for in-water work that have not yet been incorporated into the Project's construction plans. Therefore, **we recommend that**:

- **Prior to construction, TGP should file with the Secretary the results of its consultation with state agencies regarding the approved construction timing window(s) for in-water work and construction plans that demonstrate consideration of the recommendations.**

Removal of riparian vegetation on banks of waterbodies during construction activities could result in short-term increases in turbidity and sedimentation, and long-term, localized increases in light penetration. TGP would also remove boulders, woody debris, and undercut banks during site preparation. Activities within perennial, fish-bearing waterbodies could temporarily displace fish that use these features for cover, spawning, and feeding. However, these impacts would be temporary and relatively minor due to the limited amount of total stream bank affected at each waterbody. TGP would stabilize disturbed areas to prevent erosion of exposed soils and sedimentation to on- and off-site resource areas according to TGP's Plan and Procedures. Following construction, TGP would restore the contours and elevations of the waterbodies to preconstruction conditions, and would rehabilitate and revegetate disturbed riparian areas according to its Plan and Procedures.

Based on the minimization and avoidance measures proposed by TGP, the temporary nature of impacts on fisheries, and our recommendation to complete consultation with state agencies regarding in-water work windows, we conclude that impacts on fisheries from the Project would not be significant.

2.3.3 Wildlife

Existing Habitats and Species

The Project area spans five distinct ecoregions: Eastern Broadleaf Forest (Oceanic), Eastern Broadleaf Forest (Continental), Southeastern Mixed Forest, Lower Mississippi Riverine Forest, and Outer Coastal Plain Mixed Forest. Wildlife commonly associated with these ecoregions is summarized in table 2.3-3. Within the ecoregions, variations in vegetative cover represent an important environmental component for defining wildlife habitat and influence the distribution of wildlife species. Vegetation community types in the Project area include forest, agricultural land, open land or early successional communities, and wetland.

Table 2.3-3

Wildlife Species Occurring Within the Ecoregions of the ACRP Project Area

Ecoregion	Typical Wildlife Species
Eastern Broadleaf Forest (Oceanic)	**Mammals:** white-tailed deer, black bear, bobcat, gray fox, raccoon, gray squirrel, fox squirrel, eastern chipmunk, white-footed mouse, pine vole, shorttail shrew, cotton mouse **Birds:** turkey, ruffed grouse, bobwhite, mourning dove, cardinal, tufted titmouse, wood thrush, summer tanager, red-eyed vireo, blue-gray gnatchatcher, Carolina wren **Reptiles:** box turtle, common garter snake, timber rattlesnake
Eastern Broadleaf Forest (Continental)	**Mammals:** white-tailed deer, coyote, fox, gray squirrel, fox squirrel, eastern chipmunk, muskrat **Birds:** turkey, blue jay, scarlet tanager, summer tanager, rose-breasted grosbeak, ovenbird **Reptiles:** box turtle, common garter snake
Southeastern Mixed Forest	**Mammals:** white-tailed deer, cottontail, gray squirrel, fox squirrel, raccoon, fox **Birds:** turkey, bobwhite, mourning dove, pine warbler, cardinal, summer tanager, Carolina wren, ruby-throated hummingbird, blue jay, hooded warbler, eastern towhee, and tufted titmouse **Reptiles:** cottonmouth moccasin, copperhead, rough green snake, rat snake, coachwhip, speckled kingsnake, fench lizard, glass lizard **Amphibians**: salamander
Lower Mississippi Riverine Forest	**Mammals:** white-tailed deer, raccoon, opossum, flying squirrel, rabbit, ground-dwelling rodents **Birds:** wood duck, prothonotary warbler, white-eyed vireo, yellow-billed cuckoo, Louisiana waterthrush, turkey, bobwhite, mourning dove, pine warbler, cardinal, summer tanager, Carolina wren, ruby-throated hummingbird, blue jay, hooded warbler, eastern towhee, and tufted titmouse **Reptiles:** cottonmouth moccasin, copperhead, rough green snake, rat snake, coachwhip, speckled kingsnake, fench lizard, glass lizard **Amphibians**: salamander
Outer Coastal Plain Mixed	**Mammals:** white-tailed deer, black bear, raccoon, opossum, flying squirrel, rabbit, ground-dwelling rodents **Birds:** turkey, bobwhite, migratory songbirds, waterfowl, and winter birds **Reptiles:** American alligator

Source: Bailey (1995)

Forested community types provide food, cover, and nesting habitat for a wide range of large and small mammals, amphibians, reptiles, and invertebrates. Predatory species are attracted to these forests due to the diversity of prey species.

Agricultural habitats include active croplands, and hayfields. Although agricultural and developed land generally does not support a multitude of wildlife species, it can provide forage for certain species, such as white-tailed deer (*Odocoileus virginianus*), eastern meadowlark (*Sturnella magna*), and mourning dove (*Zenaida macroura*).

Open or early successional habitats consist of grasslands (nonagricultural areas dominated by native grasses), scrub-shrub areas, pasture, barren rock, early successional/fallow fields, and previously disturbed areas such as maintained rights-of-way. Grasslands, scrub-shrub areas, and early successional/fallow field habitats provide food, cover, and nesting habitat for a variety of wildlife species. Species common to early successional open land habitats in the ecoregions crossed by the ACRP include mammals such as eastern cottontail (*Sylvilagus floridanus*), gray squirrel (*Sciurus carolinensis*), red fox (*Vulpes vulpes*), Virginia opossum (*Didelphis virginiana*), and raccoon (*Procyon lotor*).

Edges, where forested habitats lay adjacent to grasslands or other open areas, also create habitat for certain species for food, nesting, and travel between other habitats. Species that use edge habitats may include white-tailed deer, coyote (*Canus latrans*), eastern cottontail, and forest edge bird species, such as the American robin (*Turdus migratorius*), brown thrasher (*Toxostoma rufum*), field sparrow (*Spizella pusilla*), and northern cardinal (*Cardinalis cardinalis*).

Three different types of wetland habitats occur in the Project area as described in section 2.2.3: PFO, PSS, and PEM. Forested wetlands may provide a diverse assemblage of vegetation and an abundance of food, water sources, shelter, migratory and wintering areas, and breeding areas for a number of wildlife species. Scrub-shrub wetlands may supply food and cover resources for mammals, reptiles, amphibians, and birds, including the black bear (*Ursus americanus*), muskrat (*Ondatra zibethicus*), American toad (*Anaxyrus americanus*), and gray catbird (*Dumetella carlinensis*). Emergent wetlands and open water habitats, including streams and rivers, provide habitat for species such as wading birds, ducks, and other aquatic species. Wildlife species use these emergent wetlands and waterbodies for nesting, feeding, and migratory stopovers.

Managed and Sensitive Wildlife Areas

Wildlife resources of special concern include managed or sensitive habitats that provide breeding, rearing, nesting, foraging, or migration routes, and are geographically identified and tracked by state and federal agencies. Managed and sensitive wildlife areas include national wildlife refuges, state game refuges, wildlife management areas, wildlife sanctuaries, rookeries, waterfowl colonies, wildlife viewing areas, nature preserves, and other unique or sensitive areas. Based on information provided by the Arkansas Natural Heritage Commission (ANHC) and ODNR, managed and sensitive wildlife areas would not be affected by the Project in Arkansas or Ohio. However, the Project has the potential to affect sensitive wildlife areas or wildlife management areas within Kentucky, Louisiana, Mississippi, and Tennessee based on information from the KDFWR, Louisiana Department of Wildlife and Fisheries (LDWF), Mississippi Museum of Natural Science (MMNS), and TDEC Tennessee Natural Heritage Inventory Program (TNHIP).

In Kentucky, the Bat Cave within Carter Caves State Resort Park is about 4 miles southeast of the Project area in Carter County. The Carter Caves State Resort Park comprises over 20 underground caverns, and an estimated 40,000 Indiana bats (*Myotis sodalis*) use the cave system for winter hibernation (Kentucky Department of Parks, 2014). The Kentucky State Nature Preservation Commission (KSNPC) also identified 22 significant or sensitive wildlife habitats within or adjacent to the Project area. Based on data TGP obtained from KSNPC, which included a centrum latitude and longitude for potentially affected natural communities (KSNPC, 2014), TGP determined that two different significant or sensitive wildlife habitats, the North Fork of Triplett Creek Corridor Macrosite in Rowan County and the Green River Bioreserve Megasite in Barren, Green, Hart, and Taylor Counties, Kentucky, could be affected by the Project. The Green River Bioreserve Megasite is an area characterized by karst features that extend for miles. It is important for wildlife as it contains one of the highest concentrations of rare freshwater mussels in the United States. It also contains the Mammoth Cave System, which is the most extensive cave system in the world and has 41 species of cave-adapted organisms. The North Fork of Triplett Creek Corridor Macrosite is also an important for wildlife as it contains a number of federally listed mussel species and state listed species.

The Project would also traverse 10 PCAs designated in the Kentucky State Wildlife Action Plan. Tier 1 PCAs are considered by the KDFWR to be unique and highly valuable habitats supporting species that have the greatest conservation need in Kentucky and are organized by taxonomic groups (the avian group is further divided by habitat types) (KDFWR, 2013). Combined, Tier I PCAs comprise 14.4 percent of Kentucky's total land area. Karst topography is of particular importance for cave-adapted species, including several species of federally and state-listed bats. The KDFWR recommends that TGP avoid Tier 1 PCAs or take steps to minimize impacts on those areas. Complete avoidance of Tier 1 PCAs is not possible because proposed facility locations are dictated by the existing pipeline facilities, which already overlap the Interior Low Plate Karst Conservation Areas.

In Tennessee, one Project workspace area overlaps the Cheatham Wildlife Management Area (WMA). The Cheatham WMA is managed by the Tennessee Wildlife Resources Agency to support regenerating clear cuts and standing hardwood forested habitat for game species such as white-tailed deer, wild turkey (*Meleagris gallopavo*), and squirrel (Tennessee Wildlife Resources Agency, 2014).

In Mississippi, one Project workspace overlaps the Bald Cypress Swamp, a MMNS-identified significant or sensitive wildlife habitat.

In Louisiana, the LDWF identified 22 natural communities that may occur within the Project area within Jackson, Morehouse, Natchitoches, Ouachita, and Winn Parishes. These communities consist of plants, animals, landscapes, or environments that often occur together and are relatively rare in Louisiana. TGP requested information regarding locations of the natural communities relative to the Project facilities from the LDWF Natural Heritage Program but did not receive a response. All ACRP activities in Louisiana would occur primarily within the existing maintained pipeline right-of-way, which would reduce the potential to affect the LDWF-identified natural communities.

Impacts and Mitigation

General

Construction and operation of the Project would result in various short-term, long-term, and permanent impacts on wildlife and habitat. Potential short-term impacts on wildlife include the loss or alteration of habitats, which could result in displacement of individuals from construction areas and adjacent habitats. Displacement could cause wildlife to expend energy to find alternate habitats and could reduce foraging or breeding success. Small, less-mobile mammals, reptiles, and amphibians could experience direct mortality because they may be unable to escape the construction area.

Noise associated with construction and operation of the facilities may also disturb wildlife. Wildlife response to noise is dependent on noise type (i.e., continuous or intermittent), the ability to detect the noise, prior exposure to noise, proximity to a noise source, stage in the breeding cycle, activity (e.g., foraging), age, and gender. Response to continuous noise could result in behavioral effects such as reduced communication, interference with predator/prey detection, habitat avoidance, and reduced pairing success (Barber et al., 2009; Francis and Barber, 2013). However, bursts of noise or pulse noise, such as those caused by an alarm or short-term venting at the compressor stations, can result in startle or flushing effects. As discussed in section 2.9.2, the use of construction equipment would result in temporary localized elevated noise levels. Construction would occur during daytime hours to the extent practicable.

Long-term impacts on wildlife would include permanent habitat loss in areas of new aboveground facilities, habitat alteration through conversion of forested or early successional habitats to herbaceous areas and maintained rights-of-way, localized habitat fragmentation, and periodic disturbance of wildlife during operation.

During construction, TGP would use specialized equipment and techniques to minimize the amount of time necessary for clearing activities, which would reduce the amount of time wildlife are exposed to related noise and activity. Following construction, TGP would revegetate and restore temporary workspaces and permanent rights-of-way according to the TGP Plan and Procedures and other federal, state, and local agency requirements, as applicable. In general, temporary workspaces would be restored and revegetated to their original vegetation cover type. The revegetation and restoration methods would take into account the preferences of affected landowners or lessees, or would meet the requirements stipulated by permit conditions.

Table 2.3-2 lists the acreage of wildlife habitats by vegetation cover types that would be affected by construction and operation of the proposed Project. Habitat impacts are discussed by Project component below.

Overall impacts associated with construction and operation of the Project would be minor given the mobile nature of most wildlife in the area, the relatively small areas affected by construction, and the availability of similar habitat adjacent to each of the facilities. TGP would minimize construction and operation-related impacts by implementing the measures described in TGP's Plan and Procedures.

Construction and Modification of Compressor Stations

Construction of new Compressor Stations 202.5, 206.5, 211.5, and 216.5 and associated access roads would impact 96.4 acres of wildlife habitat as a result of vegetation clearing and construction activities, with 51.4 acres permanently converted to industrial facilities or permanent rights-of-way for operation (see table 2.3-2). Construction activities would primarily affect open upland habitats (61.1 acres) and upland forest habitats (12.1 acres). In addition to direct habitat loss, habitat fragmentation could reduce habitat quality, and construction activities could cause disturbance of wildlife in areas surrounding the Project area.

Operation of Compressor Stations 202.5, 206.5, 211.5, and 216.5 and associated access roads would result in permanent impacts on about 51.4 acres of wildlife habitat including open upland habitat (26.1 acres) and upland forest habitat (11.1 acres). The newly built gas-turbine-driven compressors would generate continuous background noise that could disturb nearby wildlife. Due to the relatively small areas that would be affected by operational noise and the ability of some wildlife species to adapt to continuous noise, we conclude that compressor station noise would not significantly affect wildlife populations.

Construction activities associated with the modification of Compressor Station 110 and associated workspace KY0070 would overlap the North Fork of Triplett Creek Corridor Macrosite, but would not affect wildlife because construction and operation impacts would occur in areas identified as industrial land, which does not provide habitat.

New-build Pipeline

Construction of the new-build pipeline in Carter and Lewis Counties, Kentucky, and associated new access roads would impact 130.4 acres of wildlife habitat as a result of vegetation clearing. About 46.3 of these acres would be maintained as permanent right-of-way. Construction activities would primarily affect upland forest habitats (79.7 acres) and open upland habitats (48.6 acres). In addition to habitat loss, long-term impacts could occur as a result of fragmentation of adjacent habitats (forest and open upland) in areas where the new pipeline is not collocated with the existing pipeline.

Short-term impacts on individual bats and bat habitat may occur as a result of construction activities including blasting, if necessary, and stormwater runoff could impact foraging habitat for bats that eat flying aquatic and terrestrial insects found along waterbodies. Potential impacts and measures to minimize potential impacts on threatened and endangered species, such as the Indiana bat, are discussed further in section 2.4.

Replacement Pipelines

Construction activities associated with the MLV 53 replacement pipeline would affect 11.9 acres of open upland wildlife habitat as a result of vegetation clearing, and construction activities associated with the MLV 874 replacement pipeline would affect 8.7 acres of open upland and 0.4 acres of open wetlands (see table 2.3-1).

Off-right-of-way Tap Reconnects

Construction activities associated with off-right-of-way tap reconnect activities would impact about 69.3 acres of wildlife habitat as a result of vegetation clearing, of which 45.1 acres would be within permanent rights-of-way. Affected habitats would include upland forest, wetland forest, open upland, and open wetlands (see table 2.3-1).

Other Abandonment Activities

Additional proposed abandonment and replacement activities, including gas disconnects and reconnects, crossover removals and reconnects, and tap removals and reconnects, would occur primarily within the existing right-of-way. These activities could result in temporary impacts on wildlife as a result of vegetation clearing. See appendix C for a full list of abandonment and replacement activities.

About 4.2 acres affected by activities at Project workspaces KY0360, KY0370, KY0380, and KY0430 in Hart, Barren and Simpson Counties, Kentucky are within the areas designated as the Tier 1 Interior Low Plate Karst Conservation Area PCA. Project workspaces KY0320, KY0330, KY0340, KY0350, KY0360, KY0370, and KY0380 in Taylor, Green, Hart, and Barren Counties, Kentucky overlap with the Green River Bioreserve Megasite. TGP would limit workspaces in the Tier 1 Interior Low Plate Karst Conservation Area PCA and the Green River Bioreserve Megasite to existing, previously disturbed, permanent right-of-way. Project activities at these sites would require minor ground disturbance, including shallow excavation, and TGP would use protective measures to prevent sediments and any contaminants from spreading and leaving the right-of-way. Furthermore, TGP routinely surveys its pipeline routes and facilities for sinkhole formations, which may support cave-adapted species, and has not previously identified karst formations at these workspaces. If karst features are encountered, TGP would implement construction methods to avoid or minimize impacts on these sensitive areas as described in section 2.1.1. TGP would implement its SPCC Plans and the measures in its Plan and Procedures to reduce the risk of impacts from spills during construction. As a result, no long-term impacts are expected on karst habitats within the Tier 1 Interior Low Plate Karst Conservation Area PCA or the Green River Bioreserve Megasite.

Construction of tap removal and reconnection activities at workspace TN0100 in Cheatham County, Tennessee would affect 1.4 acres of habitat in the Cheatham WMA. Of the 1.4 acres affected, 0.8 acre in temporary workspace areas would be restored to its previous vegetation cover type following construction. The remaining 0.6 acre would be maintained as grassland within the permanent right-of way. Of the 0.6 acre that would be within the new operational easement, 0.5 acre is already within the existing and disturbed permanent right-of-way.

Less than 0.1 acre of habitat in the Bald Cypress Swamp in Mississippi may be affected by construction and operations activities within the existing right-of-way at workspace MS0150 in Quitman County, Mississippi.

Migratory Birds

Most birds in the United States are protected under the Migratory Bird Treaty Act (MBTA) (16 United States Code [U.S.C.] 703-711). The MBTA states that it is unlawful to pursue, hunt, take, capture, kill, possess, sell, purchase, barter, import, export, or transport any migratory bird, or any part, nest, or egg of any such bird. Take is defined in the regulations as "pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect" (50 CFR 10).

EO 13186 (66 Federal Register [FR] 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. EO 13186 was issued, in part, to ensure that environmental analyses of federal actions assess the impacts of these actions/plans on migratory birds. It also states that emphasis should be placed on species of concern, priority habitats, and key risk factors, and it prohibits the take of any migratory bird without authorization from the USFWS. On March 30, 2011, the USFWS and the Commission entered into a Memorandum of Understanding (MOU) that focuses on avoiding or minimizing adverse impacts on migratory birds and strengthening migratory bird conservation through enhanced collaboration between the Commission and the USFWS. This voluntary MOU does not waive legal requirements under the MBTA, the ESA, the NGA, or any other statutes, and does not authorize the take of migratory birds.

Bald and golden eagles are additionally protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d). Bird species that are listed under the ESA and state-listed special status species are discussed in section 2.4.

Birds of Conservation Concern are a subset of protected birds under the MBTA and include all species, subspecies, and populations of non-game birds that could become candidates for listing under the ESA without additional conservation actions (USFWS, 2008a). Lists of Birds of Conservation Concern are maintained for each Bird Conservation Region (BCR) throughout the United States. The Project is within the following BCRs (USFWS, 2008a):

- BCR 13 – Lower Great Lakes/St. Lawrence Plain (Ohio);
- BCR 24 – Central Hardwoods (Kentucky and Tennessee);
- BCR 25 – West Gulf Coastal Plains/Ouachitas (Louisiana);
- BCR 26 – Mississippi Alluvial Valley (Mississippi, Arkansas, and Louisiana);
- BCR 27 – Southeastern Coastal Plain (Tennessee and Mississippi); and
- BCR 28 – Appalachian Mountains (Ohio and Kentucky).

The USFWS Information for Planning and Conservation (IPaC) tool was used to create a list of 40 Birds of Conservation Concern that may occur within the Project area (see table 2.3-4).

Table 2.3-4

Birds of Conservation Concern that May Occur within the Project Area

Common Name	Scientific Name	Seasonal Occurrence in Project Area	States within Project Area
American bittern	*Botaurus lentiginosus*	Wintering	MS, AR, LA
American kestrel	*Falco sparverius* ssp. *paulus*	Year-round	TN, MS, AR, LA
Bachman's sparrow	*Aimophila aestivalis*	Year-round, Breeding	KY, TN, MS, AR, LA
Bald eagle	*Haliaeetus leucocephalus*	Year-round	OH, KY, TN, MS, AR, LA
Bell's vireo	*Vireo bellii*	Breeding	MS, AR, LA
Black-billed cuckoo	*Coccyzus erythropthalmus*	Breeding	OH, KY, TN
Blue-winged warbler	*Vermivora pinus*	Breeding	OH, KY, TN
Brown-headed nuthatch	*Sitta pusilla*	Year-round	MS, AR, LA
Canada warbler	*Wilsonia canadensis*	Breeding	OH
Cerulean warbler	*Dendroica* cerulea	Breeding	OH, KY, TN, MS, AR, LA
Chuck-will's-widow	*Caprimulgus carolinensis*	Breeding	OH, KY, TN, MS, AR, LA
Dickcissel	*Spiza americana*	Breeding	OH, KY, TN, MS, AR, LA
Fox sparrow	*Passerella iliaca*	Wintering	OH, KY, TN, MS, AR, LA
Golden-winged warbler	*Vermivora chrysoptera*	Breeding	OH, KY, TN, MS, AR
Henslow's sparrow	*Ammodramus henslowii*	Wintering, Breeding	OH, KY, TN, AR, LA
Hudsonian godwit	*Limosa haemastica*	Migrating	LA
Kentucky warbler	*Oporomis formosus*	Breeding	OH, KY, TN, MS, AR, LA
Le Conte's sparrow	*Ammodramus leconteii*	Wintering	TN, MS, AR, LA
Least bittern	*Ixobrychus exilis*	Breeding	OH, KY, TN, MS, AR, LA
Least tern	*Sterna antillarum*	Breeding	MS, AR
Lesser yellowlegs	*Tringa flavipes*	Wintering	LA
Little blue heron	*Egretta caerulea*	Breeding	AR, LA
Loggerhead shrike	*Lanius ludovicianus*	Year-round	KY, TN, MS, AR, LA
Louisiana waterthrush	*Parkesia motacilla*	Breeding	OH, KY, AR, LA
Mississippi kite	*Ictinia mississippiensis*	Breeding	MS, AR, LA
Orchard oriole	*Icterus spurius*	Breeding	MS, AR, LA
Painted bunting	*Passerina ciris*	Breeding	MS, AR, LA
Pied-billed grebe	*Podilymbus podiceps*	Year-round	OH, KY
Prairie warbler	*Dendroica discolor*	Breeding	OH, KY, TN, MS, AR, LA
Prothonotary warbler	*Protonotaria citrea*	Breeding	OH, KY, TN, MS, AR, LA
Red-headed woodpecker	*Melanerpes erythrocephalus*	Year-round	OH, KY, TN, MS, AR, LA
Rusty blackbird	*Euphagus carolinus*	Wintering	OH, KY, TN, MS, AR, LA
Sedge wren	*Cistothorus platensis*	Wintering, Migrating	KY, TN, MS, AR, LA
Short-eared owl	*Asio flammeus*	Wintering	OH, KY, TN, MS, AR, LA
Sprague's pipit	*Anthus spragueii*	Wintering	LA
Swainson's warbler	*Limnothlypis swainsonii*	Breeding	TN, MS, AR, LA
Swallow-tailed kite	*Elanoides forficatus*	Breeding	AR, LA
Upland sandpiper	*Bartramia longicauda*	Breeding	OH
Wood thrush	*Hylocichla mustelina*	Breeding	OH, KY, TN, MS, AR, LA
Worm eating warbler	*Helmitheros vermivorum*	Breeding	OH, KY, TN, MS, AR, LA

Source: USFWS (2015a)

Potential impacts on migratory birds would include the temporary and permanent loss of habitat associated with the removal of existing vegetation. Construction and operation of the Project facilities would reduce the amount of habitat available for nesting, foraging, and cover from predators and would temporarily displace birds into adjacent habitats. This could, in turn, increase stress and susceptibility to predation, and negatively affect reproductive success for certain species of birds (Keyser et al., 1997; King et al., 2010; DeGregorio et al., 2014). In addition, forest fragmentation could increase predation, increase competition among individuals of the same or different species for resources, and reduce the quality and quantity of nesting habitat for migratory and ground-nesting birds (Faaborg et al., 1995).

Construction activities, such as vegetation removal and mowing (e.g., brush hogging) during critical breeding and nesting periods could potentially result in the loss of nests, eggs, or young. To avoid disturbance during migratory bird critical nesting periods, TGP would attempt to conduct tree clearing activities outside of the appropriate migratory bird nesting season in each state, as shown in table 2.3-5. However, in the event that preconstruction vegetation clearing is required during the nesting season, TGP would work with the appropriate USFWS field offices to develop a plan for preconstruction migratory bird nesting surveys. Qualified biologists would conduct these surveys within and adjacent to the Project area to identify active nests of birds protected by the MBTA. The surveys would occur prior to any clearing occurring during the bird nesting season. If migratory bird nests are found, active nests would be documented using a Global Positioning System device and would be marked with fluorescent flagging at appropriate distances.

Table 2.3-5

USFWS-recommended Vegetation Clearing Avoidance Dates

State	Avoidance Dates
Ohio	March 31–October 1
Kentucky	April 15–August 31
Tennessee	March 31–August 31
Mississippi	March 31–July 1
Arkansas	March 31–July 1
Louisana	March 1–August 1

During operation of the pipelines, TGP would not conduct routine mowing or clearing over the full width of the permanent right-of-way more frequently than every 3 years. In addition, TGP would not mow or clear during the migratory bird nesting season (April 15 through August 1), unless specifically approved by USFWS.

In a letter dated May 31, 2016, the USFWS recommended that TGP develop a bird conservation plan to address impacts of the Project on migratory bird species and their habitats (USFWS, 2016a). Therefore, **we recommend that:**

- **<u>Prior to construction</u>, TGP should file with the Secretary a Migratory Bird Conservation Plan, along with documentation of consultation with the USFWS. The plan should identify acreages of bird habitat that will be affected by the Project (both temporary and permanent), assess the related effects of habitat loss and forest fragmentation to migratory birds, and identify mitigation measures to address the impacts.**

Letters from the USFWS Ohio Field Office (dated February 25, 2015) and Kentucky Field Office (dated November 20, 2013) indicate that there are currently no records of bald eagle (*Haliaeetus leucocephalus*) nests within 0.5 mile of the proposed Project workspaces in Ohio and Kentucky, although the USFWS database of nest locations may not be complete because bald eagles can build new nests each year (USFWS, 2015b and 2013a). The USFWS field offices in Tennessee, Arkansas, Mississippi, and Louisiana have not provided specific information regarding the presence or absence of bald eagle nests close to the Project area. However, in a letter dated July 7, 2014, the MMNS noted one recorded occurrence of a bald eagle within the Project area in Mississippi (MMNS, 2014a). Furthermore, in a letter dated March 20, 2015, the LDWF indicated that the Project is less than 1,000 feet away from a bald eagle nest of concern but did not identify the specific location in the letter (LDWF, 2015).

To prevent disturbance of eagles from the egg-laying period until the young fledge, the USFWS recommends that no tree clearing occur within 660 feet of a bald eagle nest or within any woodlot supporting a nest tree. In addition, the USFWS recommends that work within 660 feet of a nest or within the direct line-of-sight of a nest be restricted from January 15 through July 31 in the northern United States, including Ohio, and from late September through late May in the USFWS southeast region, which includes Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana (USFWS, 2007a). On May 15, 2015, the USFWS Kentucky Field Office stated that if a bald eagle nest is discovered within 1,500 feet of construction workspaces, TGP should conduct an evaluation to determine whether the activity is likely to disturb nesting bald eagles and conduct additional consultation if necessary (USFWS 2015c). To ensure that appropriate avoidance and minimization measures would be used for bald eagle nests in the vicinity of the Project area, **we recommend that**:

- **Prior to construction, if any bald eagle nests are discovered within 1,500 feet of the Project construction workspaces, TGP should file with the Secretary documentation of consultation with the appropriate USFWS field office and state agencies regarding appropriate avoidance and minimization measures.**

Conclusions for Wildlife Resources

Construction and operation of the Project could result in various short- and long-term impacts on wildlife species as a result of temporary and permanent loss of habitat associated with the removal of existing vegetation. Based on the characteristics and habitat requirements of birds and wildlife known to occur in the proposed Project area, the relatively small areas affected by construction, the amount of similar habitat adjacent to and near the Project, and the implementation of avoidance and minimization measures, we conclude that construction and operation of the Project would not have significant impacts on wildlife and migratory bird species.

2.4 Threatened, Endangered, and Other Special Status Species

Special status species are those species for which federal or state agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed species that are protected under the ESA, federal candidate species, and state sensitive species. The bird species discussed above that are protected under only the MBTA or the Bald and Golden Eagle Protection Act, or that are Birds of Conservation Concern are not discussed here. Under Section 7 of the ESA, federal agencies are required to ensure that any actions authorized, funded, or carried out by the agency would not jeopardize the continued existence of a federally listed or candidate threatened or endangered species, or result in the destruction or adverse modification of designated critical habitat of a federally listed or candidate species. As the federal lead agency authorizing the Project, FERC is responsible for consulting with the USFWS to determine whether federally listed threatened or endangered species or designated critical habitat are found in the vicinity of the Project, and determining the proposed action's potential effects on those species or critical habitats. In accordance with the Commission's regulations contained in 18 CFR 380.13(b), TGP was designated as the Commission's non-federal representative for purposes of informal consultation with the USFWS.

TGP obtained information regarding federally and state-listed species (including threatened, endangered, and candidate species; species of special concern; species deemed in need of management; and historic species) within the Project area from the USFWS and state agencies in conjunction with a query of the USFWS IPaC database and the following natural heritage inventory or state agency programs: ODNR Natural Heritage Database; ODNR Division of Natural Areas and Preserves; KSNPC; KDFWR; TNHIP; MMNS; Mississippi Natural Heritage Program; ANHC; and LDWF. Based on each species habitat association and range, and based on consultation with relevant resource agencies, 136 special status wildlife species and 55 special status plant species have potential to occur in the Project area.

2.4.1 Federally Listed Threatened and Endangered Species

TGP, acting as our non-federal representative, initiated informal consultation with the USFWS field offices in Ohio, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana to determine the federally listed species with potential to be affected by the Project. Based on consultation with each USFWS field office, 31 federally listed wildlife species, 8 federally listed plant species, 2 candidate species, and 2 federal species of concern are known to occur in counties affected by the proposed Project and/or have potential to occur in in the Project area. Federally listed species with the potential to occur in the Project area, as well as their protection status and habitat preferences, are summarized in appendix E. Federally listed species that we determined the Project would not affect (red-cockaded woodpecker [*Leuconotopicus borealis*], earth fruit [*Geocarpon minimum*], and small whorled pogonia [*Isotria medeoloides*]) are not discussed further.

We received comments from the USFWS regarding potential effects on special status species as a result of the UMTP Project. The USFWS requested that FERC consider the potential impacts associated with the UMTP Project in our effect determinations on special status species. FERC has no jurisdiction to enforce mitigation for the UMTP Project impacts. The lead federal agency with ESA Section 7 responsibilities for the UMTP Project is the COE. However, in our EA we are disclosing what we know about the potential impacts of the UMTP Project on federally listed and special status species to inform decision makers, the USFWS, and other interested stakeholders. This information can be found in section 2.11.4 and appendix J, tables J-2 through J-8.

We received specific comments from the USFWS Kentucky Field Office regarding potential impacts on the eastern hellbender (*Cryptobranchus alleganiensis*), diamond darter (*Crystallaria cincotta*), pallid sturgeon (*Scaphirhynchus albus*), pygmy madtom (*Noturus stanauli*), Kentucky cave shrimp (*Palaemonias ganteri*), Tatum Cave beetle (*Pseudanopthalmus parvus*), and 12 species of federally listed mussels as a result of the UMTP Project operation and future use of the abandoned pipeline for NGL transportation. Potential effects from the UMTP Project on these and other federally listed species are described in section 2.11.4 and appendix J, tables J-2 through J-8.

Mammals

Gray Bat

The USFWS listed the gray bat (*Myotis grisescens*) as endangered under the ESA in 1976 due to population declines attributed to human disturbance of cave hibernacula (Harriman, 2003; USFWS, 1997a). Gray bats live in caves year-round and are susceptible to disturbance while roosting or hibernating in caves. During the winter, gray bats use deep, vertical caves for hibernation; during the summer, gray bats use caves along streams or rivers in limestone karst areas for roosting (Harriman, 2003; USFWS, 1997a). Karst landscapes are characterized by limestone caves and sinkholes. According to the USFWS, gray bats have also been documented roosting in rock shelters, abandoned mines, and under tunnels and bridges during the spring, summer, and fall (USFWS, 2015c). Gray bats have a relatively small distribution and are generally limited to suitable habitats in the southeastern United States. Gray bats eat a variety of flying aquatic and terrestrial insects found along waterbodies (USFWS, 1997a). No critical habitat has been established for the gray bat (USFWS, 2016b).

The Project area overlaps the gray bat's range, and gray bats are known or suspected to occur in 10 counties in Kentucky and 4 counties in Tennessee (USFWS, 2015d). Based on occurrence records, the species has been documented within 1 to 3 miles of the Project area in Allen and Simpson Counties in Kentucky and Robertson and Decatur Counties in Tennessee (USFWS, 2015d). Gray bats have also been documented within 5 miles of the Project area in Madison County, Kentucky (KSNPC, 2016).

In coordination with the USFWS Kentucky Field Office via the KDFWR, TGP performed a mist net survey for bats near Compressor Station 875 in Madison County, Kentucky, from August 5 through August 11, 2014. During the survey, five gray bats were captured while foraging over Otter Creek, about 200 feet from Compressor Station 875. The results of the mist net surveys suggest that gray bats use the area surrounding Compressor Station 875 for summer foraging habitat along nearby waterbodies (Stantec Consulting Services, Inc. [Stantec] and TRC Environmental Corporation [TRC], 2015a). TGP also completed surveys for gray bat summer roosting habitat and winter hibernacula within other Project workspaces in Kentucky in 2014 and 2015. However, TGP has not conducted mist-net surveys or surveys for gray bat summer roosting habitat within the proposed MLV 874 pipeline replacement corridor in Madison County, Kentucky.

Short-term direct impacts on gray bat foraging habitat in Kentucky could occur as a result of the 16 waterbody crossings required for construction of the new-build pipeline in Carter County, Kentucky, 4 waterbody crossings required for construction of the MLV 874 pipeline replacement, and 6 waterbody crossings required for construction of the off-right-of-way tap reconnects and other abandonment activities within the existing right-of-way (see appendix D). Short-term indirect impacts on adjacent foraging habitat could also occur as a result of ground disturbance during modification of Compressor Station 875 through increased sedimentation to adjacent waterbodies, which could indirectly reduce the amount of prey available for gray bats. In Tennessee, short-term direct impacts on gray bat foraging habitat could occur as a result of one surface water crossing required for construction of an off-right-of-way tap reconnect within the existing right-of-way (see appendix D).

No direct impacts on gray bat roosting habitat would occur as a result of the Project because proposed activities would not affect caves or mines. During construction, TGP would minimize direct and indirect impacts on gray bat foraging habitat by implementing their Plan and Procedures, which are designed to minimize siltation of streams in the Project area using specific mitigation and erosion control measures. In addition, TGP would follow recommendations from the USFWS Kentucky Field Office and comply with the KYDEP stormwater discharge permit requirements. Short-term impacts on foraging habitat are possible; however, given TGP's adherence to their Plan and Procedures and implementation of BMPs, these impacts would be minimal. Based on these findings, we conclude that the Project may affect, but *would not likely adversely affect*, gray bats in Tennessee. Concurrence from the USFWS is pending.

TGP has not conducted mist-net surveys or surveys for gray bat summer roosting habitat within the proposed MLV 874 pipeline replacement corridor in Madison County, Kentucky. Ground disturbance and stream channel and bank disturbance associated with MLV 874 pipeline replacement could impact gray bat foraging habitat. This site would need to be surveyed before an effect determination can be made for grey bat in Kentucky. In section 2.4.4, we have included a recommendation for TGP to complete surveys and consultation with the USFWS prior to construction.

Indiana Bat

The USFWS originally protected the Indiana bat under the Endangered Species Preservation Act of 1966 and currently lists the bat as endangered under the ESA. Thirteen winter hibernacula (11 caves and 2 mines) in 6 states were designated as critical habitat for Indiana bat in 1976 (41 FR 41914). From the time of listing in 1967 through 2003, most of the population declines were attributed to declines at high-priority hibernacula. Recently, white-nose syndrome (a fungus-caused disease affecting hibernating bats) has spread rapidly across the eastern and midwestern United States, eastern Canada, and as far south as Mississippi. White-nose syndrome has caused mortality of thousands of hibernating Indiana bats, among other bat species (USFWS, 2015e).

Indiana bats are found over most of the eastern United States. Most populations swarm, or gather, at appropriate hibernation sites in the fall and use well-developed limestone caverns found in Indiana, Kentucky, and Missouri for winter hibernation. More than 85 percent of the known population of Indiana bats hibernates in only nine caves (USFWS, 2014a). When active (not hibernating), the Indiana bat roosts in dead or dying trees with crevices and in live trees with exfoliating bark, such as shagbark hickory. During the summer months, reproductive females mostly occupy roost sites that consist of live trees and/or snags that have exfoliating bark, cracks, crevices, and/or hollows and that receive direct sunlight for more than half the day. Roost trees are generally found in canopy gaps in a forest, in a fence line, or along a wooded edge. Maternity roosts are found in riparian zones, wooded wetlands, upland communities, and bottomland and floodplain habitats. Indiana bats forage in semi-open to closed forests, forest edges, and riparian areas (USFWS, 2007b and 2015f).

The Project area lies within the range of the Indiana bat in Ohio, Kentucky, Tennessee, and Mississippi. In 2014, TGP conducted surveys for the presence of cave or mine portals that might be suitable for bat hibernacula in Project workspaces and found none. However, in Kentucky, Project activities associated with construction of the new-build pipeline would occur within 5 miles of Carter Caves State Resort Park, a Priority 1 Indiana bat hibernaculum. Priority 1 hibernacula are those that have a current or observed historic population of 10,000 individuals or greater (USFWS, 2007b). In Tennessee, one Indiana bat Priority 4 hibernaculum is within 5 miles of the Project (USFWS, 2015g). Priority 4 hibernacula are those that have a current or observed historic population of 50 individuals or less (USFWS, 2007b). No direct or indirect impacts on winter hibernacula would occur because Project activities would not affect caves or mines.

Direct impacts on Indiana bats and their summer roosting habitat (i.e., trees with exfoliating bark, cracks, crevices, and/or hollows) could occur from clearing forest habitat in Ohio, Kentucky, Tennessee, and Mississippi. Implementation of TGP's proposed measures to conduct tree clearing activities when Indiana bats would not be present (see below) would avoid direct take of Indiana bats. However, tree removal may eliminate potential roosting habitat for Indiana bats.

In Ohio and Kentucky, TGP identified potentially suitable summer habitat for the Indiana bat within the three Project workspaces (OH0170, OH0180, and OH0200) in Scioto County, Ohio; at Compressor Station 206.5 in Morgan County, Ohio; and at Compressor Station 875 in Madison County, Kentucky. Using methods prescribed by the January 2014 *Range-Wide Indiana Bat Summer Survey Guidelines* (USFWS, 2014b) and in coordination with the USFWS Ohio and Kentucky Field Offices, TGP conducted mist net surveys at Compressor Station 206.5 and Compressor Station 875 from July 30 through August 1, 2014, and from August 5 through August 11, 2014, respectively. No Indiana bats were captured during the surveys (Stantec and TRC, 2015a and 2015b). However, in Ohio, construction of Compressor Stations 202.5, 206.5, 211.5, and 216.5; Off-right-of-way Tap Reconnects OH0030 and OH0110; associated access roads; pipe and contractor yards; and other abandonment and replacement workspaces would result in temporary clearing of 17.4 acres of forest habitat suitable for roosting, of which 13.3 acres would be permanently cleared for operation. In Kentucky, Project activities, including construction of the new-build pipeline and other abandonment and replacement workspaces, would result in construction impacts on 82.9 acres and operational impacts on 32.8 acres of forested habitat suitable for summer roosting Indiana bats. This includes forest habitat within 5 miles of Carter Caves State Resort Park. Within 5- and 10-mile buffers of the Project area in Kentucky, tree removal activities would remove 0.05 and 0.02 percent of potential roosting habitat, respectively.

In Tennessee, Project activities, including off-right-of-way tap reconnects and other abandonment and replacement activities would result in construction impacts on 4.7 acres and operational impacts on 1.8 acres of forested habitat suitable for roosting Indiana bats. No known roosts are near the Priority 4 hibernaculum identified by USFWS, but all habitat within 5 miles of the Priority 4 hibernaculum is considered swarming and potential roosting habitat (USFWS, 2015g). Project activities, including off-right-of-way tap reconnects and additional abandonment activities within the existing right-of-way, would result in construction impacts on 6.8 acres and operational impacts on 2.7 acres of forested habitat suitable for roosting Indiana bats in Mississippi.

To avoid direct take of bats, TGP would conduct all tree removal activities in Ohio (outside of Scioto County), Tennessee, and Mississippi between October 15 and March 31, when Indiana bats would not be present. The clearing of workspaces in Scioto County, Ohio (OH0170, OH0180, and OH0200) would occur between November 15 and March 15 due to proximity to a known Indiana bat fall swarming/hibernation site.

To avoid impacts on Indiana bats in Kentucky, TGP would:

- provide awareness training for identifying karst-like features and the potential signs of sinkhole formation to construction supervisors and environmental inspectors;
- clearly mark and establish a buffer zone around existing or signs of new sinkholes within or immediately adjacent to the new-build pipeline right-of-way;
- limit tree removal to between November 15 and March 31 (outside of the swarming period) within a 10-mile perimeter of the Bat Cave in Carter Caves State Resort Park;
- conduct tree removal at other Project workspaces in Kentucky between October 15 and March 31, when Indiana bats would not be present;
- develop and implement a spill prevention and response plan to outline actions to prevent spills and to specify actions that would be taken should spills occur;
- notify FERC if blasting is determined to be necessary during construction and prepare and file a Project-specific blasting plan;
- protect any known or discovered karst features from stormwater runoff in accordance with the TGP Plan and Procedures; and
- routinely survey the pipeline route for sinkhole formation as part of standard monitoring procedures.

Based on implementation measures to avoid direct take of Indiana bats, the USFWS Ohio Field Office stated in a letter dated February 25, 2015, that these efforts should assist the USFWS with making a may affect, but *not likely to adversely affect* determination for Indiana bats in Ohio (USFWS, 2015b). Based on these factors, including the clearing timing measures adopted by TGP, we conclude that the Project may affect, but would *not likely adversely affect*, the Indiana bat in Ohio. Similarly, based on the limited amount of forested habitat that would be affected and TGP's proposed tree clearing time frame, we conclude that the Project may affect, but would *not likely adversely affect*, the Indiana bat in Mississippi. Concurrence from the USFWS is pending.

Based on the loss of potential habitat, the USFWS Kentucky Field Office concluded that the Project may affect, and would *likely adversely affect*, the Indiana bat in Kentucky in a letter dated May 15, 2015 (USFWS, 2015c). TGP has elected to assume presence of the species in the Project area and has committed to enter into a Conservation Memorandum of Agreement (MOA) with the USFWS to account for incidental take of Indiana bats. We have included a recommendation in section 2.4.4 for TGP to file the completed MOA before Project construction begins in areas that may support Indiana bats. Note that entering in to a Conservation MOA would also address potential impacts on the northern long-eared bat (described below). Our assessment is that a project of this size that adopts the recommended seasonal tree clearing restrictions is not likely to adversely affect bats. However, in deference to the pending MOA between the USFWS and TGP, we concur that the Project would *likely adversely affect* the Indiana bat in Kentucky. Any take of Indiana bat resulting from habitat loss in Kentucky would be required to follow conservation measures outlined in the Biological Opinion (BO) that supports use of the Conservation MOA mitigation option, but take would be authorized and the non-jeopardy conclusion of the BO would apply.

Based on the loss of potential habitat, the USFWS Tennessee Field Office, in a telephone discussion on March 19, 2015, concluded that the Project may affect, and would *likely adversely affect*, the Indiana bat in Tennessee (USFWS, 2015h). Based on this finding, TGP has elected to participate in the Indiana Bat Mitigation In-Lieu Fee program. This would include voluntary contribution to the Imperiled Bat Conservation Fund at the applicable mitigation rates/ratios. Prior to participation in the Indiana Bat Mitigation In-Lieu Fee program, TGP would coordinate with the USFWS Tennessee Field Office to determine the location of swarming 1 or 2 and summer 1 or 2 habitats within the limits of tree clearing and the amount of mitigation fees associated with this tree clearing. Note that participation in the In-Lieu Fee program would also address potential impacts on the northern long-eared bat (described below). TGP would still be required to adhere to seasonal clearing restrictions to avoid direct take of the species. Our assessment is that a project of this size that adopts the recommended seasonal tree clearing restrictions is not likely to adversely affect bats. However, in deference to the agreements between the USFWS and TGP, we concur that the Project would *likely adversely affect* the Indiana bat in Tennessee. Any take of Indiana bat resulting from habitat loss in Tennessee would be required to follow conservation measures outlined in the BO that supports use of the Indiana Bat Mitigation In-Lieu Fee program mitigation option, but take would be authorized and the non-jeopardy conclusion of the BO would apply.

Northern Long-eared Bat

The USFWS listed the northern long-eared bat (*Myotis septentrionalis*) as threatened under the ESA on April 2, 2015, due to dramatic population declines attributed to white-nose syndrome. White-nose syndrome has caused extensive mortality of northern long-eared bats, especially throughout the Northeast, where the disease has caused population declines of up to 99 percent at many hibernation sites (USFWS, 2015e). The USFWS has identified counties where white-nose syndrome is known to exist as part of a final rule under Section 4(d) of the ESA (USFWS, 2016c).

Northern long-eared bats spend their winters hibernating in various-sized caves and mines with constant temperatures, high humidity, and no air currents. Suitable summer habitat consists of a wide variety of forested/wooded areas with varying canopy cover containing live or dead trees with exfoliating bark, cracks, crevices, and/or cavities (USFWS, 2015i). These habitats can be found adjacent to or can contain interspersed non-forested habitats such as emergent wetlands, agricultural fields, pastures, and formerly cultivated but now abandoned agricultural fields. Northern long-eared bats have also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses (USFWS, 2015f).

The Project area lies within the range of the northern long-eared bat in Ohio, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana. Based on consultation with the USFWS Kentucky Field Office, TGP identified winter habitat in Carter and Lewis Counties, Kentucky. In Ohio, most Project workspaces are near one or more confirmed summer or fall/winter records of northern long-eared bat. Two Project workspaces (OH0100 and OH0110) in southwest Morgan County, two Project workspaces (OH0115 and OH0120) in northern Athens County, and three Project workspaces (OH0170, OH0180, and OH0200) in Scioto County are near known fall swarming and/or hibernation sites. In 2014, TGP conducted surveys for the presence of cave or mine portals that might be suitable for bat hibernacula in Project workspaces and found none. Thus, no direct or indirect impacts on winter hibernacula would occur because proposed activities would not affect caves or mines. However, TGP identified potentially suitable summer habitat for the species within the Project area.

In Ohio, TGP identified potentially suitable summer habitat for the species in the Project area at Compressor Station 206.5 in Morgan County. Using methods prescribed by the January 2014 *Range-Wide Indiana Bat Summer Survey Guidelines* (USFWS, 2014b) and in coordination with the USFWS Ohio Field Office, TGP conducted mist net surveys at Compressor Station 206.5 from July 30 through August 1, 2014. Two northern long-eared bats (bat 573 and bat 866) were captured during the survey and were outfitted with radio transmitters and tracked. Based on radio tracking, TGP identified 10 roost locations (four for bat 573 and six for bat 866). These roost locations ranged from 1.3 to 2.8 miles from the Compressor Station 206.5 construction footprint (Stantec and TRC, 2015b). TGP did not identify any roost sites within the Project footprint. Based on the results of the survey and radio tracking, TGP concluded that the captured northern long-eared bats do not use the Compressor Station 206.5 construction footprint for roosting, but likely use the Project area for foraging. Construction of Compressor Stations 202.5, 206.5, 211.5, and 216.5; off-right-of-way tap reconnects; associated access roads; pipe and contractor yards; and other abandonment and replacement workspaces would result in construction impacts on 17.4 acres and operational impacts on 13.3 acres of forested habitat in Ohio suitable for northern long-eared bat foraging.

In Kentucky, TGP identified potentially suitable summer habitat for the species in the Project area. Based on consultation with the USFWS Kentucky Field Office, TGP also identified winter habitat within 5 miles of the Project area in Carter and Lewis Counties and summer habitat in Rowan County. Using methods prescribed by the January 2014 *Range-Wide Indiana Bat Summer Survey Guidelines* (USFWS, 2014b) and in coordination with the USFWS Kentucky Field Office via the KDFWR, TGP conducted mist net surveys at Compressor Station 875 from August 5 through August 11, 2014. No northern long-eared bats were captured during the survey (Stantec and TRC, 2015a). However, Project activities, including construction of the new-build pipeline and other abandonment and replacement workspaces would result in construction impacts on 82.9 acres and operational impacts on 32.8 acres of forested habitat in Kentucky suitable for northern long-eared bat roosting and foraging.

In Tennessee, Project activities, including off-right-of-way tap reconnects and other abandonment activities, would result in construction impacts on 4.7 acres and operational impacts on 1.8 acres of forested habitat suitable for northern long-eared bats roosting. In Mississippi, Project activities, including off-right-of-way tap reconnects and additional abandonment activities in the existing right-of-way, would result in construction impacts on 6.8 acres and operational impacts on 2.7 acres of forested habitat suitable for northern long-eared bat roosting and foraging in Mississippi.

To avoid direct take of bats, TGP would conduct all tree removal activities in Ohio between October 15 and March 31, when northern long-eared bats would not be present. Clearing of workspaces OH0100 and OH0110 in Morgan County; OH0115, OH0120, and OH0140 in Athens County; and OH0170, OH0180, and OH0200 in Scioto County, would be further restricted to the period between November 15 and March 15 due to proximity to known northern long-eared bat fall swarming and/or hibernation sites. In Kentucky, Tennessee, and Mississippi, TGP would restrict vegetation clearing to a USFWS-recommended time frame outside of the pup season (June 1 through July 31) to avoid direct take of bats. However, tree removal may eliminate potential roosting and foraging habitat for the species.

Based on the limited amount of habitat lost and implementation of tree clearing timing restrictions, we conclude that the Project may affect, but is *not likely to adversely affect* the northern long-eared bat in Ohio and Mississippi. Concurrence from USFWS is pending.

Based on the loss of potential habitat, the USFWS Kentucky Field Office concluded that the Project may affect, and would *likely adversely affect*, the northern long-eared bat in Kentucky in a letter dated May 15, 2015 (USFWS, 2015c). TGP has elected to assume presence of the species in the Project area and has committed to enter into a Conservation Memorandum of Agreement (MOA) with the USFWS to account for incidental take of northern long-eared bats in Kentucky. We have included a recommendation in section 2.4.4 for TGP to file the completed MOA before Project construction begins in areas that may support northern long-eared bats. Our assessment is that a project of this size that adopts the recommended seasonal tree clearing restrictions is not likely to adversely affect bats. However, in deference to the pending MOA between the USFWS and TGP, we concur that the Project would *likely adversely affect* the Indiana bat in Kentucky. Any take of northern long-eared bat resulting from habitat loss in Kentucky would be required to follow conservation measures outlined in the BO that supports use of the Conservation MOA mitigation option, but take would be authorized and the non-jeopardy conclusion of the BO would apply.

Based on the loss of potential habitat, the USFWS Tennessee Field Office concluded that the Project may affect, and would *likely adversely affect*, the Indiana bat in Tennessee in a letter dated May 15, 2015 (USFWS, 2015c). Based on this finding, TGP has elected to participate in the Indiana Bat Mitigation In-Lieu Fee program, which also applies to northern long-eared bats. This would include voluntary contribution to the Imperiled Bat Conservation Fund at the applicable mitigation rates/ratios as described for Indiana bat, above. TGP would still be required to adhere to seasonal clearing restrictions to avoid direct take of the species. Our assessment is that a project of this size that adopts the recommended seasonal tree clearing restrictions is not likely to adversely affect bats. However, in deference to the agreements between the USFWS and TGP, we concur that the Project would *likely adversely affect* the Indiana bat in Tennessee. Any take of northern long-eared bat resulting from habitat loss in Tennessee would be required to follow conservation measures outlined in the BO that supports use of the Indiana Bat Mitigation In-Lieu Fee program mitigation option, but take would be authorized and the non-jeopardy conclusion of the BO would apply.

In Louisiana, there have been confirmed sightings of the northern long-eared bat in Winn and Ouachita Parishes. Some northern long-eared bat individuals have been documented during mist net and bridge surveys in the Winn District of the Kisatchie National Forest. In Louisiana, all Project activities would occur within existing right-of-way. No forested habitat would be directly affected by construction or operations. TGP would consult with the USFWS if any northern long-eared bats are observed during construction. TGP obtained concurrence from the USFWS Louisiana Field Office in a letter dated

March 30, 2015, that the Project may affect, but would *not likely adversely affect*, northern long-eared bat in Louisiana (USFWS, 2015j). We agree and conclude that the Project may affect, but would *not likely adversely affect*, the northern long-eared bat in Louisiana.

We conclude that the Project would have *no effect* on northern long-eared bat in Arkansas due to lack of suitable habitat.

Virginia Big-eared Bat

The USFWS listed Virginia big-eared bat (*Corynorhinus townsendii virginianus*) as endangered under the ESA on December 31, 1979, due to loss of habitat, vandalism, and increased human visitation to maternity roosts and hibernacula. The Virginia big-eared bat is found in parts of western North Carolina, eastern Tennessee, southwestern Virginia, eastern Kentucky, and southern West Virginia. It inhabits caves year-round in karst regions dominated by oak-hickory or beech-maple-hemlock forest (USFWS, 2011a).

In Kentucky, the Project area in Rowan County is near several documented occurrences of the Virginia big-eared bat. Four Project workspaces (KY0070, CS 110, KY0080, and KY0100) occur in Rowan County; however, Project activities would not affect cliff lines, rock shelters, caves, or specific karst features. TGP obtained concurrence from the USFWS Kentucky Field Office in a letter dated May 15, 2015, that the Project may affect, but would *not likely adversely affect*, the Virginia big-eared bat in Kentucky (USFWS, 2015c). We agree and conclude that the Project may affect, but would *not likely adversely affect*, the Virginia big-eared bat in Kentucky.

Birds

Interior Least Tern

The USFWS listed the interior population of the least tern (*Sterna antillarum* ssp. *athalassos*) as endangered under the ESA on May 28, 1985, primarily due to widespread loss and alteration of riverine nesting habitat. On the lower Mississippi River, the interior least tern breeding population is concentrated within about 500 river miles between Cairo, Illinois, and Vicksburg, Mississippi, and along the Arkansas, Mississippi, and Red Rivers in Chicot County, Arkansas. Nesting habitat includes bare or sparsely vegetated sand, shell, and gravel beaches, sandbars, islands, and salt flats associated with rivers and reservoirs. No critical habitat has been designated for the species (USFWS, 2015d).

The Project area overlaps the range of the interior least tern in Washington County, Mississippi; Chicot County, Arkansas; and Natchitoches and Winn Parishes, Louisiana. We conclude that the Project would have *no effect* on the interior least tern in Mississippi due to lack of suitable habitat. In Arkansas and Louisiana, interior least terns have historically occurred along the Mississippi River north of Baton Rouge. Based on occurrence data provided by the USFWS Louisiana Field Office, nesting colonies of interior least term occur along the Red River in northwestern and central Louisiana. All Project activities in Arkansas would occur within the existing right-of-way and would not involve in-stream work or activities within 0.5 mile of the Mississippi River. One Project workspace (LA0260/0270) is within 1 mile of the Red River in Louisiana, but this workspace is not close to known nesting colonies of interior least tern along the Red River. TGP obtained concurrence from the USFWS Arkansas and Louisiana Field Offices in letters dated March 10, 2015, and March 30, 2015, respectively, that the Project may affect, but would *not likely adversely affect*, the interior least tern in Arkansas and Louisiana (USFWS, 2015k and 2015j). We agree that the Project may affect, but would *not likely adversely affect*, the interior least tern in Arkansas and Louisiana.

Piping Plover

The USFWS listed piping plover (*Charadrius melodus*) as endangered under the ESA in the Great Lakes watershed and as threatened in the remainder of its range on December 11, 1985, due to destruction and degradation of summer and winter habitat, human disturbance of nesting and foraging birds, and predation. The species breeds in sandy beaches of shallow lakes, ponds, rivers, and impoundments. Nonbreeding habitat includes ocean beaches, or sand or algal flats in protected bays. Critical habitat is designated for the Great Lakes and northern Great Plains breeding populations and for the wintering population in Texas (NatureServe, 2015). Critical habitat is not designated in the Project area (USFWS, 2015d).

The range of the piping plover overlaps the Project area along the Mississippi River in Chicot County, Arkansas. In Arkansas, all Project activities would occur within the existing right-of-way, and no suitable habitat for piping plover has been identified at Project workspaces. However, the species is mobile and has potential to occur as a transient in Project workspaces year-round. TGP obtained concurrence from the USFWS Arkansas Field Office in a letter dated March 10, 2015, that the Project may affect, but would *not likely adversely affect*, piping plover in Arkansas (USFWS, 2015k). We agree that the Project may affect, but would *not likely adversely affect*, piping plover in Arkansas.

Wood Stork

The USFWS listed wood stork (*Mycteria americana*) as threatened under the ESA on February 28, 1984, due to low productivity associated with inadequate food caused in part by the disruption and drainage of wetlands (NatureServe, 2015). The species primarily uses freshwater marshes, swamps, lagoons, ponds, flooded fields, and depressions in marshes. The wood stork nests in the upper parts of cypress trees, mangroves, or dead hardwood over water, on islands in streams, or adjacent to shallow lakes (NatureServe, 2015). No critical habitat has been designated for the species (USFWS, 2015d).

The Project area overlaps the wood stork’s range in Washington, Bolivar, Sunflower, Tallahatchie, Quitman, Panola, Lafayette, Marshall, and Benton Counties, Mississippi. Wood stork are likely to be present in Mississippi only during foraging or as a passing migrant and not as a breeding individual because nesting is limited to Florida, Georgia, and South Carolina (USFWS, 2015d). TGP did not observe wood stork during general habitat reconnaissance surveys of Project workspaces in Mississippi. Project activities, including off-right-of-way tap reconnects, would result in construction impacts on 4.9 acres and operational impacts on 2.8 acres of open (PEM) and forested (PFO) wetlands in Mississippi. Based on minimal impacts on potential wood stork foraging habitat, we conclude that the Project may affect, but would *not likely adversely affect*, wood stork in Mississippi. Concurrence from the USFWS is pending.

Mussels

The Project area occurs in the range of 17 species of mussels that are federally listed as endangered, including clubshell (*Pleurobema decisum*), cracking pearlymussel (*Hemistena lata*), fanshell (*Cyprogenia stegaria*), fat pocketbook (*Potamilus capax*), fluted kidney shell (*Ptychobranchus subtentum*), littlewing pearlymussel (*Pegias fabula*), northern riffleshell (*Epioblasma torulosa rangiana*), orangefoot pimpleback (*Plethobasus cooperianus*), pink mucket (*Lampsilis abrupta*), rayed bean (*Villosa fabalis*), ring pink (*Obovaria retusa*), rough pigtoe (*Pleurobema plenum*), sheepnose (*Plethobasus cyphyus*), slabside pearlymussel (*Pleuronaia dolabelloides*), snuffbox (*Epioblasma triquetra*), spectaclecase (*Cumberlandia monodonta*), and white wartyback (*Plethobasus cicatricosus*). Additionally, the Project is within the range of rabbitsfoot (*Quadrula cylindrica cylindrica*), a mussel that is federally listed as threatened. Federally listed mussel species are present in all six states crossed by the Project area, and habitats used by each species are described in appendix E. The USFWS designated critical habitat for both fluted kidneyshell and slabside pearlymussel on October 28, 2013; designated critical habitat overlapped by the Project area includes reaches of the Duck River in Hickman County and the Buffalo River in Perry County, Tennessee. The USFWS designated critical habitat for the rabbitsfoot on June 1, 2015; designated critical habitat overlapped by the Project area includes reaches of the Green River in Green County, Kentucky, and the Duck River in Hickman County, Tennessee.

As discussed in sections 2.2.2 and 2.3.2, the Project would cross 14 perennial waterbodies. All waterbodies crossed by the Project have warmwater fisheries classifications and none of the waterbodies crossed are designated as critical habitat for any mussel species. TGP would implement its Procedures, and other minimization and avoidance measures regarding freshwater waterbodies as discussed in sections 2.2.2 and 2.3.2. No in-water work would occur at Project workspaces in Arkansas and Louisiana. No in-water work in perennial streams would occur in Mississippi. In Ohio and Tennessee, no suitable habitat for federally listed mussel species would occur in Project workspaces because waterbodies that would be affected by the Project have watersheds of less than 10 square miles above the crossing point (USGS, 2016b; ODNR and USFWS, 2016). Therefore, we conclude that the Project would have *no effect* on the federally listed mussels in Ohio, Tennessee, Mississippi, Arkansas, and Louisiana.

In Kentucky, the federally listed fluted kidney shell, littlewing pearlymussel, slabside pearlymussel, spectaclecase, clubshell, fanshell, northern riffleshell, orangefoot pimpleback, pink mucket, rabbitsfoot, ring pink, rough pigtoe, sheepnose, and snuffbox mussel species may be present in the Project area in 13 counties. In-water work in perennial streams would occur only in Rowan, Madison, Lewis, and Carter Counties. No in-water work in perennial streams, and therefore, no direct impacts on mussels, would occur in Allen, Barren, Bath, Green, Greenup, Hart, Marion, Powell, Simpson, and Taylor Counties. In addition, no in-water work would occur in the Green River in Green County, and therefore no direct impacts on designated critical habitat for rabbitsfoot would occur.

Construction of the new-build pipeline would cross six perennial waterbodies in Lewis and Carter Counties (see appendix D). These waterbodies are tributaries of Tygarts and Kinniconick Creeks, respectively. Two additional perennial waterbodies (tributaries of Triplett Creek in the Licking River sub-basin) would be temporarily affected by construction activities associated with Off-right-of-way Tap Reconnect KY0080 in Rowan County. Federally listed mussel species present in Rowan, Lewis, and Carter Counties include the clubshell, fanshell, northern riffleshell, orangefoot pimpleback, pink mucket, rabbitsfoot, ring pink, rough pigtoe, sheepnose, and snuffbox (USFWS, 2015a). No federally listed mussel species are known to occur in Madison County (USFWS, 2015a)

No direct impacts on federally listed mussels in Kentucky would occur as a result of in-water work because preferred habitat for these species is not likely present in the small streams and creeks affected and the area of the waterbodies affected would be relatively small. TGP would minimize indirect impacts through implementation of its Plan and Procedures to reduce the potential that waterbodies would be affected by stormwater runoff. We conclude that the Project would have *no effect* on fluted kidney shell, littlewing pearlymussel, slabside pearlymussel, and spectaclecase mussels in Kentucky due to absence of suitable habitat and in-water work. Additionally, we conclude that because of potential indirect impacts of sedimentation in suitable habitat downstream, the Project may affect, but would *not likely adversely affect*, clubshell, fanshell, northern riffleshell, orangefoot pimpleback, pink mucket, rabbitsfoot, ring pink, rough pigtoe, sheepnose, and snuffbox mussels in Kentucky. TGP would implement its Plan and Procedures to minimize sedimentation in suitable habitat downstream. Concurrence from the USFWS is pending.

Other Invertebrates

American Burying Beetle

The USFWS listed the American burying beetle (*Nicrophorus americanus*) as endangered throughout its range, with the exception of an experimental population on the Wah'Kon-tah Prairie in Missouri, on July 13, 1989. No critical habitat has been designated for the American burying beetle. The American burying beetle was historically widespread in the Eastern United States and portions of Canada but is currently reduced to less than 10 percent of its original size (NatureServe, 2015). The species currently lives only on Block Island in Rhode Island and in eastern Oklahoma, Nebraska, South Dakota, Texas, and probably Arkansas. It is presumed extirpated in most of the eastern United States and Canada. However, American burying beetles were released in Ohio in 1998 through 2000 and in 2011 (ODNR, 2012a). American burying beetles are decomposers who bury vertebrate carrion to feed their larvae. Primary threats include habitat fragmentation, disturbance of soils, loss of suitably sized carrion and competition from other scavengers, and use of insecticides and other insect control devices. The species burrows in the soil in grasslands, open woodlands, and brushlands. American burying beetles are dependent on suitable soil characteristics because habitats with extremely dry, wet, or loose sandy soils are unsuitable for burying carrion (NatureServe, 2015).

In Ohio, the American burying beetle has the potential to occur in Morgan County, where four Project workspaces (CS 206.5, OH0090, OH0100, and OH0110) contain suitable habitat for the species. TGP conducted a species-specific survey for American burying beetle in the four Morgan County workspaces between August 13 and 19, 2015, and provided survey results to us on March 14, 2016. No American burying beetles were identified during the survey. Based on the results of the survey, we conclude that the Project may affect, but would *not likely adversely affect*, American burying beetle in Ohio. Concurrence from the USFWS is pending.

Plants

Pondberry

The USFWS listed pondberry (*Lindera melissifolia*) as endangered under the ESA throughout its range on July 31, 1986, due to loss and alteration of habitat. The species inhabits seasonally flooded wetlands, seasonal ponds, and depressions in pine forests from North Carolina south to Florida and west to Mississippi, and in southern Missouri and Arkansas (NatureServe, 2015). No critical habitat has been designated for the species (USFWS, 2015d).

The Project area overlaps the range of Pondberry in Arkansas and Mississippi. We conclude that the Project would have *no effect* on pondberry in Arkansas due to lack of suitable habitat. In Mississippi, pondberry has the potential to occur in Washington, Bolivar, Sunflower, Tallahatchie, and Quitman Counties. Based on desktop review of Project workspaces, preliminary field habitat assessments, and in coordination with the USFWS Mississippi Field Office, TGP determined that no suitable pondberry habitat is present within the workspaces of three off-right-of-way tap reconnects and 14 other abandonment activities in Washington, Bolivar, Sunflower, Tallahatchie, and Quitman Counties. Project activities associated with the MLV 53 replacement pipeline would result in construction impacts on 0.4 acre of open (PEM) wetlands in Washington County. Because of the lack of forested vegetation, there is low potential for pondberry habitat to occur in the affected wetland area. Based on minimal impact on potential pondberry habitat, we conclude that the Project may affect, but would *not likely adversely affect*, pondberry in Mississippi. Concurrence from the USFWS is pending.

Price's Potato-bean

The USFWS listed Price's potato-bean (*Apios priceana*) as threatened under the ESA on January 5, 1990, due to habitat loss from cattle grazing and forest clearcutting. Widespread use of herbicides applied to highway rights-of-way have also contributed to the decline of Price's potato-bean. This species is unable to tolerate deep shade and usually inhabits lightly disturbed areas in the understory of mixed hardwood forests, such as in forest edges and clearings and along river bottoms or ravines. It has also been found growing along highways and powerline corridors because these areas mimic early successional habitat. Suitable soil includes well-drained loams on old alluvium or over limestone. Known populations of Price's potato-bean occur at 21 sites in five states; however, about 40 percent of these occurrences are currently extinct. No critical habitat has been designated for the species (USFWS, 2015d).

The Project area overlaps the range of Price's potato-bean in Cheatham, Dickson, Hickman, Perry, and Robertson Counties, Tennessee. Seven workspaces associated with abandonment activities are within these counties; those with potential habitat include TN0100, TN0125, TN0140/TN0150, TN0160, TN0190, TN0200, and TN0210/0220. TGP conducted species-specific surveys for Price's potato-bean from September 15 through 20, 2014, on October 1, 2014, and on September 13 and 14, 2016. No individuals were identified in the survey areas; however, some potentially suitable Price's potato-bean habitat was identified within TN0140/TN0150, TN0190, and TN0210/0220 (Stantec and TRC, 2015c and 2016). Furthermore, TN0210/0220 was only partially surveyed due to lack of access. This site would need to be surveyed before an effect determination can be made. In section 2.4.4, we have included a recommendation for TGP to complete surveys and consultation with the USFWS prior to construction.

Running Buffalo Clover

The USFWS listed running buffalo clover (*Trifolium stoloniferum*) as endangered under the ESA on June 5, 1987, due to population decline associated with habitat destruction, poor dispersal following elimination of bison and other large herbivores, overgrazing by cattle and rabbits, and increased competition from exotic plants. Running buffalo clover can be found in partially shaded woodlots, in mowed areas, and along streams and trails. The species requires periodic disturbance and somewhat open habitat to flourish, but cannot tolerate full-sun, full-shade, or severe disturbance (NatureServe, 2015). No critical habitat has been designated for the running buffalo clover (USFWS, 2015d).

The Project overlaps the range of running buffalo clover in several counties crossed by the Project in Ohio and Kentucky. We conclude that the Project would have *no effect* on running buffalo clover in Ohio because no populations of the species were found during species-specific surveys conducted within potential habitat (Stantec and TRC, 2015d). In Kentucky, the Project area overlaps the running buffalo clover's range in Clark, Garrard, Greenup, and Madison Counties. TGP evaluated Project workspaces in Kentucky for potential running buffalo clover habitat and found that, based on general habitat reconnaissance surveys, four locations had suitable habitat (Stantec and TRC, 2015e). In coordination with the USFWS Kentucky Field Office, TGP conducted species-specific surveys within potential habitat from June 10 through 13, 2015, when the plant was in flower. This report was submitted electronically to the USFWS Kentucky Field Office on August 12, 2015. No populations of running buffalo clover were found within the survey areas. In addition, the vegetative communities in the survey areas were not conducive to populations of running buffalo clover due to frequency of mowing, use for agriculture, or young, even-aged tree composition of forests. TGP conducted additional species-specific surveys within potential habitat within the existing permanent right-of-way portion of the MLV 874 pipeline replacement workspace on September 14 and 15, 2016. No populations of running buffalo clover were found within the MLV 874 pipeline replacement survey area. However, landowners did not grant access to a portion of workspace KY0010 and the MLV 874 replacement pipeline construction right-of-way; therefore, surveys for running buffalo clover in Kentucky are incomplete. In section 2.4.4, we have included a recommendation for TGP to complete surveys and consultation with the USFWS prior to construction.

Short's Bladderpod

The USFWS listed Short's bladderpod (*Physaria globosa*) as endangered under the ESA on August 1, 2014, due to population decline associated with road construction/maintenance activities and residential/commercial development (USFWS, 2015d; NatureServe, 2015). Short's bladderpod typically inhabits dry, open limestone ledges on river bluffs, talus of lower bluff slopes, and shale at cliff bases. These are usually south- to west-facing rocky slopes, and the tops, ledges, or bases of steep cliffs (NatureServe, 2015). Critical habitat has been designated for Short's bladderpod in Posey County, Indiana; Clark, Franklin, and Woodford Counties, Kentucky; and Cheatham, Davidson, Dickson, Jackson, Montgomery, Smith, and Trousdale Counties, Tennessee (79 FR 50989–51039).

The Project area overlaps the range of Short's bladderpod in Garrard and Madison Counties, Kentucky. TGP identified potentially suitable habitat for Short's bladderpod within the MLV 874 replacement pipeline workspace. TGP conducted habitat assessment surveys for Short's bladderpod on September 14 and 15, 2016. No suitable habitat for Short's bladderpod was observed in the existing permanent right-of-way. However, the landowner did not grant access to the proposed temporary construction right-of-way for the MLV 874 replacement pipeline; therefore, habitat assessment surveys for Short's bladderpod in Kentucky are incomplete. In section 2.4.4, we have included a recommendation for TGP to either complete surveys or to provide confirmation from USFWS that no additional surveys are needed, and to complete consultation with the USFWS prior to construction.

Based on surveys indicating the absence of Short's bladderpod in Project workspaces in Tennessee and because Project activities would be within the existing and actively maintained right-of-way, we conclude that the Project would have *no effect* on Short's bladderpod in Tennessee.

Virginia Spiraea

The USFWS listed Virginia spiraea (*Spiraea virginiana*) as endangered under the ESA throughout its range on June 15, 1990, due to limited range, small population, and poor dispersal abilities. These intrinsic vulnerabilities, combined with threats from land-use change and habitat fragmentation, have led to population declines. Virginia spiraea is often found along gravel bars and rocky banks of rivers and streams where periodic floods remove competition from large trees and other woody vegetation (USFWS, 2011b). No critical habitat has been designated for the species (USFWS, 2015d).

The Project area lies within the range of the Virginia spiraea in Ohio and Kentucky. We determined that the Project would have no effect on Virginia spiraea in Ohio as no populations of the species were found during species-specific surveys conducted within potential habitat. In Kentucky, the Project area lies within the range of the Virginia spiraea in Lewis County. During general habitat reconnaissance surveys, TGP evaluated Project workspaces for potential Virginia spiraea habitat. The new-build pipeline alignment in Lewis and Carter Counties and workspace KY0060 in Lewis County were determined to have suitable habitat. In coordination with the USFWS Kentucky Field Office, TGP conducted species-specific surveys of the sites from June 11 through 13, 2015, when the plant was in flower (Stantec and TRC, 2015e). This report was submitted electronically to the USFWS Kentucky Field Office on August 12, 2015. No populations or individuals of the species were found during surveys (Stantec and TRC, 2015e). However, TGP was unable to complete surveys along the new-build pipeline due to lack of private land access. TGP has committed to surveying areas that contain suitable habitat but that were unable to be surveyed, and will provide the results to USFWS before constructing in those workspaces. In section 2.4.4, we have included a recommendation for TGP to complete surveys and consultation with the USFWS prior to construction.

Whorled Sunflower

The USFWS listed whorled sunflower (*Helianthus verticillatus*) as endangered under the ESA throughout its range on August 1, 2015, due to changes in land-use cover, including forestry activities, crop production, and right-of-way management. The species inhabits wet prairie and calcareous barrens in openings of woodlands and along creeks (NatureServe, 2015). The USFWS designated critical habitat for whorled sunflower in Cherokee County, Alabama; Floyd County, Georgia; and Madison and McNairy Counties, Tennessee (79 FR 50989–51039).

The Project area overlaps the range of whorled sunflower in Henderson and McNairy Counties, Tennessee. However, the Project area does not intersect designated critical habitat and, at its closest, is more than 10 miles from the nearest critical habitat. Between September 15 and 20, 2014, and on September 13 and 14, 2016, TGP conducted species-specific surveys for the whorled sunflower within potential habitat in Henderson and McNairy Counties, Tennessee. No individuals were identified within the survey areas, but some potentially suitable whorled sunflower habitat was identified within TN0320 (Stantec and TRC, 2015c and 2016). However, not all areas could be accessed for survey and require additional surveys before an effect determination can be made for this species. In section 2.4.4, we have included a recommendation for TGP to complete surveys and consultation with the USFWS prior to construction.

Candidate Species, Proposed Species, and Federal Species of Concern

Based on consultation with each USFWS field office, one candidate species, one proposed species, and two federal species of concern are known to occur in counties affected by the proposed Project and/or have potential to occur in the Project area. Candidate species and federal species of concern that we determined the Project would not affect (Tatum Cave beetle and eastern hellbender) are not discussed further.

Louisiana Pine Snake

The Louisiana pine snake (*Pituophis ruthveni*) was designated a candidate species for federal listing under the ESA in 1999. On October 6, 2016, the USFWS published a rule proposing to list the Louisiana pine snake as threatened in the Federal Register (81 FR 69454). The Louisiana pine snake historically occurred in portions of west-central Louisiana and extreme east-central Texas but is currently restricted to six small areas in four Louisiana parishes and five Texas counties (USFWS, 2005). Habitat for the Louisiana pine snake consists of longleaf pine savannah with sandy, well-drained soils and well-developed herbaceous ground cover. Pocket gophers are an essential component of suitable Louisiana pine snake habitat because they create burrow systems where the snakes are most frequently found and serve as a major source of food for the species (USFWS, 2005). The greatest threats to the Louisiana pine snake are habitat destruction and degradation due to logging, grazing, road development, short rotation silviculture, and fire suppression.

The Project area overlaps the range of the Louisiana pine snake in Natchitoches Parish, Louisiana. Five Project workspaces are in this parish (LA0230, LA0240, LA0250, LA0260/LA0270, and LA0280). TGP did not observe Louisiana pine snake individuals or large concentrations of pocket gophers or pocket gopher habitat during general habitat reconnaissance surveys of Project workspaces in Natchitoches Parish, Louisiana. No forested habitat would be directly affected by construction or operations in Louisiana. Based on minimal impacts on potential Louisiana pine snake habitat, we conclude that the Project may affect, but would *not likely adversely affect*, Louisiana pine snake in Louisiana. Concurrence from the USFWS is pending.

Timber Rattlesnake

The timber rattlesnake (*Crotalus horridus*) is listed as a federal species of concern, an informal term that commonly refers to species that are declining or appear to be in need of conservation. The timber rattlesnake's range extends from central New England to northern Florida, and from eastern Texas and southeastern Nebraska in the west to the Appalachian Mountains from Pennsylvania though the Virginias and the Carolinas in the east (NatureServe, 2016). In Ohio, the timber rattlesnake occurs within the un-glaciated Allegheny Plateau and uses regenerating clear cuts, downed timber and rocky outcrops, and other openings within mature forest habitats for feeding and basking sites (ODNR, 2012b). Timber rattlesnakes spend winter in dens on high, dry ridges. Threats include loss of habitat, habitat fragmentation, and direct mortality due to hunting or vehicle traffic on roads (NatureServe, 2016).

Because the timber rattlesnake is not federally listed as endangered or threatened at this time, the USFWS does not require consultation regarding impacts on this species. However, in a letter dated February 25, 2015, the USFWS Ohio Field Office recommended that TGP take proactive efforts to conserve the species (USFWS, 2015b). In Ohio, the Project area overlaps the range of the timber rattlesnake in Scioto, Jackson, Vinton, Athens, Morgan, Guernsey, Tuscarawas, Carroll, and Columbiana Counties. Twenty-three workspaces associated with construction of Compressor Stations 202.5, 206.5, and 211.5; the off-right-of-way tap reconnects; and other abandonment activities are within these counties. TGP identified 12 workspaces within these counties as having potentially suitable habitat for timber rattlesnake.

To minimize potential impacts on timber rattlesnake in Ohio, TGP would avoid, when possible, mowing or clearing activities at workspaces with suitable timber rattlesnake habitat between March 1 and November 1. When construction activities require mowing or clearing between March 1 and November 1, TGP and its contractors would conduct a walk-over to observe if timber rattlesnakes are present at the work location. If a timber rattlesnake were found at the work location, work would cease at that location until the snake leaves the work location. Open trenches left in place overnight would have a wildlife ramp installed for wildlife, including timber rattlesnakes, to use to vacate the trench. If necessary, an approved timber rattlesnake biologist may be used to remove snakes from work locations. Based on implementation of these minimization measures, we conclude that the Project may affect, but would *not likely adversely affect*, timber rattlesnake in Ohio.

2.4.2 State-listed Threatened and Endangered Species

State laws and regulations regarding rare wildlife and plant species vary by state. State-listed threatened and endangered species are discussed by state below. A full list of state-listed species is provided in appendix E.

Ohio

In Ohio, the ODNR Division of Wildlife has authority to restrict taking or possession of native wildlife designated as threatened with statewide extinction (Ohio Revised Code 1531.25). Species on Ohio's endangered wildlife list (ODNR, 2015c) are categorized as endangered, threatened, potentially threatened, species of concern, species of special interest, extirpated, or extinct. The ODNR identified 29 state-listed animals (25 endangered and 4 threatened species) and 27 state-listed plants (3 endangered, 19 threatened, and 5 potentially threatened species) as having potential to occur in the Project area (ODNR, 2015d and 2014). These include six federally listed species: the Indiana bat, American burying beetle, clubshell, pink mucket, sheepnose, and snuffbox. Potential impacts on federally listed species are described in section 2.4.1.

The ODNR identified seven species of state-endangered fish and four species of state-threatened fish having potential to occur in perennial streams in the Project area (ODNR, 2015d; see appendix D). The Project would temporarily affect two perennial waterbodies (Smith Run and an unnamed waterbody) that could serve as habitat for these species. To reduce impacts on indigenous aquatic species and their habitat, we recommend that TGP complete consultation with state agencies regarding the approved in-water work timing restrictions (see section 2.3.2). Based on the limited amount of aquatic habitat affected and implementation of our recommendation, we conclude that the Project would not have significant adverse impacts on state-listed fish species in Ohio.

The ODNR identified two species of state-endangered migratory birds, the northern harrier (*Circus cyaneus*) and the American bittern (*Botaurus lentiginosus*), whose ranges overlap the Project area. Northern harrier nest on the ground in large marshes and grasslands and hunt over the same habitat. American bittern prefer larger undisturbed wetlands, but also occupy bogs, large wet meadows, and dense shrubby swamps (ODNR, 2015d). To avoid potential impacts on these species, the ODNR has requested that vegetation clearing within these species' habitats avoid the nesting periods (May 15 to August 1 for the northern harrier and May 1 to July 31 for the American bittern). These dates are consistent with general restrictions on tree removal and mowing to avoid impacts on migratory birds in Ohio (breeding season is April 15 through August 31; see section 2.3.3) (USFWS, 2015b). We conclude that the Project would not have significant adverse impacts on the state-listed northern harrier or American bittern in Ohio.

The ODNR identified four areas along the abandoned pipeline with potential to contain rare plants. These include one wetland area in Columbiana County, one wetland area in Meigs County, and the Keystone Furnace Wetlands Preserve and Baker Swamp Preserve in Jackson County (ODNR, 2014). No Project workspaces would occur within 0.5 mile of any of these areas. Therefore, construction activities at these workspaces would not affect wetland habitats likely to contain these species. The ODNR did not identify other rare plant species known to occur in the Project area. However, the ODNR recommends it be consulted if state-listed plants are found during construction regarding measures for avoiding or transplanting the plants.

Kentucky

The state of Kentucky does not have state-level endangered species laws, but regulations for wildlife defer to federal regulations (301 Kentucky Administrative Regulations [KAR] 3:061). Kentucky does have legislation governing rare plants under the Rare Plant Recognition Act (Kentucky Revised Statutes Annotated §§146.600-619). This act is governed by the KSNPC and requires that federally threatened and endangered plant species be listed and that associated location and population information be kept. However, this act does not create any obligation on the part of landowners, either public or private, to protect the rare plants on these lists. The KSNPC has not requested species-specific surveys for state-listed plant species.

The KSNPC also publishes a list of wildlife species of "Greatest Conservation Need" through the Kentucky Natural Heritage Program. The KSNPC monitors the state's biodiversity and maintains a list of state endangered, threatened, and special concern wildlife species, but these designations convey no legal protection (Floyd, 2014). The KDFWR also maintains a list of state endangered, threatened, and special concern wildlife species. The KDFWR identified 48 state-listed animals (19 endangered, 8 threatened, 1 extirpated, and 20 species of special concern) as having potential to occur in the Project area (KDFWR, 2015). These include 12 federally listed species: the Indiana bat, gray bat, Virginia big-eared bat, northern long-eared bat, and eight species of mussels. Potential impacts on federally listed species are described in section 2.4.1.

Impacts on Kentucky state-listed species could occur as a result of construction and operation activities associated with the modification of Compressor Stations 875 and 110 in Madison and Rowan Counties, respectively; the new-build pipeline in Lewis and Carter Counties; the MLV 874 replacement pipeline in Madison County, and Off-right-of-way Tap Reconnects KY0080 and KY0170 in Rowan and Madison Counties, respectively. Habitat disturbance could also occur as a result of abandonment activities in the existing right-of-way. Construction activities would result in short-term loss or disturbance of wildlife and plant habitat in Project workspaces. Project operations at compressor stations could result in permanent alteration of available habitat and long-term impacts from tree clearing in temporary workspaces. Impacts on state-listed species in the Project area would be avoided and minimized through implementation of TGP's Plan and Procedures and TGP's mitigation measures, including minimizing in-water work in perennial streams and adhering to appropriate vegetation clearing time frames. Based on minimal potential loss of habitat and with consideration for measures committed to by TGP, including following its Plan and Procedures, we conclude that the Project would not have significant adverse impacts on state-listed species in Kentucky.

Tennessee

The state of Tennessee has two acts of state legislation for the protection of wildlife and plant species. The Nongame and Endangered or Threatened Wildlife Species Conservation Act (Tennessee Code Annotated [T.C.A.] §70-8-101-112) protects wildlife species, and the Rare Plant Protection and Conservation Act (T.C.A. §70-8-301-314) protects plant species. The TDEC Division of Natural Areas oversees the TNHIP and coordinates activities with other state agencies. The TNHIP maintains a list of rare, threatened, or endangered wildlife and plant species, and the state of Tennessee designates the Tennessee Wildlife Resource Agency to oversee the protection of these wildlife and plant species. The TNHIP identified 30 state-listed animals (6 endangered, 4 threatened, 8 rare, and 12 species deemed in need of management) and 16 state-listed plants (3 endangered, 8 threatened, and 5 species of special concern) that have been previously observed within 4 miles of the Project area (TDEC, 2015). These include four federally listed species: the Indiana bat, gray bat, rabbitsfoot mussel, and Price's potato-bean. Potential impacts on these federally listed species are described in section 2.4.1.

Impacts on state-listed animal and plant species could occur as a result of construction and operation activities associated with the four off-right-of-way tap reconnects in Hickman and Perry Counties. Habitat disturbance could also occur as a result of construction activities within the existing right-of-way.

Impacts on four state-listed small mammals—the Allegheny woodrat (*Neotoma magister*), American pygmy shrew (*Sorex hoyi*), meadow jumping mouse (*Zapus hudsonius*), and Southeastern shrew (*Sorex longirostris*)—and two species of reptiles—eastern slender glass lizard (*Ophisaurus attenuatus longicaudus*) and northern pinesnake (*Pituophis melanoleucus melanoleucus*)—could occur because of habitat loss or disturbance. These species have not been observed within 4 miles of the Project area. Based on a review of habitats present within the Project area, TDEC does not anticipate impacts on these species as a result of the Project (TDEC, 2015). Based on minimal potential loss of habitat and with consideration for minimization measures committed to by TGP, including following its Plan and Procedures, we conclude that the Project would not have significant adverse impacts on state-listed species in Tennessee.

Mississippi

In Mississippi, the Nongame and Endangered Species Conservation Act of 1974 protects species whose survival and continued welfare in the state is in jeopardy or is likely to become so in the near future. This act is enforced by the Mississippi Department of Wildlife, Fisheries, and Parks and prohibits taking, possessing, transporting, exporting, offering to sell, or offering to ship endangered species (MMNS, 2014b). The MMNS identified two state-listed endangered wildlife species, the American black bear and the pyramid pigtoe mussel, that may occur within 2 miles of the Project area. The MMNS identified an additional 22 state-listed species (18 wildlife species and 4 plant species) that may occur within 2 miles of the Project area (MMNS, 2014a). The MLV 53 replacement pipeline in Washinton County, Mississippi would temporarily affect 11.9 acres of open upland wildlife habitat. Two intermittent and one ephemeral waterbody would also be temporarily affected by construction activities associated with the MLV 53 replacement pipeline. Five off-right-of-way tap reconnects in Benton, Panola, Quitman, Tallahatchie, and Sunflower Counties that would temporarily affect 15.0 acres of wildlife habitat (i.e., non-developed vegetated land). Two perennial waterbodies and two intermittent waterbodies would be temporarily affected by construction activities associated with Off-right-of-way Tap Reconnect MS0040 in Benton County. Direct and indirect impacts on mud darter (*Etheostoma asprigene*, state rank S2 - imperiled), steelcolor shiner (*Cyprinella whipplei*, state rank S2), and yazoo darter (*Etheostoma raneyi*, state rank S2) habitat could occur as a result of habitat disturbance and increased sedimentation downstream; however, these impacts would be minimized by implementation of the TGP Plan and Procedures.

The MMNS concluded that if BMPs are properly implemented, monitored, and maintained, particularly measures to prevent or minimize impacts on water quality, the Project likely poses no threat to listed species and their habitats in Mississippi (MMNS, 2015). Based on the MMNS conclusions, the limited acreage of habitat that would be affected, and TGP's proposed impact minimization measures, including following its Plan and Procedures, we conclude that the Project would not have significant adverse impacts on state-listed species in Mississippi.

Arkansas

The state of Arkansas does not have state-level protected species laws for wildlife or plants, and instead defers to the federal ESA. The ANHC designates Species of Conservation Concern, which are native animals and plants that are at risk due to declining population trends, threats to their habitats, restricted distribution, or other factors (ANHC, 2015a). The ANHC identified six state-listed animals (bald eagle, interior least tern, goldeye [*Hyodon alosoides*], pallid sturgeon, mole salamander [*ambystoma* spp.], and Ohio shrimp [*Macrobrachium ohione*]) that have been previously observed within 5 miles of the Project area in Arkansas (ANHC, 2015b). Of these, two are federally listed species, interior least tern and pallid sturgeon, which are addressed in section 2.4.1.

All Project activities in Arkansas would occur within the existing right-of-way, and no waterbodies would be crossed. Based on the minimal amount of suitable habitat affected and implementation of mitigation measures committed to by TGP, including following its Plan and Procedures, we conclude that the Project would have no significant adverse impacts on state-listed species in Arkansas.

Louisiana

In Louisiana, the LDWF manages the species protection program for species listed as endangered or threatened and is authorized to issue regulations to provide for the conservation of protected species (Louisiana Revised Statutes 56:1903). The LDWF identified six state-listed animals (three birds and three fish) and one state-listed plant that have been previously observed within 1 mile of the Project area in Louisiana (LDWF, 2015).

All Project activities in Louisiana would occur within the existing right-of-way, and no waterbodies would be crossed. Based on the minimal amount of suitable habitat affected and implementation of mitigation measures committed to by TGP, including following the TGP Plan and Procedures, we conclude that the Project would have no significant adverse impacts on state-listed species in Louisiana.

2.4.3 Other Special Status Species

In addition to federally and state-listed special status species, the Project area also crosses the Kisatchie National Forest in Louisiana where the USFS manages special status species on its land under its Threatened, Endangered, and Sensitive Species Program. The USFS defines "sensitive species" as those needing special management to maintain and improve their status on National Forests and Grasslands, and to prevent a need to list them under the ESA (USFS, 2012). The Project area intersects the Kisatchie National Forest in Winn Parish, Louisiana. TGP determined that three Kisatchie National Forest Sensitive Species are likely to occur in the Project area, Bachman's sparrow (*Aimophila aestivalis*), Ouachita fencing crayfish (*Faxonella creaseri*), and Louisiana bluestar (*Amsonia ludoviciana*).

Bachman's sparrow inhabits open pine woods with scattered bushes and a grassy understory. The species nests on the ground against grass tufts or under low shrubs (NatureServe, 2015). Implementation of TGP's proposed measures to avoid impacts on migratory birds, such as conducting tree removal and mowing activities outside the migratory bird nesting season (March 1 through July 31 in Louisiana) or conducting pre-clearing migratory bird surveys, would likely avoid impacts on Bachman's sparrow (see section 2.3.3). Based on the characteristics and habitat requirements of Bachman's sparrow, TGP's adherence to USFWS guidelines and implementation of mitigation measures, and our recommended conditions to avoid impacts on migratory bird populations (see section 2.3.3), we conclude that ACRP activities in Kisatchie National Forest may impact individual Bachman's sparrows, but are not likely to cause a trend to federal listing or a loss of viability for this species.

Ouachita fencing crayfish inhabits seasonal freshwater pools and roadside ditches with mud and sand substrate, hibernating in burrows during the dry season (NatureServe, 2015; LDWF, 2012). The USFS has not documented Ouachita fencing crayfish in the Project area on Kisatchie National Forest. However, roadside ditches along access roads that would be used for the Project may provide suitable habitat for Ouachita fencing crayfish. In its review of the Project, the USFS determined that Ouachita fencing crayfish may be affected by construction activities, but impacts would be limited to a few individual crayfish and impacts would not likely affect the viability of the species. TGP would avoid use of vehicles in shallow temporary pools and roadside ditches, when possible, to limit impacts on Ouachita fencing crayfish. Based on the characteristics and habitat requirements of Ouachita fencing crayfish and TGP's adherence to USFS recommended mitigation, we conclude that construction and operation of the Project in Kisatchie National Forest may impact individual Ouachita fencing crayfish, but is not likely to cause a trend to federal listing or a loss of viability for this species.

Louisiana bluestar occurs in pine flatwoods, small-stream riparian forests, and bottomland forests. The plant species frequently occurs in previously disturbed or altered habitats, such as along roadsides, along powerline rights-of-way, and in artificial drainages (NatureServe, 2015). The USFS has not documented Louisiana bluestar in the Project area. However, based on the presence of suitable habitat in the Project area, the USFS determined that the ACRP may impact individuals, but is not likely to cause a trend to federal listing or a loss of viability for this species. TGP would implement the measures below to limit impacts on Louisiana bluestar:

- Follow rehabilitation guidelines as stated in the Kisatchie National Forest Land and Resource Management Plan and adhere to "Restoration of Disturbed Areas" Guidelines, including seed rates. TGP continues to work with Kisatchie National Forest representatives to verify that rehabilitation guidelines that would apply to the Project are outlined in the Special Use Permit for these locations.
- Clean and inspect equipment for nonnative and invasive species, soil, and vegetation prior to mobilization on Kisatchie National Forest.

Based on the characteristics and habitat requirements of Louisiana bluestar and TGP's adherence to USFS recommended mitigation, we conclude that implementation of the Project may impact individuals, but is not likely to cause a trend to federal listing or a loss of viability for this species.

2.4.4 Threatened, Endangered, and Other Special Status Species Conclusions

Based on consultation with each USFWS field office, 31 federally listed wildlife species, 8 federally listed plant species, 1 candidate species, 1 proposed species, and 2 federal species of concern are known to occur in counties affected by the proposed Project and/or have potential to occur in in the Project area. Of these, 32 are listed as endangered and 7 are listed as threatened under the ESA. Based on general habitat reconnaissance surveys, coordination with individual USFWS field offices, and desktop review of Project workspaces, we conclude that the Project either would have *no effect* on, or may affect, but would *not likely adversely affect*, 35 of the 43 federally threatened, endangered, or candidate species and species of concern.

We determined that the Project may affect, and would *likely adversely affect*, the Indiana bat and northern long-eared bat in Tennessee and Kentucky due to loss of habitat. TGP has committed to participate in a Conservation MOA with the USFWS to account for incidental take of Indiana bats and northern long-eared bats in Kentucky and the Indiana Bat Mitigation In-Lieu Fee program in Tennessee to account for potential impacts on Indiana bat and northern long-eared bats. Any take of Indiana bats or northern long-eared bat resulting from habitat loss would be required to follow conservation measures outlined in the BOs that support use of the Conservation MOA or Indiana Bat Mitigation In-Lieu Fee program mitigation options in Kentucky and Tennessee, respectively. However, take would be authorized and the non-jeopardy conclusion of the respective BOs supporting each mitigation option would apply.

Species-specific surveys and effect determinations for six species (gray bat, Virginia spiraea, whorled sunflower, running buffalo clover, Short's bladderpod, and Price's potato-bean) are still pending. Surveys are complete for numerous other species, but USFWS concurrence with our conclusions are still pending. To ensure protection of these species and fulfillment of Section 7 consultation under the ESA, **we recommend that**:

- **TGP should not begin construction activities within areas of potential effect <u>until</u>:**

  a. TGP completes surveys (or provides confirmation from USFWS that no surveys are needed) for gray bat, Virginia spiraea, whorled sunflower, running buffalo clover, Short's bladderpod, and Price's potato-bean. Before

the initiation of surveys, TGP should consult with the USFWS for appropriate survey methods and periods for each species. The survey reports and any USFWS comments should be filed with the Secretary. The survey reports should include the following information:

- **i.** **name(s) and qualifications of the person(s) conducting the survey;**
- **ii.** **method(s) used to conduct the survey;**
- **iii.** **date(s) of the survey;**
- **iv.** **area surveyed (include the mileposts surveyed, as applicable); and**
- **v.** **proposed mitigation that would substantially minimize or avoid the potential impacts.**

b. **TGP files with the Secretary the final MOA with the USFWS Kentucky Field Office for Indiana bats and northern long-eared bats.**

c. **FERC staff completes ESA consultation with the USFWS and TGP has received written notification from the Director of OEP that construction or use of mitigation may begin.**

State laws and regulations regarding rare wildlife and plant species vary by state. Based on consultation with relevant resources agencies and species habitat associations, 136 state-listed special status wildlife species and 55 state-listed special status plant species have the potential to occur in the Project area. Based on the limited amount of habitat affected and implementation of TGP's mitigation measures, including its Plan and Procedures, we conclude that the Project would not have significant impacts on state-listed species in the six states affected by the Project.

2.5 Land Use, Recreation, and Visual Resources

2.5.1 Land Use

Construction of the Project would affect land use at the modified and new compressor stations, along the new-build pipeline route, and at the off-right-of-way tap reconnects. Other work along the abandoned line would be within the existing right-of-way and would not affect the existing land use. General land use types that would be affected include agricultural land, forest/woodland, open land, residential, open water, and industrial/commercial (see appendix F).

The Project would affect about 533 acres of land during construction. Following construction, about 257 acres would be maintained for operations, and TGP would restore and revegetate the disturbed areas not required for operational purposes.

Industrial/Commercial

Industrial/commercial land consists of manufacturing or industrial plants, paved areas, landfills, mines, quarries, electric power or natural gas utility facilities, developed areas, roads, railroads and railroad yards, and commercial or retail facilities. About 39 percent (206 acres) of all lands affected by the Project are classified as industrial/commercial. No commercial or industrial structures occur within 50 feet of the modified or new compressor stations, the new-build pipeline, the replacement pipelines, or the off-right-of-way tap reconnects. TGP identified no planned commercial developments within 0.25 mile of any Project facilities.

Forest/Woodland

Forest/woodland includes upland and wetland hardwood and mixed hardwood forest and pine plantation. For all activities proposed for the Project, TGP would clear 111.9 acres of forest/woodland. This represents about 22 percent of all lands affected by construction. Following construction, about 61.3 acres would be allowed to revert to original conditions. TGP would permanently convert about 50.6 acres of forest/woodland for the operation of the Project.

About 12.1 acres of forest/woodland would be within the construction footprint of the new compressor stations and about 11.1 acres would be within the permanent footprint. Construction activities in forested areas would require removal of trees within the construction workspaces. Impacts would range from long-term within temporary work areas to permanent within areas where forested land would be converted to other land use types. Temporary work areas would be allowed to revegetate following construction. No forest/woodland would be affected by the modification of the existing compressor stations.

TGP would clear 79.7 acres of forest/woodland for construction of the new-build pipeline and about 30.9 acres for the permanent right-of-way. Construction activities in forested areas would require removal of all trees within the construction right-of-way. About 48.8 acres would be cleared within the construction right-of-way but outside of the permanent right-of-way. These areas would be allowed to revert to original conditions following construction. TGP would work with individual landowners to develop replanting plans as part of its easement negotiations. Impacts on these forested lands would be long-term, as it would take 20 years or more for mature trees to re-establish.

About 16.8 acres of forest/woodland would be within the construction footprint of the off-right-of-way tap reconnects. Of this total, about 7.2 acres would be within the permanent right-of-way and would be permanently converted to maintained right-of-way. About 9.5 acres of forest/woodland would be allowed to revegetate following construction.

Agricultural Land

Agricultural land consists of active hayfields, cultivated crop land, and specialty crops, including organic farms. TGP would affect about 115.5 acres (about 22 percent of all lands affected) of agricultural land for construction. TGP would permanently convert about 33.0 acres of agricultural lands for operation of the Project.

About 73.7 acres of agricultural land would be within the construction footprint of the new and modified compressor stations and about 23.2 acres would be within the permanent footprint. Construction of the new-build pipeline would affect about 9.7 acres of agricultural land. About 3.5 acres would be within the permanent right-of-way for operation of the new-build pipeline and 6.2 acres would be within temporary construction areas. About 7.1 acres of agricultural land would be affected during the construction of the replacement pipelines and allowed to revert to original condition after construction. Construction of off-right-of-way tap reconnects would affect about 5.1 acres of agricultural land. About 1.7 acres would be within the permanent right-of-way and 3.4 acres would be within temporary construction areas.

TGP has committed to replacing or repairing drain tiles and irrigation systems damaged during construction, in accordance with landowner agreements. After construction and restoration, agricultural lands could revert back to agricultural land; except at aboveground facilities. Crops, with the exception of deep-rooted crops such as orchards, could be grown over a pipeline right-of-way. TGP would inspect crops for 2 years after construction in accordance with TGP's Plan. Prime farmland potentially affected by construction of the new compressor stations, the new-build pipeline, and off-right-of-way tap reconnects is discussed in section 2.1.2.

Open Land

Open land in the Project area consists of non-forested areas not classified as developed land, and includes utility rights-of-way, open fields, vacant land, herbaceous and scrub-shrub uplands, non-forested lands, emergent wetland, scrub-shrub wetland, golf courses, and municipal land absent of hardwood and softwood trees. For all activities proposed for the Project, construction would affect a total of 95.2 acres of open land (18 percent of all lands affected by construction), most of which (73.0 acres) would be allowed to revert to original conditions following construction. However, shrubs may be cleared from a 10-foot-wide corridor over pipelines.

Construction of the new compressor stations would affect about 11.0 acres of open land. About 8.1 acres would be temporarily disturbed and allowed to revert to original condition after construction. The remaining 2.9 acres of open land would be permanently converted to industrial land for the compressor stations. Less than 0.1 acre of open land would be temporarily disturbed during modification of the existing compressor stations.

TGP would affect about 32.2 acres of open land during construction of the new-build pipeline and maintain 11.0 acres as permanent right-of-way. About 13.5 acres of open land would be affected during the construction of the replacement pipelines and allowed to revert to original condition after construction. About 12.9 acres of open land lie within the construction footprint of the off-right-of-way tap reconnects and about 7.2 acres are within the permanent footprint.

Residential Land

Residential land includes developed residential areas or residentially zoned areas, and existing residences. TGP identified no planned or future residential developments within 0.25 mile of the proposed compressor stations, new-build pipeline, or off-right-of-way tap facilities. The Project would affect about 2.1 acres of residential land during construction, of which only 0.8 acre are within a maintained permanent right-of-way. TGP identified no residential structures within 50 feet of the modified or new compressor stations or the off-right-of-way tap reconnects. A small portion (less than 0.1 acre) of the site for Compressor Station 206.5 is zoned for residential use; however, no existing residential buildings are near the site.

One residence is within 50 feet of the construction workspace for the new-build pipeline. The residence off Fairlane Drive/SR50 is 22 feet from the fenceline of the existing valve yard at MP 0.0 of the new-build pipeline. TGP estimates that construction activities immediately adjacent to the residence could last up to 3 months. Access to the right-of-way via Fairlane Drive/SR50 and through the existing valve yard would continue for the duration of construction of the new-build pipeline, which is estimated to be 6 to 8 months.

Seven residences, a church, and a church/daycare center are within 50 feet of the construction workspace of the MLV 874 replacement pipeline in Kentucky (see table 2.5-1). TGP would use either the sewer line or the drag section technique when installing the replacement pipeline close to these residences. The sewer line technique would involve installing pipe one joint at a time and performing the welding, x-ray and coating activities in the open trench. The drag section construction technique would involve trenching, installation, and backfill of a prefabricated length of pipe containing several segments all in one day. For both techniques, the newly installed pipeline would be backfilled or the open trench covered with steel plates or timber mats at the end of each day.

Table 2.5-1

Residences within 50 Feet of the Construction Right-of-way

Milepost / Station ID	Structure Type [a]	County, State	Distance From Edge of Work Area (feet)	Structure ID	Site Specific Plan
New-build Pipeline					
0.0	Single-family residence	Lewis, KY	22.0	Home	TO-T6-100-7-231A1
MLV 874 Replacement Pipeline					
8.6 / 452	Church	Madison, KY	8.1	A	SP-SEG_1_RES_001
8.6 / 454	Church/Daycare	Madison, KY	1.0	B	SP-SEG_1_RES_001
11.2 / 590	Single-family residence	Madison, KY	12.6	C	SP-SEG_2_RES_001
12.3 / 650	Single-family residence	Madison, KY	38.6	D	SP-SEG_4_RES_001
12.3 / 651	Multi-family residence	Madison, KY	15.1	E	SP-SEG_4_RES_001
12.4 / 652	Multi-family residence	Madison, KY	1.0	F	SP-SEG_4_RES_001
12.4 / 653	Multi-family residence	Madison, KY	1.0	G	SP-SEG_4_RES_001
12.4 / 654	Multi-family residence	Madison, KY	13.2	H	SP-SEG_4_RES_001
12.4 / 654	Multi-family residence	Madison, KY	37.0	I	SP-SEG_4_RES_001

a Structure types would be confirmed prior to construction.

TGP has prepared site-specific construction plans for residences less than 50 feet from the construction right-of-way (see appendix G). We have reviewed the site-specific plans, and we are requesting comments on the plans from any affected stakeholders.

In addition, our *Guidance Manual for Environmental Report Preparation* (2002) states that for construction work areas within 10 feet of a residence, applicants should provide evidence of landowner agreement with the plan. TGP has not provided written agreements for residences within 10 feet of construction work areas. Therefore, **we recommend that**:

- **Prior to construction, TGP should file with the Secretary, for review and approval by the Director of OEP:**
  - **a. revised site-specific plans for residences less than 50 feet from the construction right-of-way for the MLV 874 replacement pipeline. These plans should be on aerial photography background, indicate all distances between the construction workspace and the residence, and show all residential features such as driveways; and**

b. evidence of landowner concurrence for the construction work area within 10 feet of a residence, including all the structures identified in table 2.5-1.

To minimize potential disruptions on residential areas near construction work areas, TGP would coordinate construction work schedules with affected landowners prior to construction. In addition, TGP would ensure that construction activities progress in a timely manner to minimize the residents' exposure to noise, dust, and the general presence of construction activities. To further minimize impacts on residential areas within the vicinity of construction work areas, TGP would:

- install temporary safety fencing for a distance of 100 feet on either side of the residence to control access and keep equipment or materials such as spoil piles within the construction workspace;
- install pipe as quickly as reasonably possible;
- backfill trenches as soon as pipe is laid or use steel plates or timber mats to cover the open trench; and
- restore all lawn areas, landscaping, and disturbed areas according to TGP's Plan and terms of individual easement agreements.

Other

This land use category includes waterbodies (open water) that would be affected by the Project. The Project would affect about 2.3 acres of open water during construction, of which 1.1 acres would be within permanent right-of-way or the operational footprint.

Conclusion

Because the Project would result in a relatively small amount of permanent land conversion and TGP would restore disturbed areas not needed for operations, as well as work with landowners to restore agricultural and residential land, we conclude that the Project would not have significant impacts on land use.

2.5.2 Public Land, Recreation, and Special Interest Areas

Natural Resources Conservation Service and Farm Service Agency Programs

The USDA's NRCS and Farm Service Agency administer a number of programs, such as the Conservation Reserve Program (CRP), the Conservation Reserve Enhancement Program (CREP), and the Farmable Wetlands Program. Landowners in the Project area may be enrolled in these USDA programs, which are designed to preserve and restore wetlands, forests, and wildlife habitat, and reduce soil erosion and protect drinking water (USDA, 2015). To identify properties enrolled in the CRP and CREP, TGP submitted a Freedom of Information Act request to the NRCS for locations of CRP and CREP lands in the Project area. The NRCS provided mailing addresses of enrollees in their programs, but the disclosure of precise locations of enrolled acreage is protected under Section 1619 of the Farm Bill, and the exact locations of parcels enrolled in the CRP and CREP were not provided. TGP would identify specific CRP and CREP parcel locations during land and right-of-way negotiations with landowners.

Public Lands and Recreational Areas

Abandonment activities would occur within the Kisatchie National Forest in Louisiana. Construction would also occur adjacent to the Louisiana Trails and Jackson Parish Fish and Game

Preserve in Louisiana; the Great River Road National Scenic Byway in Arkansas; and the Ohio River National Scenic Byway/Blueway Recreation Trail and Welsh Scenic Byway in Ohio. Potential impacts on each area are discussed further below. No other project facilities would be within 0.25 mile of public lands or recreational sites including national parks and forests, national natural landmarks, wilderness areas, wild and scenic rivers, or Urban Parks and Recreation Recovery Areas (Bureau of Land Management, 2015; NPS, 2006, 2009, 2015; National Wild and Scenic Rivers System, 2015; University of Montana, 2015; USGS, 2014b).

Kisatchie National Forest

The existing pipeline right-of-way passes through Kisatchie National Forest, which covers seven parishes in central and northern Louisiana (USFS, 1999). Project activities within Kisatchie National Forest would include installation of straight pipeline at taps at workspaces LA0200 and LA0201 and a disconnect crossover at workspace LA0220. Construction activities at each site would last about 7 days. The abandonment activities and the movement of equipment to and from workspaces would temporarily disrupt the public and wildlife concurrently using the Kisatchie National Forest. TGP initiated consultation with the USFS in November 2013 and continued to consult and conduct requested species-specific surveys through 2015. The USFS provided species information, mitigation measures and a determination of effects. TGP has committed to work with Kisatchie National Forest to identify and implement required measures as they apply to each workspace.

Louisiana Trails

Louisiana Trails is a 63-mile-long multi-use trail corridor between Sibley and Winnfield, in Webster and Winn Parishes, Louisiana (Louisiana Trails, 2015). Louisiana Trails is a project of the L&A Trail, Inc., a 501(c)(3) not-for-profit organization incorporated in the State of Louisiana. A proposed disconnect crossover at workspace LA0220 would be about 0.1 mile from Louisiana Trails. There would be no direct disturbance to the trail from the Project activities; however, the construction activities could be visible to trail users as they pass near the construction site. Abandonment activities would only last about 1 week at this location.

Jackson Parish Fish and Game Preserve

Jackson Parish Fish and Game Preserve at Chatham Lake in north central Louisiana is managed by the Jackson Parish Game and Fish Preserve as a recreational fishery (LDWF, 2009). Project activities would occur about 0.1 mile north of the preserve and would include a crossover removal at workspace LA0130. The Project activities would not directly disturb the preserve; however, the abandonment activities could be visible to recreational users near the construction site. TGP estimates activities would not last more than 1 week, and existing land cover between the crossover removal and preserve would help to screen activities from users of the preserve.

Great River Road National Scenic Byway

The Great River Road National Scenic Byway is a series of connecting roads and highways that follows the course of the Mississippi River for 3,000 miles from northern Minnesota to the Gulf of Mexico. The existing pipeline right-of-way crosses the byway in Chicot County, Arkansas. Project activities would occur about 0.1 mile south of the byway on Highway 278/82 and would include a proposed disconnect crossover at workspace AR0010. The Project would not directly affect the byway, but activities would be visible to drivers. The work would last about 1 week and take place within the existing cleared pipeline right-of-way.

Ohio River National Scenic Byway/Blueway Recreation Trail

The Ohio River National Scenic Byway follows the banks of the Ohio River through three states including 14 counties in southern Ohio where it is part of the Ohio Scenic Byways Program. The Ohio River National Scenic Blueway Recreation Trail consists of the Ohio River adjacent to the byway. The existing pipeline right-of-way crosses the byway (Highway 278/82 at this location) in Scioto County north of Franklin Furnace at U.S. Highway 52. Project activities would occur 0.2 mile west of the byway and 0.1 mile west of the river on and would include a proposed disconnect crossover at workspace OH0200. This temporary abandonment activity would be visible to drivers on the scenic byway and recreational users of the river. Users of the river may also experience construction noise. The impact would be temporary, however, as disconnect activities would not last much more than 1 week. Abandonment activities would not directly affect use of the river.

Welsh Scenic Byway

The existing pipeline right-of-way crosses the Welsh Scenic Byway at U.S. Highway 35 in Jackson County, Ohio. Project activities would occur about 0.1 mile south of the byway and would include a disconnect and temporary workspace at workspace OH0160. Activities would not directly affect the byway. The disconnect site likely would not be noticeable to viewers on the byway and abandonment activities would be temporary.

Because the abandonment activities within or near the public lands and recreation areas described above would be of short duration and limited to TGP's existing right-of-way, we conclude that the Project would not have significant impacts on these areas or their users.

2.5.3 Visual Resources

The Project would alter existing visual resources from the presence of construction equipment and activities in the viewshed or from aboveground facilities that would represent permanent alterations to the viewshed. The significance of these visual impacts would depend primarily on the quality of the viewshed, the degree of alteration of that view, the sensitivity or concern of potential viewers, and the perspective of the viewer.

Compressor Stations

New Compressor Station 202.5 would be built in Jackson County, Ohio in an area of open land, forest/woodland, and agriculture. The site is buffered to the north, west, and south by forest/woodland. To the east, there is open agricultural land between the proposed compressor station site and residences about 1,800 feet away. This open space and agricultural land would provide little shielding from the residences to the compressor station site. Therefore, construction and operation of the compressor station would have visual impacts on nearby residents with largely unobstructed views of the site.

New Compressor Station 206.5 would be built in Morgan County, Ohio in an area dominated by forest/woodland. The site would be screened by existing vegetation, with exception of the southwest corner of the site, which would be partially visible from West Poplar Ridge Road. Three residences are about 1,000 feet from the compressor station site; however, they would not have direct views of the facility.

New Compressor Station 211.5 would be built in Tuscarawas County, Ohio in an area of open land, forest/woodland, and agriculture. The site is buffered to the south and west by forest/woodland. To the east, there is open agricultural land between the proposed compressor station site and residences about

1,200 feet away along Edie Hill Road. This open space and agricultural land would provide little shielding from the residences to the compressor station site. Therefore, construction and operation of the compressor station would have visual impacts on nearby residents and motorists with largely unobstructed views of the site.

New Compressor Station 216.5 would be built in Mahoning County, Ohio on a site surrounded by mining, agriculture, forested areas, and open land. To the north of the site is a religious institution that is visually buffered from the proposed compressor station site by forest/woodland. To the east is agricultural land buffered partially by forest/woodland. The west side of the proposed site is open to the surroundings; however, the property contains a mining operation. A residence is about 1,000 feet south of the proposed site; however, the topography between the compressor station and the residence would minimize the potential views of the site. During construction, staging areas with equipment and materials would be visible to travelers on Woodworth Road. The town of New Springfield is about 1 mile from the proposed site, and the generally rolling topography and forest cover would minimize potential views of the compressor station.

Compressor Station 110 in Rowan County, Kentucky is an existing compressor station in Rowan County, Kentucky. The modification of the facility would not change the visual character of the existing facility. Construction activities would be visible temporarily within the site; however, the compressor station site is shielded by forested buffers, which would minimize any potential visual impacts on residents or motorists traveling by the site. The 85-foot-tall turbine exhaust stack would be visible following construction.

Compressor Station 875 would be constructed in Madison County, Kentucky as part of the Broad Run Expansion Project. Construction activities would be visible temporarily within the site. The expansion of the site to include an additional compressor unit for ACRP would not change the visual character of the site. The terrain provides a buffer between the station and the nearest residence, which is about 1,900 feet to the southeast.

Based on our review of existing conditions at and adjacent to the sites, we conclude that construction of Compressor Stations 206.5 and 216.5 and modification of Compressor Stations 110 and 875 would not result in significant visual impacts. Construction and operation of Compressor Stations 202.5 and 211.5 would have less than significant but noticeable visual impacts on residents and motorists with largely unobstructed views of the site. To minimize these visual impacts, **we recommend that:**

- **Prior to construction, TGP should file with the Secretary, for review and written approval by the Director of OEP, a visual impact mitigation plan for Compressor Stations 202.5 and 211.5 that includes the following measures:**
  - **a. maintaining existing foliage, to the maximum extent practicable, around the compressor station;**
  - **b. installing vegetative screening around the station boundaries;**
  - **c. installing slatted fencing around the compressor station boundaries;**
  - **d. painting buildings and equipment inside the stations in colors that reduce contrast with the natural environment; and**
  - **e. installing downward-facing, shielded lights to mitigate off-site exposure.**

New-build Pipeline

From MP 0.0 to 5.5 and 6.0 to 6.6, the new-build pipeline would parallel TGP's existing pipeline right-of-way through forest/woodland; between MPs 5.5 and 6.0 the pipeline would cross agricultural lands; and between MPs 6.6 and 7.7 the pipeline would cross forest/woodland, farms, and open land. The majority of the land traversed by the new-build pipeline would be forest/woodland (64 percent) and open land (26 percent). The remaining 10 percent would traverse agricultural, residential, industrial/commercial land, and open water. Construction activities would be visible at residences near the new-build pipeline at MPs 0.0, 4.9, 6.8, 7.0, 7.3, and 7.7. Construction activities could also be visible from local roads and from SH 396 near MPs 6.7 to 7.5.

There may be visual impacts during pipeline construction due to soil disturbance and the presence of personnel and equipment. After construction, temporary workspaces would generally be returned to pre-construction conditions according to TGP's Plan and Procedures. Impacts would be minimized by the proposed pipeline route's collocation with existing maintained rights-of-way from MP 0.0 to 5.5 and MP 6.0 to 6.6. Visual impacts would be most noticeable in areas of forested land. The conversion of forested land to open land has the potential to impact its use as a visual buffer and reduce its aesthetic quality. In restored areas, regrowth of trees to pre-construction condition would generally take 20 to 30 years for many species to reach maturity. Hardwood species, such as oaks, could take 50 to 100 years to reach maturity. Permanent operation impacts on forested land would occur along the permanent right-of-way, where periodic vegetation maintenance activities would prohibit the re-growth of trees.

Replacement Pipelines

The majority of the land affected for replacement pipelines MLV 874 and MLV 53 would be open land (56 percent), agriculture (30 percent) and industrial / commercial (12 percent). The remaining 2 percent would be residential and wetlands. Following construction, the pipeline replacement facilities would be underground and not visible. The Project areas would be restored and backfilled to original conditions. Because most of the land crossed by the replacement facilities would be open land and construction would occur within or adjacent to an existing pipeline right-of-way, significant visual impacts would not occur.

Off-right-of-way Tap Reconnects

The majority of the land affected for off-right-of-way tap reconnects would be industrial/commercial (49 percent), forest/woodland (24 percent) and open land (19 percent). The remaining 9 percent would be residential, agricultural, and open water. Most of the tap reconnect equipment and pipeline would be buried underground and not visible. Following construction, the Project areas would be restored and backfilled to original conditions. Visual impacts would be most noticeable in forested land, similar to the impacts for the new-build pipeline. However, because most of the land crossed by the off-right-of-way tap reconnects would be industrial or commercial, significant impacts on the visual character of most areas would not occur.

Other Abandonment Activities

As described in section 2.5.2, project activities associated with abandonment would occur within and near a number of public land and recreational areas. Because all work would occur within the existing right-of-way, no trees would be removed, and the work at each location would last no longer than about 1 week, we conclude that there would be no significant impacts on visual resources at these areas.

2.6 Socioeconomics

2.6.1 Population, Economy, and Employment

Appendix H (see table H-1) provides a summary of demographic conditions and trends at the county/parish level for the different Project activities. Even though the Project area is spread over several hundred miles and covers 61 counties from Louisiana to Ohio, it can be described as predominantly rural. County/Parish population estimates range from 7,803 (Quitman County, Mississippi) to 658,602 (Davidson County, Tennessee). Only seven urbanized areas (i.e., areas with a population of 50,000 of more) were identified within 15 miles of the existing TGP pipeline right-of-way or other aboveground Project facilities. These urbanized areas include, in descending order of population: Memphis, Tennessee; Nashville-Davidson, Tennessee; Louisville-Jefferson, Kentucky; Lexington-Fayette, Kentucky; Canton, Ohio; Youngstown, Ohio; and Bowling Green, Kentucky. More than half of the counties and parishes crossed by the Project have experienced a decrease in population since the 2010 U.S. Census. For the most part, those counties are in Mississippi and Ohio. In addition, more than two-thirds of the counties and parishes crossed by the Project have a population density lower than the U.S. average (89.5 persons per square mile in 2013). In the Project area, only Davidson County, Tennessee, has a population density greater than 400 persons per square mile (1,243 persons per square mile).

Recent economic conditions (income and employment) are summarized at the county/parish level in appendix H (see table H-2).

In more than two-thirds of counties and parishes, the unemployment rate is substantially higher than the national average (9.7 percent) over the period 2009 to 2013. Four counties, including three in Mississippi alone, report an unemployment rate above 20 percent.

In the same way, all but one county/parish in the Project area have a per capita personal income significantly lower than the U.S. average ($28,155) over the period of 2009 to 2013. Per capita personal income ranges from a low of $12,588 in Sunflower County, Mississippi, to a high of $28,467 in Tuscarawas County, Ohio. Some of the poorest counties are in Mississippi and Arkansas.

Overall, education, health, and social services are the dominant industry in the Project area. However, manufacturing remains the number one industry (by number of employees) in several counties, especially in Mississippi and Kentucky. A large proportion of employees also work in the retail trade sector.

The Project would result in a very small increase in the local population during the construction phase and no change during the operational phase. Up to 110 construction personnel would be required for the construction of new compressor stations in Ohio and modifications to compressor stations in Kentucky. Compressor station construction would generally occur concurrently at all sites, but other construction activities would occur sequentially over the construction period, so that workers would move from one site to the next. The new-build pipeline in Lewis and Carter Counties in Kentucky would require one construction spread of 120 to 130 construction workers. Construction of the replacement pipelines would require about 100 workers. About nine construction contractors and one foreman would be required for abandonment activities, including tap reconnects at 12 locations off the existing TGP right-of-way. Overall, TGP anticipates that less than half of the required construction workforce would come from outside the Project area. After completion of construction, TGP would hire up to five employees to operate the new compressor stations in Ohio. No additional personnel would be hired for operation of the new-build pipeline.

Project activities are expected to last about 2 years. The four new compressor stations and the modifications at Compressor Stations 110 and 875 would be constructed concurrently and would take 7 to 9 months to build. Construction of the off-right-of-way tap reconnects would take 4 to 6 months, and construction of the new-build pipeline would take 6 to 8 months. TGP has not yet determined the construction schedule for the replacement pipelines. TGP estimates that abandonment activities within the existing right-of-way would require 12 to 18 months.

2.6.2 Transportation

The Project area contains an extensive transportation network of roadways, freight and passenger rail tracks, and public and private airports. Access to the Project sites would be from interstates, state and local highways, county roadways, and private roads. The access roads that would be constructed for the ACRP are described in section 1.5.

Because the majority of construction activities would be in sparsely populated, rural areas, minor, short-term impacts would likely occur along some roadways from the movement of workers and the delivery of equipment and materials. TGP's construction contractors would obtain all necessary roadway transport and load permits from applicable federal, state, and local agencies. To minimize the impact on local traffic, TGP would implement traffic control measures and take necessary safety precautions. In particular, TGP would ask the construction contractors to ensure enforcement of local weight restrictions and limitations for trucks driving through the Project area.

On average, each new compressor station would require 36 round-trips per day for construction workers commuting to the sites, including 12 trips in passenger vehicles (assuming up to four passengers per vehicle), 12 trips in pickups (assuming up to eight passengers per vehicle), and 12 trips in buses (assuming up to 20 passengers per bus). In addition, TGP estimates that each new compressor station would require 13 trips per day for trucks carrying equipment and materials, or waste. We expect construction of the new-build pipeline would generate similar daily traffic volumes since the required workforce is comparable in size (120 to 130 workers for the new-build pipeline versus a peak of 110 workers for the new compressor stations).

2.6.3 Housing and Public Services

The Project area contains a few urbanized areas with a large supply of construction workers. TGP anticipates that less than half of the required construction workforce would come from outside the Project area. A majority of these workers would reside in temporary housing since construction activities at any given site would not exceed 6 months. Temporary accommodations include short-term rental units (hotels, motels, bed and breakfasts, and apartments), trailers, recreational vehicles, and campgrounds. Adequate temporary housing options are available in the towns and cities surrounding the construction sites to accommodate nonlocal construction workers (e.g., more than 500 hotels and motels are within 15 miles of Project activities).

A wide range of public services and facilities are presently available throughout the Project area, including law enforcement (police departments and sheriff's offices), fire departments, and medical emergency services, as well as medical facilities (i.e., 86 hospitals).

2.6.4 Property Values

We received comments from a number of landowners who are concerned that the Project would reduce their property values. We are unaware of any studies that have specifically addressed the effects of compressor stations on property values. The effect that a pipeline easement may have on property value is a damage-related issue that would be negotiated between the parties during the easement acquisition process. The easement acquisition process 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 typically based on objective characteristics of the property and any improvements. The impact a pipeline could have on a property's value would depend on many factors including the size of the tract, the values of adjacent properties, the presence of other utilities, the current value of the land, and the current land use. Subjective valuation is generally not considered in appraisals. 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.

A number of studies have been conducted since the early 1990s on the effects of proximity to pipelines on property values. In a few of them, advanced statistical techniques have been applied to evaluate transaction sales data before and after the construction of a pipeline. A literature review of these studies can be found in Wilde et al. (2012). The paper concludes that natural gas pipelines have no statistically significant impact on the values of nearby properties.

2.6.5 Tax Revenue

Construction activities and operation of the new compressor stations would result in additional state and local tax revenues related to retail sales and payroll. Nonlocal construction workers would spend money on housing, transportation, food, and entertainment. In addition, equipment fuel and construction materials such as gravel and fencing materials would likely be purchased from local or regional vendors. These revenues would result in short-term beneficial impacts on local businesses by generating additional revenues and contributing to the tax base. Moreover, once in operation, TGP would pay *ad valorem* taxes based on the assessed value of the compressor stations. Finally, TGP would have to pay county environmental and construction permit fees during the development phase of the Project.

The construction of new compressor stations in Ohio and modifications to compressor stations in Kentucky would require up to 110 workers at each site. All four new compressor stations would be constructed concurrently. Assuming an average pay rate of $42.50 per hour, the total payroll for each new compressor station is estimated at $6,668,000 (or $26,672,000 for all four compressor stations). A portion of that payroll would be spent by nonlocal workers (estimated at 17 during the peak construction month) on local lodging and meals. The new-build pipeline in Lewis and Carter Counties in Kentucky would require a slightly larger workforce of 120 to 130 construction workers, who would earn a combined $20,718,750. The 10-person nonlocal workforce would contribute an estimated $1,950,000 to local lodging and dining businesses over a period of 65 weeks. Each abandonment activity would require about nine construction contractors and one foreman. TGP would schedule these activities sequentially over the 65-week construction period, allowing workers to move from one site to the next. The total payroll is estimated at $1,657,000.

After completion of construction activities, between three and five full-time employees would be hired to operate the new compressor stations in Ohio. Assuming three employees and an annual salary of $57,000 per employee, the total annual payroll would be $171,000. In addition, TGP would have to pay annual property taxes on the assessed value of each new compressor station in Ohio. TGP estimates that *ad valorem* taxes on the new compressor stations in the first year would total about $9,245,000, broken down as follows: $2,902,000 for Compressor Station 202.5, $2,271,000 for Compressor Station 206.5, $2,336,000 for Compressor Station 211.5, and $1,736,000 for Compressor Station 216.5.

Overall, the Project would have a positive impact on the local economy. Construction activities would generate more than $49 million in labor income, a portion of which would be spent locally on housing, transportation, and other basic necessities. Once in operation, the four new compressor stations would generate $171,000 in labor income and $9,245,000 in property taxes annually.

2.7 Cultural Resources

The NHPA (54 U.S.C. 3001 et seq.) is the linchpin piece of legislation in the nation's historic preservation program. While there are other federal historic preservation laws and regulations, most of them do not apply to FERC, although they may apply to federal land managing agencies.[13] The NHPA set up the Advisory Council on Historic Preservation (ACHP), created the National Register of Historic Places (NRHP), and established State Historic Preservation Offices (SHPO).

Section 101 of the NHPA requires the identification of religious and cultural properties in the area of potential effect (APE) that may be important to Indian tribes that historically occupied or used the Project area, and may be eligible for listing on the NRHP. Indian tribes are defined in 36 CFR 800.16(m) as: "an Indian tribe, band, nation, or other organized group or community, including a Native village, Regional Corporation, or Village Corporation, as those terms are defined in Section 3 of the Alaska Native Claims Settlement Act (43 U.S.C. 1602), which is recognized as eligible for the special programs and services provided by the United States to Indians because of their special status as Indians." FERC acknowledges that we have trust responsibilities to Indian tribes, so on July 23, 2003, the Commission issued a "Policy Statement on Consultations with Indian Tribes in Commission Proceedings" in Order 635. It is the obligation of FERC, on behalf of all of the federal cooperating agencies, to consult on a government-to-government basis with Indian tribes that may have an interest in the Project.

Section 106 of the NHPA requires that all federal agencies, including FERC, take into account the effects of their undertakings on historic properties and afford the ACHP an opportunity to comment. Historic properties are archaeological sites, historic districts, buildings, structures, objects, or properties of traditional, religious, or cultural importance that are listed on or eligible for the NRHP. TGP is assisting us by providing information, analyses, and recommendations, as allowed by the ACHP's regulations for implementing Section 106 at Part 800.2(a)(3), and FERC's regulations at 18 CFR 380.12(f). FERC remains responsible for all findings and determinations under the NHPA. This section summarizes the current status of compliance with the NHPA for this Project.

2.7.1 Consultations

We sent copies of our NOI issued April 17, 2015, for the ACRP to a wide range of stakeholders, including other federal agencies such as the ACHP; EPA; COE; U.S. Department of the Interior NPS, Bureau of Indian Affairs, Bureau of Land Management, and USFWS; and USFS; state agencies including the SHPOs of Ohio, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana; local governmental agencies; and Indian tribes that may have an interest in the Project area. The NOI contained a paragraph about Section 106 of the NHPA and stated that we use the notice to initiate consultations with the SHPOs and to solicit their views and those of other government agencies, interested Indian tribes, and the public on the Project's potential effects on historic properties.

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[13] For example, the Archaeological Resources Protection Act of 1979 applies to federal and tribal lands, but FERC does not own or manage any lands.

FERC received comments on the NOI from non-governmental organizations and individuals citing concerns about general impacts on cultural resources, including cemeteries. No federal or local government agencies filed comments on cultural resources issues in response to our NOI.

As part of its information gathering process, TGP (through its consultant, Verdanterra) contacted state (other than the SHPOs) and local historical and archaeological organizations seeking data about cultural resources in the Project area or comments on the ACRP. Verdanterra wrote letters dated September 25, 2015, to 18 organizations in Ohio, 30 in Kentucky, 26 in Tennessee, 23 in Mississippi, 7 in Arkansas, and 11 in Louisiana, as listed in appendix I, table I-1. TGP has not yet received responses from the historical or archaeological organizations contacted.

State Historic Preservation Offices

Two SHPOs responded to our NOI. In a letter dated May 11, 2015, the Tennessee Historical Commission, representing the Tennessee SHPO, requested the comments and recommendations of FERC staff regarding the Project's potential to affect historic properties. This section of the EA presents the staff's opinions and summarizes the status of FERC's compliance with Section 106 of the NHPA.

The Kentucky Heritage Council, representing the Kentucky SHPO, wrote a letter to FERC dated May 14, 2015, requesting further consultations and the definition of the APE. We define the APE later in this section.

Separate from FERC's consultations, TGP, through its consultants, has had ongoing communications with the SHPOs in Ohio, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana regarding cultural resources issues, as detailed below.

Ohio

TGP, through its consultant at the time (TRC), began communicating with the Ohio SHPO in May 2014 about the Project. On February 26, 2015, TRC submitted a report to the SHPO detailing archaeological and architectural investigations in Ohio (Klinge et al., 2015). The Ohio SHPO provided comments on that report in a letter dated September 2, 2015.

On October 27, 2015, TGP's consultant Verdanterra submitted an addendum report that addressed deep testing at two workspace locations (Klinge and Ericksen, 2015) to the Ohio SHPO. The SHPO commented on that report in a letter dated December 30, 2015. Verdanterra submitted a second addendum report to the Ohio SHPO on November 23, 2015, that documented archaeological surveys at five locations (Klinge, 2015). The Ohio SHPO has not yet provided comments on the second addendum report.

In a letter dated February 23, 2016, Verdanterra provided avoidance plans for the Risen and Taylor cemeteries and recommended no additional survey around Compressor Station 216.5. The Ohio SHPO has not yet concurred with the plans or survey recommendation. In a letter dated March 28, 2016, Verdanterra also recommended no additional surveys at off-right-of-way tap reconnects in Ohio. The Ohio SHPO has not yet concurred with these recommendations. In a letter dated May 11, 2016, TGP submitted an assessment of effects on sites TUS-1093-10 and TUS-2095-13 to the Ohio SHPO. The Ohio SHPO has not yet commented on the assessment.

Kentucky

TRC, on behalf of TGP, initiated communications with the Kentucky SHPO in an email dated May 22, 2014. On February 27, 2015, TRC provided two reports to the SHPO detailing the results of archaeological and architectural investigations in Kentucky (Barrett and McKeighen, 2015a; Henry and Rankin, 2015). The Kentucky SHPO commented on February 26, April 13, and May 11, 2015, finding the reports deficient. TGP's cultural resources consultants (Verdanterra, Hayes and Monahan, and ASC) met with Kentucky SHPO staff on June 10, 2015. Verdanterra submitted revised versions of the archaeological and architectural survey reports to the SHPO on June 23, 2015. The SHPO accepted and concurred with the archaeological report in a letter sent July 23, 2015, and concurred with the architectural report in a letter sent March 4, 2016.

On July 24, 2015, Verdanterra submitted a Phase II Work Plan for archaeological sites 15BH140, 15BN180, 15CR252, and 15CR275 (Schwarz, 2015). The Kentucky SHPO approved the testing plans in a letter dated August 24, 2015.

On October 27, 2015, Verdanterra submitted the first addendum report, documenting geoarchaeological assessments at three workspaces in Greenup County (Hayes, 2015), to the Kentucky SHPO. The Kentucky SHPO commented on the first addendum report on January 11, 2016.

A report detailing the results of archaeological evaluative testing at three sites (Schwarz et al., 2015) was sent by Verdanterra to the Kentucky SHPO on November 25, 2015. The Kentucky SHPO commented on the testing report on January 11, 2016.

On December 29, 2015, Verdanterra submitted a second addendum to the archaeological report and an addendum to the architectural report to the Kentucky SHPO (Mustain and Klinge, 2015; Terpstra et al., 2015). The Kentucky SHPO concurred with the second addendum to the archaeology report on February 26, 2016. The Kentucky SHPO concurred with the architectural addendum in its March 4, 2016, letter on the initial architectural report (Henry and Rankin, 2015). On January 26, 2015, Verdanterra submitted a third addendum to the archaeology report to the Kentucky SHPO (Giedd and Klinge, 2016). The Kentucky SHPO concurred with the report's findings in a letter dated April 8, 2016.

In a letter to the Kentucky SHPO dated February 23, 2016, Verdanterra provided an avoidance plan for site 15BH140 at workspace KY0110. The Kentucky SHPO accepted the avoidance plan in a letter dated April 8, 2016. Verdanterra submitted a draft treatment plan for eligible and potentially eligible sites along the new-build pipeline to the Kentucky SHPO on March 28, 2016 (Verdanterra, 2016). The Kentucky SHPO has not yet provided comments on this plan.

In a letter dated March 28, 2016, Verdanterra recommended no additional surveys at off-right-of-way tap reconnects in Kentucky. The Kentucky SHPO has not yet concurred with these recommendations.

Tennessee

On February 26, 2015, TRC provided the Tennessee SHPO with two reports (one for archaeology and another for architectural history) covering proposed ACRP workspace locations in the state (Barrett and McKeighen, 2015b; Reeves and Taylor, 2015a). The Tennessee SHPO provided comments on the archaeology report in a letter dated March 19, 2015, and commented on the architectural report on April 9, 2015.

On November 25, 2015, Verdanterra sent an addendum report documenting additional Phase I surveys at four workspaces and three yards (Ryan, Munger, et al., 2015) to the Tennessee SHPO. The Tennessee SHPO concurred with the report's findings in a letter dated December 3, 2015.

In a letter dated March 28, 2016, Verdanterra recommended no additional surveys at off-right-of-way tap reconnects in Tennessee. The Tennessee SHPO concurred with this recommendation in a letter dated April 27, 2016.

Mississippi

On February 26, 2015, TRC provided the Mississippi SHPO with both an archaeological survey report (Holland et al., 2015a) and an historic architectural survey report (Reeves and Taylor, 2015b). The Mississippi SHPO commented on both reports in a letter dated March 24, 2015. On May 25, 2015, TRC addressed the SHPO's comments in a revised final archaeological survey report.

On July 27, 2015, Verdanterra provided the Mississippi SHPO with a copy of a deep testing protocol for two ACRP workspace locations (R. Christopher Goodwin & Associates, Inc. [Goodwin], 2015a). The SHPO accepted the testing protocol in a letter dated August 19, 2015. The results of deep testing at the two ACRP workspaces in Mississippi (Goodwin, 2015b) were submitted to the SHPO on October 27, 2015. On November 19, 2015, the SHPO provided its review of that report. A second addendum report, covering four workspaces and two yard locations in Mississippi (Ryan, Johnson, et al., 2015), was sent to the SHPO on November 25, 2015. The SHPO provided comments on the second addendum report in a letter dated December 17, 2015, and requested a revised report. A revised second addendum report was submitted to the SHPO on January 5, 2016.

In a letter dated March 28, 2016, Verdanterra recommended no additional surveys at off-right-of-way tap reconnects in Mississippi. The Mississippi SHPO has not yet concurred with these recommendations.

Arkansas

TRC introduced the Project to the Arkansas SHPO during a telephone call in late April or early May 2014, during which the Arkansas SHPO requested that TGP submit a draft survey report for its review. On February 26, 2015, TRC submitted to the Arkansas SHPO a report detailing archaeological surveys at proposed ACRP workspaces in Arkansas (Holland et al., 2015b). The Arkansas SHPO commented on the report in a letter dated March 24, 2015. On July 24, 2015, Verdanterra sent the Arkansas SHPO a copy of a deep testing protocol (Goodwin, 2015c). The SHPO accepted the protocol in a letter dated August 26, 2015.

Verdanterra sent an addendum report, documenting deep testing at ACRP workspace AR0010 in Arkansas (Goodwin, 2015d), to the SHPO on October 27, 2015. The Arkansas SHPO provided comments on the report on December 4, 2015.

Verdanterra filed a supplement to the archaeology report with the Arkansas SHPO on March 1, 2016. The supplemental report reviewed potential for archaeological deposits at workspace AR0030 and concluded that no additional survey was needed at that location. The SHPO accepted the supplemental report in a letter to Verdanterra dated March 7, 2016.

Louisiana

TRC introduced the Project to the Louisiana SHPO during a telephone call in late April or early May 2014, during which the SHPO requested that TGP submit a draft survey report for its review. On February 26, 2015, TRC submitted two reports to the SHPO: one detailing archaeological surveys (Holland et al., 2015c) and the other addressing historic architecture (Reeves and Taylor, 2015c). The Louisiana SHPO commented on the archaeological survey report in a letter dated March 16, 2015. On May 27, 2015, Verdanterra and TRC held a meeting with SHPO staff to discuss the Project. On June 15, 2015, TRC submitted a final version of the Louisiana Phase I archaeological survey report that addressed the SHPO's comments, and the SHPO accepted the final report on June 25, 2015.

On July 24, 2015, Verdanterra submitted a deep testing protocol to the Louisiana SHPO (Goodwin, 2015e). The SHPO accepted the protocol on August 10, 2015.

On October 27, 2015, Verdanterra submitted an addendum report documenting deep auger testing at workspace LA0050 (Goodwin, 2015f) to the Louisiana SHPO. The SHPO accepted that report on November 10, 2015. Verdanterra submitted a second addendum report (Ryan, McLean, et al., 2015) documenting surveys at three yards and one workspace in Louisiana to the SHPO on November 25, 2015. The Louisiana SHPO concurred with the second addendum report's findings on December 4, 2015.

Indian Tribes

To fulfill our obligation to consult on a government-to-government basis with Indian tribes that may attach religious or cultural resources to historic properties in the APE, we sent our NOI to 45 tribes listed in appendix I, table I-2. No tribe filed comments with FERC in response to our NOI.

In addition to FERC's contact program, TGP, through its contractors, has communicated with 78 Indian tribes that may have an interest in the Project area (see appendix I, table I-2). Letters were first sent to tribes by TRC on February 11, 2015, and again by Verdanterra on December 29, 2015, describing the Project and requesting comments. Eighteen tribes responded: the Caddo Nation of Oklahoma, Choctaw Nation of Oklahoma, Comanche Nation of Oklahoma, Delaware Nation of Oklahoma, Delaware Tribe of Indians in Oklahoma, Jena Band of Choctaw Indians of Louisiana, Kiowa Tribe of Oklahoma, Miami Tribe of Oklahoma, Minnesota Chippewa Tribe – Bois Forte Band (Nett Lake), Minnesota Chippewa Tribe – Mille Lacs Band, Muscogee (Creek) Nation of Oklahoma, Osage Nation, Peoria Tribe of Indians of Oklahoma, Pokagon Band of Potawatomi Indians in Michigan, Quapaw Tribe of Indians in Oklahoma, Tonkawa Tribe of Oklahoma, White Mountain Apache Tribe in Arizona, and Ysleta de Sur Pueblo in Texas. Eight tribes requested copies of archaeological survey reports: the Caddo Nation, Choctaw Nation of Oklahoma, Delaware Nation, Delaware Tribe, Jena Band of Choctaw, Muscogee Nation, Osage Nation, and Quapaw Tribe. TRC and Verdanterra have provided copies of reports, addenda, and Discovery Plans to the requesting tribes.

The Caddo Nation, in a letter dated March 7, 2015, notified TGP that the Project would not impact known sites of interest. In an email to TRC dated May 15, 2015, the Caddo Nation requested copies of archaeological survey reports for Louisiana. TRC provided the archaeology survey report for Louisiana on May 21, 2015. Verdanterra provided addendum reports for Louisiana to the Caddo Nation on January 13, 2016, and additional documents on May 13, 2016.

In a March 16, 2015, email to TRC, the Choctaw Nation requested GIS shape files. TGP indicated that TRC provided the Choctaw Nation with GIS shape files on March 23, 2015. The Choctaw Nation requested the Louisiana survey report in an email dated Tuesday, March 24, 2015, which TRC provided on April 13, 2015. Verdanterra provided addendum reports for Louisiana on January 13, 2016.

The Choctaw Nation requested GIS shape files again on February 12, 2016, and March 5, 2016. Verdanterra provided the shape files on February 19, 2016, and additional documents on May 13, 2016.

In a January 26, 2016, letter to Verdanterra, the Comanche Nation responded that the tribe was unaware of any prehistoric or historic materials important to the tribe in the Project area.

The Delaware Nation responded to TRC's Project introduction letter in an undated letter received between February and April of 2015, in which the tribe requested copies of archaeological survey reports for Lewis County, Kentucky. TRC provided the Delaware Nation with a copy of the Kentucky archaeological survey report on April 23, 2015. TRC provided an addendum report for Kentucky on June 1, 2015, and Verdanterra provided additional reports on January 13, 2016. Verdanterra provided a copy of a treatment plan addressing outstanding surveys and eligible and potentially eligible sites along the new-build pipeline in Kentucky in a letter to the Delaware Nation dated March 28, 2016. Verdanterra provided additional documents to the Delaware Nation on May 13, 2016.

The Delaware Tribe of Indians responded to TRC's Project introduction letter on April 3, 2015. In the exchanges that followed, the tribe clarified which states and counties they were interested in and requested a copy of the Ohio archaeological survey report. TRC provided the report on May 29, 2015. In a letter dated June 17, 2015, the Delaware Tribe of Indians provided TRC with its comments on the Ohio survey report. Verdanterra provided addendum reports for Ohio to the tribe on January 13, 2016, and additional documents on May 13, 2016.

In a March 9, 2015, email to TRC, the Jena Band of Choctaw Indians requested additional information about the ACRP elements in Louisiana, including getting copies of cultural resources reports. TGP indicated that TRC provided a copy of the Louisiana survey report to the Jena Band of Choctaw Indians on March 11, 2015. Verdanterra provided copies of addendum reports for Louisiana on January 13, 2016. The Jena Band of Choctaw Indians concurred with TGP's Discovery Plan and provided updated contact information in an email dated February 18, 2016. Verdanterra provided additional documents to the Jena Band of Choctaw Indians on May 13, 2016.

In a January 8, 2016, email to Verdanterra, the Kiowa Tribe of Oklahoma indicated it had no comments or concerns about the Project and requested a copy of TGP's Discovery Plan.

In a March 1, 2016, letter to Verdanterra, the Miami Tribe of Oklahoma provided contact information and requested continued consultation on the Project. Verdanterra provided a copy of a treatment plan addressing eligible and potentially eligible sites along the new-build pipeline in Kentucky in a letter dated March 28, 2016. Verdanterra provided additional documents to the Miami Tribe on May 13, 2016.

During a telephone call to Verdanterra on February 10, 2016, the Minnesota Chippewa Tribe – Bois Forte Band indicated the tribe was not interested in the ACRP and requested not to receive additional correspondence.

During a telephone call to Verdanterra on March 3, 2016, the Minnesota Chippewa Tribe – Mille Lacs Band provided contact information and requested to continue receiving materials related to the ACRP.

During a telephone call with TRC on April 14, 2015, the Muscogee Nation requested copies of cultural survey reports. In a May 29, 2015, email to TRC, the tribe stated that no specific sites important to the tribe should be affected by the Project. However, the Project would cross the "Trail of Tears," the historic corridor of forced migration from the tribe's ancestral lands in Georgia and Alabama to areas west of the Mississippi River. TRC provided the Muscogee Nation with copies of its survey reports. A map of the Trail of Tears National Historic Trail was filed with the Commission by TGP on June 18, 2015. There are four locations along the pipeline segment proposed for abandonment where the trail would be crossed. However, no construction activities are planned at any of those locations. Therefore, the Project would have no adverse effects on the Trail of Tears National Historic Trail. Verdanterra provided copies of addendum reports to the Muscogee Nation on January 13, 2016. TGP provided a copy of a treatment plan addressing outstanding surveys and eligible and potentially eligible sites along the new-build pipeline in Kentucky in a letter dated March 28, 2016. Verdanterra provided additional documents to the Muscogee Nation on May 13, 2016.

In an April 27, 2016, letter to Verdanterra, the Osage Nation expressed interest in the Project and requested additional information, including reports for Ohio, Kentucky, and Louisiana. Verdanterra provided the February 2015 introduction letter and copies of the requested reports and Discovery Plans for the tribe's regions of interest. Verdanterra provided additional documents to the Osage Nation on May 13, 2016.

In a March 3, 2015, letter to TRC, the Peoria Tribe indicated that the Project would cross ceded aboriginal lands in Ohio and Kentucky; however the tribe is unaware of any sites of religious or cultural significance in the Project area.

In a January 21, 2016, letter to Verdanterra, the Pokagon Band of Potawatomi responded that the tribe is unaware of any historical, religious, or culturally significant resources to the tribe in the vicinity of the Project area. The tribe also requested to be contacted if archaeological materials are discovered during the Project. Verdanterra provided documents related to the Project in Ohio to the Pokagon Band of Potawatomi on May 13, 2016.

In a January 13, 2016, letter to Verdanterra, the Quapaw Tribe of Oklahoma requested survey reports for Mississippi and Arkansas. Verdanterra provided the requested reports in letters dated February 17, 2016, and March 7, 2016. Verdanterra provided additional documents to the Quapaw Tribe on May 13, 2016.

The Tonkawa Tribe indicated that no specifically designated historical or cultural sites important to the tribe should be affected by the Project.

In memos to TRC and Verdanterra dated February 24, 2015, and January 27, 2016, respectively, the White Mountain Apache Tribe stated that the Project would have no impacts on historic or traditional cultural properties important to the tribe.

In a letter to TRC, dated February 26, 2015, the Ysleta de Sur Pueblo indicated that the Project is outside of their area of interest.

2.7.2 Cultural Resources Investigations

Areas of Potential Effect

According to the ACHP's regulations implementing Section 106 of the NHPA at Part 800.16(d), the APE describes "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking." The direct APE is where sites could potentially be affected by construction activities. The proposed areas where construction would occur for the ACRP are described in section 1.5 and appendix C. Disturbance acreages for each facility are also described by state in appendix I, tables I-3 through I-8. For these facilities, TGP defined the direct APE as equal to the facility boundary. For the new-build pipeline in Carter and Lewis Counties, Kentucky; the MLV 874 replacement pipeline in Madison County, Kentucky; and the MLV 53 replacement pipeline in Washington County, Mississippi; the direct APE includes the entire construction right-of-way (Henry and Rankin, 2015).

The indirect APE is the geographic area beyond direct construction workspaces where Project-related activities could have visual, audible, or other effects that may alter the character of historic properties. For workspaces where no aboveground facilities would be built and no clearing would be required along pipeline corridors, TGP defined the indirect APE as equal to the direct APE. Where new aboveground construction is proposed at compressor stations, TGP defined the indirect APE for architectural resources as extending 0.5 mile from the new facilities. For off-right-of-way tap reconnects and the new-build pipeline, TGP defined the indirect APE as extending 0.5 mile on either side of the facilities, except where they would be collocated with existing facilities. Where collocated with existing facilities, the indirect APE was defined as equal to the width of the construction right-of-way. The SHPOs in all states have concurred with the APE definitions above as outlined in individual reports submitted to their offices, except regarding off-right-of-way tap reconnects. The Tennessee SHPO has concurred with the definition of the APE regarding off-right-of-way tap reconnects. The SHPOs in Ohio, Kentucky, and Mississippi have not yet commented on the indirect APE definition for off-right-of-way tap reconnects.

Inventory and Testing Results

Cultural resources investigations of proposed ACRP construction areas in Ohio, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana were conducted by consultants to TGP between November 2013 and January 2016. In total, TGP inventoried about 687 acres at all locations combined. In some situations, individual workspaces that were previously surveyed were not reinspected by TGP's consultants. The investigations in each state are discussed below.

Ohio

In Ohio, TGP proposes construction activities at 4 new compressor stations (totaling 96.4 acres), 2 off-right-of-way tap reconnects (totaling 12.4 acres), 18 workspace locations within existing rights-of-way (totaling 16.2 acres), 6 access roads (totaling 9.8 acres), and 3 yards (totaling 9.6 acres), listed in appendix I, table I-3. ASC surveyed the majority of the workspace locations in 2013 and 2014.

New Compressor Station 211.5 (OH0025) and two associated access roads (CS211.5-ACRD.001 and CS211.5-ACRD.002) were previously surveyed in 2012 by Goodwin. Two pre-contact archaeological isolated finds (33TU684 and 33TU685) were previously recorded by Goodwin adjacent to Temporary Access Road CS211.5-ACRD.002, and evaluated as not eligible for the NRHP (Hornum, Godwin, et al., 2012). The Ohio SHPO concurred with these recommendations in a letter dated March 21, 2012. Goodwin also conducted an historic architectural survey of the indirect APE (0.5-mile-radius) around Compressor Station 211.5 and recorded eight standing structures: TUS-1005-13, TUS-1028-13, TUS-1029-13, TUS-1034-13, TUS-1036-10, TUS-1037-10, TUS-1041-10, and TUS-1042-10 (Kuranda et al., 2012). ASC did not conduct archaeological surveys of Compressor Station 211.5 and its two associated access roads because they had been previously inventoried by Goodwin, but it did conduct an historic architectural survey of the indirect APE around the compressor station and rerecorded some of the same standing structures previously recorded by Goodwin in 2012, as discussed below.

No pre-contact archaeological sites were identified by ASC in the direct APEs of the workspace locations it inspected in 2013-2014 in Ohio. However, ASC identified 19 historic architectural sites within the indirect APE at the four new compressor stations and their associated access roads, as shown in table 2.7-1. All 19 of the historic architectural sites recorded during the 2013-2014 surveys within 0.5 mile of each of the four proposed new compressor stations were evaluated by ASC (Klinge et al., 2015) as not eligible for the NRHP, requiring no further work.

Table 2.7-1

Archaeological and Historic Architectural Sites Identified in the Direct or Indirect APEs of Ohio Workspaces

Workspace Name	County	Site Number and Description	Eligibility Recommendation
CS 202.5 CS202.5-ACRD.001 CS202.5-ACRD.002	Jackson	JAC-224-11, circa 1870s Jones farmstead	Not Eligible
CS 206.5 CS206.5-ACRD.001	Morgan	MRG-314-6, 1905 Massey house	Not Eligible
		MRG-315-6, 1915 house	Not Eligible
		MRG-316-6, 1905 Warren farmstead and 1875 Risen Cemetery	Not Eligible
		MRG-317-6, 1936 Hotchkiss house	Not Eligible
		MRG-318-6, 1960 house	Not Eligible
		MRG-319-6, 1900 house	Not Eligible
		MRG-320-6, 1900 barn	Not Eligible
		Taylor Cemetery	Not Eligible
CS 211.5 [a] CS211.5-ACRD.001 CS211.5-ACRD.002	Tuscarawas	TUS-1090-10 (TUS-1042-10), 1909 Steele house	Not Eligible
		TUS-1091-10 (TUS-1041-10), 1870 Caples farmstead	Not Eligible
		TUS-1092-10 (TUS-1037-10), 1930 Campbell house	Not Eligible
		TUS1093-10 (TUS-1036-10), 1865 Caples house and 1905 Gibson house	NotEligible
		TUS-1094-13, 1870 Dickerson farmstead	Not Eligible
		TUS-1095-13, 1870 Westhafer house	Eligible
		TUS-1096-13 (TUS1029-13), 1958 house	Not Eligible
CS 216.5 CS216.5-ACRD.001	Mahoning	MAH-2212-15, 1895 May house	Not Eligible
		MAH-2213-15, 1963 New Springfield Church of God	Not Eligible
		MAH-2214-15, 1870 Ruppert house	Not Eligible
		MAH-2215-15, 1963 house	Not Eligible
OH0030	Tuscarawas	Newport Cemetery	Not Eligible

a Five sites at CS 211.5 were previously recorded by R. Christopher Goodwin & Associates, Inc. under different site numbers, provided in parentheses after the ASC number.

The Ohio SHPO commented on the ASC February 2015 survey report in a letter dated September 2, 2015. The SHPO concurred with most of ASC's recommendations, and we agree with the findings of the Ohio SHPO. However, the Ohio SHPO questioned ASC's recommendations of NRHP eligibility and Project effects at the circa 1865 Caples house at historic architectural site TUS-1093-10, and the circa 1870 Westhafer house at TUS-1095-13,[14] both in Tuscarawas County near proposed new Compressor Station 211.5. TGP's consultants (ASC and Verdanterra) reassessed effects on these properties and concluded that Compressor Station 211.5 (at workspace OH0025) would have no adverse effect on these historic properties. Verdanterra submitted the assessment to the Ohio SHPO on May 12, 2016. The Ohio SHPO has not commented on the assessment report.

TGP did not record or evaluate four historical architecture sites in the indirect APE at Compressor Station 216.5 due to access restrictions by the landowners. In a letter to the Ohio SHPO dated February 23, 2016, TGP recommended that the buildings would not be adversely affected by construction of the compressor station and additional investigation was not required. The Ohio SHPO has not yet concurred with this recommendation.

The February 2015 ASC survey report identified the Risen and Taylor Cemeteries within the indirect APE of Compressor Station 206.5 in Morgan County. The Ohio SHPO requested TGP afford the same respect and treatment to cemeteries as though they were listed on the NRHP. On February 23, 2016, TGP submitted to the SHPO avoidance plans for the Risen and Taylor Cemeteries.[15] The Ohio SHPO has not yet commented on these plans.

The Newport Cemetery is within the 0.5-mile APE of Off-right-of-way Tap Reconnect OH0030. In a letter to the Ohio SHPO dated March 28, 2016, TGP recommended that the workspace, which is on flat agricultural land along an existing road, would not result in permanent indirect impacts on sensitive resources. The Ohio SHPO has not yet concurred with this recommendation.

TGP conducted a deep testing reconnaissance and additional survey at workspace OH0110 in Morgan County, and workspace OH0200 in Scioto County, Ohio. Workspace OH0110 and the floodplain of Smith Run were inspected by Hayes & Monaghan, geoarchaeologists, in July 2015. They concluded that deep testing was not necessary at this location because of the low potential for buried cultural remains. Likewise, an inspection of workspace OH0200 and the Ohio River floodplain also indicated a low potential for buried archaeological remains, so no deep testing was recommended (Klinge and Ericksen, 2015). The Ohio SHPO concurred with these findings in a letter dated December 30, 2015; and we agree. Previously recorded prehistoric site 33SC195 is about 500 feet away from OH0200 and should not be affected by activities at that workspace.

ASC conducted additional surveys of ACRP workspaces OH0012 and OH0180, and yards OH-213-003, OH-208-002, and OH-203-002 in October 2015 (Klinge, 2015). ASC did not identify any cultural resources in the APEs for these facilities. The Ohio SHPO has not yet reviewed this report.

TGP has not yet conducted architectural surveys of the indirect APE for Off-right-of-way Tap Reconnects OH0030 and OH0110. In a letter to the Ohio SHPO dated March 28, 2016, TGP argued these facilities would not cause permanent adverse impacts on aboveground historic properties because the facilities would be primarily collocated with existing pipelines and roads and would require no new vegetative clearing. The Ohio SHPO has not yet concurred with this recommendation.

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[14] ASC recorded this site, also known as the Burdette house, in 2014 as TUS-1095-13, unaware that the house had previously been recorded by Goodwin in 2011 as TUS-1005-13. Goodwin assessed the house as eligible for the NRHP (Kuranda et al., 2012), an evaluation that the Ohio SHPO appeared to concur with in a September 21, 2015, email to Verdanterra.

[15] The avoidance plans for the Risen and Taylor Cemeteries were filed with FERC on March 14, 2016.

Kentucky

In Kentucky, TGP proposes construction activities at 2 existing compressor stations (totaling 27.1 acres), a new-build 36-inch-diameter pipeline (totaling 124.4 acres), the MLV 874 replacement pipeline (totaling 14.9 acres), 2 off-right-of-way tap reconnects (totaling 23.5 acres), 36 workspace locations within existing rights-of-way (totaling about 32.2 acres), 5 yards (totaling 14 acres), 8 access roads (totaling 10.1 acres), listed in appendix I, table I-4. The majority of the workspace locations were surveyed by TRC in 2013 and 2014, except for KY0030, KY0070, and most of KY0160, KY0170, KY0380, and KY420.

In 2013 and 2014, only about 65 percent of the route of the new-build pipeline in Carter and Lewis Counties was inspected by TRC because of steep terrain, landowner access denial, or design changes. During this survey, TRC conducted 491 shovel tests along the surveyed route. Six archaeological sites and three isolated finds were identified during the survey of the new pipeline route (see table 2.7-2). TRC initially recommended that three sites are potentially eligible for NRHP listing and should be avoided or assessed through Phase II testing; however, these recommendations changed after additional surveys and site testing, as discussed below. The three pre-contact isolated finds should not be considered eligible for the NRHP (Barrett and McKeighen, 2015a). At ACRP workspace KY0110 in Bath County, potentially eligible previously recorded multi-component site 15BH140 (Olympia Springs) was identified. TRC recommended Phase II testing at site 15BH140. The Kentucky SHPO accepted TRC's archaeological survey report (Barrett and McKeighen, 2015a) on July 23, 2015, and concurred with the findings and recommendations. We agree with the findings of the Kentucky SHPO.

Table 2.7-2

Archaeological and Historic Architecture Sites Identified in the Direct or Indirect APEs of Kentucky Workspaces

Workspace Name	County	Site Number and Description	Eligibility Recommendation
Compressor Station 110	Rowan	RW-336, Eldridge and Son Feed Store	Not Eligible
Compressor Station 875	Madison	MA-1031, historic building	Not Eligible
New-build Pipeline New Build ACRD.006 ATWS.010	Carter/Lewis	15CR252, pre-contact site	Eligible
		15CR271, pre-contact site	Potentially Eligible
		15CR272, pre-contact site	Not Eligible
		15CR273, multi-component site	Potentially Eligible
		15CR274, historic site	Not Eligible
		15CR275, multi-component site	Not Eligible
		15CR280, pre-contact site	Potentially Eligible
		15CR281, pre-contact site	Potentially Eligible
		15CR282, pre-contact site	Not Eligible
		15CR283, pre-contact site	Not Eligible
		CR-155, Butler house	Not Eligible
		IF-1, pre-contact isolated find	Not Eligible
		IF-2, pre-contact isolated find	Not Eligible
		IF-3, pre-contact isolated find	Not Eligible
		IF-1 [a], pre-contact isolated find	Not Eligible
		IF-2 [a], pre-contact isolated find	Not Eligible
KY0110	Bath	15BH140, Olympia Springs and multi-component site	Eligible

a These isolated finds were recorded during the October 2015 additional survey and duplicate IF numbers assigned to previous isolated finds.

In October 2015, additional surveys were conducted by consultant ASC, on behalf of TGP, that covered all of workspaces KY0030, KY0070, KY0170, and KY0420; portions of workspaces KY0080, KY0160, and KY0380; all of yards KY-111-003, KY-109-003, and KY-105-002; and a short segment of the proposed route for the new-build pipeline, together with an associated 0.5-mile-long reroute, six access roads, and new-build pipeline yard ATWS.010. Four prehistoric archaeological sites and two isolated finds were identified along the 0.5-mile-long reroute for the new pipeline, a pipeline access road, and the pipeline yard. ASC recommended that two sites are potentially eligible for the NRHP and two sites and the two isolated finds are not eligible. In addition, ASC reassessed previously recorded site 15CR271 as potentially eligible for the NRHP. ASC recommended avoidance or testing for all potentially eligible sites. On February 26, 2016, the Kentucky SHPO concurred with the recommendations in that report, and we agree. Additional surveys are still needed along the new-build pipeline and at KY0380 due to landowner access restrictions.

On July 24, 2015, consultant Verdanterra, on behalf of TGP, submitted a Phase II Work Plan for archaeological testing at sites 15BH140, 15CR252, and 15CR275 (Schwarz, 2015) to the Kentucky SHPO. The SHPO accepted that plan on August 24, 2015. ASC conducted archaeological testing at sites 15BH140, 15CR252, and 15CR275, and as a result recommended that sites 15BH140 and 15CR252 are eligible for the NRHP; whereas the portion of site 15CR275 in the direct APE does not qualify for nomination (Schwarz et al., 2015). On January 11, 2016, the Kentucky SHPO concurred with the recommendations in the testing report, and we agree.

TGP provided an avoidance plan for 15BH140 to the Kentucky SHPO on February 23, 2016. TGP would avoid adverse effects on the site by limiting construction activities to previously disturbed areas within the site. The Kentucky SHPO accepted the avoidance plan for 15BH140 in a letter dated April 8, 2016.

On March 28, 2016, TGP provided the Kentucky SHPO with a treatment plan for archaeological resources along the new-build pipeline. TGP recommends that prehistoric archaeological sites along the new-build pipeline comprise a new archaeological district they have identified as the Carter Cave Chert Lithic Workshop and Quarry District. The treatment plan provides for archaeological survey of remaining unsurveyed portions of the new-build pipeline; Phase II testing at potentially eligible sites 15CR271, 15CR281, and any new potentially eligible sites identified during the survey that cannot be avoided by construction; and data recovery at site 15CR252 and any new eligible sites identified during Phase II testing that cannot be avoided by construction. Sites 15CR273, 15CR275, and 15CR280 would be avoided. Under the treatment plan, TGP would also prepare an NRHP historic district nomination for the archaeological district, present findings at two archaeological society meetings, and develop a publicly available brochure on the district to mitigate adverse effects of construction within the district. The Kentucky SHPO has not yet commented on the treatment plan.

In October 2015, TGP submitted to the SHPO a report of a desktop geoarchaeological analysis of workspaces KY0002, KY0010, and KY0020 in Greenup County, Kentucky. The analysis concluded that construction activities at these three workspaces would only affect previously disturbed cut-and-fill deposits (Hayes, 2015). On January 11, 2016, the Kentucky SHPO agreed with the assessments for workspaces KY0002, KY0010, and KY0020, and we concur.

TRC conducted an historical architectural survey of selected ACRP locations in October and November 2014. One historic architectural site (RW-336, the Eldridge & Son Feed Store) was identified within the indirect APE around existing Compressor Station 110 and its associated access roads (CS110[KY0070]-ACRD.001 and CS 110 [KY0070]-ACRD.002). The Eldridge & Son Feed Store, a 1930s converted barn, was evaluated as not eligible for the NRHP. Along the new-build pipeline route, TRC identified one historic structure: CR-155 (Butler House). This circa 1890s abandoned building was evaluated to be not eligible for the NRHP, requiring no further work (Henry and Rankin, 2015). On March 4, 2016, the Kentucky SHPO provided comments on the historic architectural report. The Kentucky SHPO agreed with the recommendations that the Butler House (CR-155) along the new-build pipeline and the Eldridge & Sons Feed Store (RW-336) near CS110 are not eligible for the NRHP; and we concur.

In October 2015, ASC conducted additional archaeological and aboveground historic resource surveys of selected ACRP locations (Mustain and Klinge, 2015; Terpstra et al., 2015). A farmstead and a house were observed along new pipeline access road ACRD-002; a farmstead along access road ACRD-003; barns along access road ACRD-004; and a house and barn along access road ACRD-005. Although all of these buildings appear to be more than 50 years old, ASC did not record or evaluate them. It was the opinion of ASC that like use of the existing access roads would have no effect on these historic buildings (Terpstra et al., 2015). ASC also noted but did not record or evaluate two barns in the indirect APE of the new-build pipeline reroute in Tract 17.007. ASC recommended the pipeline would have no adverse effect on the barns in this location because the surrounding area is pasture, little vegetative clearing would be required, and the area would be restored to present conditions (Terpstra et al., 2015). In their March 4, 2016 letter, the Kentucky SHPO concurred with these assessments and the finding that use of the access roads would have no impacts on nearby historic standing structures. We agree.

In December 2015, ASC conducted additional archaeological surveys of the new-build pipeline (Giedd and Klinge, 2016). The surveys did not identify any new archaeological resources. The results of the survey were provided to the Kentucky SHPO on January 26, 2016. The Kentucky SHPO concurred with the report's findings on April 8, 2016. We agree with the SHPO.

In August and September 2014, TRC performed archaeological and historic architectural surveys for Compressor Station 875 in connection with TGP's Broad Run Expansion Project (Barrett, 2014; Henry and Rankin, 2014). TRC identified one historic architectural resource: site MA-1031 (Johnson Property) in the indirect APE. TRC recommended that MA-1031 is not eligible for the NRHP. The Kentucky SHPO concurred with the reports' recommendations in letters dated January 30, and May 19, 2015; we agree.

TGP has not yet conducted archaeological surveys of workspaces KY0080, KY0160, KY0380, and 9.5 acres of the new-build pipeline. TGP has not yet conducted architectural surveys of the indirect APE for off-right-of-way tap reconnects KY0080 and KY0160/KY0170. TGP has not conducted archaeological or architectural surveys for the MLV 874 replacement pipeline. TGP will consult with the Kentucky SHPO and conduct these surveys if required. In a letter to the Kentucky SHPO dated March 28, 2016, TGP argued these facilities would not cause permanent adverse impacts on aboveground historic properties because the facilities would be primarily collocated with existing roads and utility corridors or located in agricultural land with little to no tree clearing. TGP recommended no additional architectural surveys for the off-right-of-way tap reconnects were necessary. The Kentucky SHPO has not yet concurred with this recommendation.

Tennessee

TGP proposes construction activities at 3 off-right-of-way tap reconnects (totaling 6.2 acres), 28 workspace locations within existing rights-of-way (totaling 29.1 acres), and 3 yards (totaling 12.4 acres) in the state of Tennessee, listed in appendix I, table I-5.

The original 2013 and 2014 TRC archaeological surveys covered most of the workspaces in Tennessee, except not the entire APE at workspaces TN0160, TN0200, TN0210, TN0220, yard TN-78-002, and yard TN-71-000 (Barrett and McKeighen, 2015b). A pre-contact archaeological site (40DS69), previously recorded in 2000 (Ezell and Wampler, 2001, as cited in Barrett and McKeighen, 2015b), was noted at workspace TN0125. However, TRC did not find evidence of site 40DS69 at workspace TN0125 and speculated that it was destroyed during past activities. The SHPO commented on the TRC survey report for the state of Tennessee (Barrett and McKeighen, 2015b) on March 16, 2015, but did not mention site 40SD69. We agree with TRC that site 40DS69 is not eligible within the APE. No historic architectural sites were identified in the ACRP direct APE (Reeves and Taylor, 2015a).

In a March 24, 2015, email to TRC, Daniel Ragle, the NHPA Section 106 Reviewer for the Choctaw Nation of Oklahoma, indicated that the Project would cross the Trail of Tears and would be close to a historic Choctaw village site. The Trail of Tears National Historic Trail is mapped about 3.5 miles northeast of workspace TN0070 and more than 1 mile north of workspaces TN0340 and TN0350 (June 18, 2015, data response to question 4-57), so construction activities for the ACRP should not affect that trail.

In October 2015, Goodwin conducted an archaeological survey of four workspaces (TN0160, TN0200, TN0210, and TN0210) and three yards (TN-71-000, TN-78-002, and TN-86-003) in Tennessee (Ryan, Munger, et al., 2015). No cultural resources were identified in the direct APE at those locations. Goodwin noted seven historic standing structures in the vicinity of yard TN-86-003: six buildings associated with an existing compressor station, and one barn. Goodwin did not assess the NRHP eligibility of the standing structures, asserting the structures are outside the APE and temporary use of yard TN-86-003 would not permanently adversely affect the structures. Furthermore, Goodwin recommends that use of the yard is consistent with historic and ongoing activities at the adjacent compressor station containing many of the historic structures. On December 3, 2015, the SHPO reviewed Goodwin's addendum survey report (Ryan, Munger, et al., 2015) and stated that it did not identify any NRHP listed or eligible archaeological sites at the locations inspected; we agree.

TGP did not conduct architectural surveys of the indirect APE for off-right-of-way tap reconnects TN0190, TN0200, and TN0210/TN0220. In a letter to the Tennessee SHPO dated March 28, 2016, TGP argued these facilities would not cause permanent adverse impacts on aboveground historic properties because the facilities would be primarily collocated with existing roads and vegetative clearing would be limited. TGP recommended no additional architectural surveys were necessary. The Tennessee SHPO concurred with this recommendation in a letter dated April 27, 2016; we agree with the SHPO.

Mississippi

In Mississippi, TGP proposes construction activities at the MLV 53 replacement pipeline (totaling 9.2 acres), 5 off-right-of-way tap reconnects (totaling 27.5 acres), 27 workspaces within existing rights-of-way (totaling 24.5 acres) and 2 yards (totaling 3.3 acres), listed in appendix I, table I-6.

The February 2015 TRC survey report (Holland et al., 2015a) covered the majority of the workspaces, except for portions of MS0040, MS0160, MS0290, and MS0310. One archaeological site 22QU1048 and one isolated find were found in the direct APE at combined workspaces MS0170 and MS0180 (see table 2.7-3). In its March 24, 2015, review of the TRC archaeological survey report (Holland et al., 2015a), the Mississippi SHPO agreed that site 22QU1048, an historic artifact scatter, is not eligible for the NRHP. We concur, and also conclude that IF#1, a few historic items, found at workspace MS0280, does not qualify for the NRHP.

Table 2.7-3

Archaeological Sites Identified in the Direct or Indirect APEs of Mississippi Workspaces

Workspace Name	County	Site Number and Description	Eligibility Recommendation
MS0170/MS0180	Quitman	22QU1048, historic artifact scatter	Not Eligible
		IF-1, historic isolated find	Not Eligible

One off-right-of-way tap reconnect (MS0040) and one yard (MS-53-002) were surveyed by Goodwin in October 2015. In Goodwin's opinion, the other three workspaces partially inventoried by TRC (MS0160, MS0290, and MS0310) were previously disturbed and should not require additional on-the-ground pedestrian inspections because they have little potential to contain significant archaeological remains (Ryan, Johnson, et al., 2015). On December 17, 2015, the Mississippi SHPO accepted Goodwin's Addendum 2 survey report (Ryan, Johnson, et al., 2015), and concurred that no cultural resources were identified in the areas inspected. We agree.

In August 2015, Goodwin conducted deep testing at ACRP workspaces MS0170, MS0180 and MS0270. Auger holes were dug more than 10 feet deep and the results were negative. Goodwin (2015b) concluded that neither location has the potential for intact deeply buried cultural remains. The Mississippi SHPO accepted the testing report in a letter dated November 19, 2015. We agree with the findings of the SHPO.

TGP has not yet conducted archaeological or architectural surveys of for the MLV 53 replacement pipeline. TGP will consult with the Mississippi SHPO and conduct these surveys if required. TGP has not yet conducted architectural surveys of the indirect APE for off-right-of-way tap reconnects MS0040, MS0110, MS0170, MS0180, MS0200, and MS0280. In a letter to the Mississippi SHPO regarding the off-right-of-way tap reconnects dated March 28, 2016, TGP recommended these architectural surveys were not necessary. According to TGP, these facilities would not cause permanent adverse impacts on aboveground historic properties because the facilities would either be located in agricultural land or in wooded areas but collocated with existing utility corridors and little tree clearing would be required. The Mississippi SHPO has not yet concurred with this recommendation.

Arkansas

In Arkansas, TGP proposes construction activities at three workspace locations within existing rights-of-way, totaling about 2.8 acres, listed in appendix I, table I-7.

Most of these areas were inventoried by TRC between November 2013 and November 2014, except for a portion of workspace AR0030. The February 2015 TRC archaeological survey report (Holland et al., 2015b) recommended deep testing at workspace AR0010 and additional inventory at AR0030. The Arkansas SHPO commented on the TRC report on March 24, 2015. We agree with the findings of the Arkansas SHPO.

On July 24, 2015, Verdanterra submitted Goodwin's testing protocol to the Arkansas SHPO, who accepted the protocol in a letter dated August 26, 2015. Goodwin advised that deep testing should not be performed at workspace AR0010 because of the presence of underground pipelines (Goodwin, 2015c). The Arkansas SHPO accepted the Goodwin report in a letter dated December 4, 2015.

In February 2016, TGP's consultants conducted a review of previous investigations and aerial imagery of facility AR0030. The review concluded that intact archaeological deposits are unlikely in the workspace due to previous disturbance related to pipelines. In a letter to the SHPO dated March 1, 2016, Verdanterra recommended that no additional investigations are necessary at AR0030. The Arkansas SHPO accepted that report in a letter to Verdanterra dated March 7, 2016, and stated that no known historic properties would be affected at that location. We concur.

From its review of previously recorded sites in the Project area, TGP indicated that the Ditch Bayou Battlefield and the Trail of Tears National Historic Trail were in the vicinity of ACRP workspace AR0010. In a January 25, 2016, letter to the Arkansas SHPO, TGP provided a map of the Ditch Bayou Battlefield (also known as the Lake Chicot Battlesite and Old River Lake Battlefield; sites CH3, AR17, and 3CH189), a minor Civil War skirmish, in relation to workspace AR0010. The Arkansas SHPO stated, in a letter to Verdanterra dated March 10, 2016, that site CH3/3CH189 was previously assessed as NRHP eligible. TGP indicated that workspace AR0010 is in a periphery zone, occupies 0.01 percent of the battlefield, and would have no adverse effect on the site. The Arkansas SHPO concurred with this assessment in a letter dated February 26, 2016. On March 14, 2016, TGP filed with FERC a map of the Trail of Tears in Arkansas that showed it more than 20 miles from workspace AR0010. We conclude that activities at workspace AR0010 would have no adverse effects on site CH3/3CH189 (Ditch Bayou Battlefield) and have no impacts on the Trail of Tears National Historic Trail.

Louisiana

In Louisiana, TGP proposes construction activities at 27 workspace areas within existing rights-of-way (totaling about 20.4 acres) and 3 yards (totaling about 7.1 acres), listed in appendix I, table I-8.

TGP documented that all of the construction areas have been inventoried for cultural resources. Twenty-three workspaces were inventoried by TRC between November 2013 and November 2014 (Holland et al., 2015c). Three locations (workspaces LA0200, LA0210, and LA0220) are within the Kisatchie National Forest, and were previously surveyed by other investigators (Moore et al., 2008, as cited in Holland et al., 2015c) with negative results.

The February 2015 TRC survey report identified one archaeological site (16MO26) and two isolated finds within the direct APE in Louisiana (see table 2.7-4). Site 16MO26 is a pre-contact mound originally recorded in 1961. That site was not relocated during TRC's survey of workspace LA0010. Because the portion of site 16MO26 in the direct APE was destroyed by past activities, it was reevaluated by TRC as not eligible for the NRHP. Two historic isolated finds were noted at workspace LA0140, which were also evaluated as not eligible for the NRHP. The SHPO reviewed the TRC survey report (Holland et al., 2015c) in a letter dated March 16, 2015, and agreed that the portion of site 16MO26 within the ACRP direct APE at workspace LA0010 is not eligible for the NRHP. We concur, and also conclude that the two isolated finds at workspace LA140 are not eligible.

Table 2.7-4

Archaeological Sites Identified in the Direct or Indirect APEs of Louisiana Workspaces

Workspace Name	County	Site Number and Description	Eligibility Recommendation
LA0010	Morehouse	16MO26, pre-contact site	Not Eligible
LA0140	Jackson	IF-1, historic isolated find	Not Eligible
		IF-2, historic isolated find	Not Eligible

One workspace (LA0190) and three yards were inventoried by Goodwin in October 2015 (Ryan, McLean, et al., 2015). On December 4, 2015, the Louisiana SHPO reviewed the Goodwin survey report and concurred that no historic properties would be affected at the examined locations. We agree.

In August 2015, Goodwin conducted deep auger testing at workspace LA0050. The auger hole was excavated 10 feet deep, and no cultural resources were discovered (Goodwin, 2015f). The Louisiana SHPO reviewed that testing report in a letter dated November 10, 2015, and stated that no historic properties would be affected at workspace LA0050. We agree.

2.7.3 Unanticipated Discovery Plan

The Project has the potential to impact currently unknown buried archaeological sites not discovered during surveys. To handle the contingency of finding cultural remains during construction, TGP developed state-specific plans for the "Unanticipated Discovery of Cultural Resources and Human Remains" (Discovery Plan) for Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, and Ohio, filed with the Commission on September 30, 2015. TGP provided copies of the Discovery Plans to the SHPO in each state on October 6, 2015. On December 31, 2015, the Ohio SHPO commented on the plan. On October 30, 2015, the Kentucky SHPO commented. The Tennessee SHPO offered comments on the plan in a letter dated October 26, 2015. The Mississippi SHPO concurred with the plan on October 22, 2015. The Arkansas SHPO provided comments on the plan in a letter dated October 20, 2015. The Louisiana SHPO requested changes to the plan in a letter dated October 15, 2015.

TGP provided revised Discovery Plans for each state to the corresponding SHPOs and tribes on March 7, 2016. The Arkansas, Mississippi, and Tennessee SHPOs accepted the revised Discovery Plans in letters dated March 14, 2016, May 17, 2016, and March 16, 2016, respectively. The Louisiana SHPO requested additional revisions to the revised Discovery Plan, after which they accepted the plan in a letter dated May 4, 2016. The Ohio and Kentucky SHPOs have not yet provided comments on the revised Discovery Plans.

2.7.4 Compliance with the National Historic Preservation Act

No traditional cultural properties, sacred sites, aboriginal burials, or objects of cultural patrimony were identified in the APE by the NPS, the Bureau of Indian Affairs, the SHPOs, TGP or its consultants, or any Indian tribes. After consultations with the SHPOs and Indian tribes, FERC concludes that the ACRP would have no effect on sites of traditional, cultural, or religious importance to Indian tribes, and therefore, we have completed compliance with Section 101(d)(6) of the NHPA.

The entire process of compliance with Section 106 of the NHPA has not yet been completed for the ACRP. Additional inventory is required along the new-build pipeline and facilities KY0080, KY0160, and KY0380 in Kentucky. Additional inventory may also be necessary in the indirect APE of Compressor Station 216.5 in Ohio, at the MLV 874 and MLV 53 replacement pipelines in Kentucky and Mississippi, and the indirect APEs of off-right-of-way tap reconnects in Ohio, Kentucky, and Mississippi based on the results of TGP's consultations with the SHPOs in those states. Phase II testing is needed at sites 15CR271 and 15CR281 to determine if these sites are eligible for the NRHP. Only after inventories, testing, and evaluations have been completed could all historic properties in the APE be identified, in consultations with the SHPOs. Once all historic properties are identified in the APE, FERC staff, in consultations with the SHPOs, would then make an assessment of Project effects. If any historic property would be adversely affected, FERC staff would provide the ACHP an opportunity to participate in the resolution of adverse effects, and would develop, in consultations with the SHPOs, an MOA to resolve adverse effects on historic properties that cannot be avoided. The MOA could include the treatment plans, such as those TGP has provided for the Carver Cave Chert Lithic Workshop and Quarry Site proposed archaeological district in Kentucky. To ensure that the Commission is in compliance with Section 106 of the NHPA, **we recommend that:**

- **TGP should not begin construction of facilities and/or use staging, storage, or temporary work areas and new or to-be-improved access roads until:**
  - **a. TGP files with the Secretary:**
    - **i. remaining cultural resources survey reports;**
    - **ii. site evaluation reports, avoidance plans, or treatment plans, as necessary; and**
    - **iii. comments on the reports and plans, including Discovery Plans, from the SHPOs and interested Indian tribes.**
  - **b. The ACHP has been afforded an opportunity to comment if historic properties would be adversely affected.**
  - **c. The FERC staff reviews and the Director of OEP approves all cultural resources reports and plans, and notifies TGP in writing that either treatment measures (including archaeological data recovery) may be implemented 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: "CONTAINS PRIVILEGED INFORMATION - DO NOT RELEASE."

2.8 Air Quality

This section of the EA describes existing air quality, identifies the construction and operating air emissions, describes methods that would be used to achieve compliance with regulatory requirements, and outlines projected air quality impacts for the Project.

Construction and operation of the Project could have an effect on local and regional air quality. Federal and state air quality standards have been designed to protect people and the environment from airborne pollutants. The discussion below focuses primarily on Ohio and Kentucky as new and modified compressor stations and the new-build pipeline would be in those states. Compressor stations would produce virtually all of the Project's operational emissions.

The EPA has established National Ambient Air Quality Standards (NAAQS) for nitrogen oxides (NO_x), carbon monoxide (CO), ozone (O_3), sulfur dioxide (SO_2), lead (Pb), and inhalable particulate matter (PM_{10} and $PM_{2.5}$). PM_{10} and $PM_{2.5}$ include particles with aerodynamic diameters of 10 micrometers or less and 2.5 microns or less, respectively. States are allowed to adopt stricter standards than the NAAQS. Kentucky and Ohio have adopted the NAAQS in addition to establishing their own standards. The NAAQS, Kentucky air quality standards, and Ohio air quality standards are can be found at the EPA and state websites, respectively.[16]

In addition to criteria pollutants, the Project is expected to emit greenhouse gases (GHG), volatile organic compounds (VOC), and hazardous air pollutants (HAP). GHGs are gases that absorb infrared radiation in the atmosphere and the most common anthropogenic GHGs emitted during fossil fuel combustion and natural gas combustion are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). GHG are reported in terms of carbon dioxide equivalents (CO_{2e}) calculated based on the global warming potential of each gas. VOCs are any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate, which participates in atmospheric photochemical reactions, except those designated by EPA as having negligible photochemical reactivity (40 CFR 51.100). HAPs are air pollutants known to cause cancer and other serious health impacts (EPA, 2016b).

Under the Prevention of Significant Deterioration (PSD) regulations in 40 CFR 52.21 (b) (23), special consideration is given to Class I Areas or areas of special national or regional value from a natural, scenic, recreational, or historical perspective. If a new source or major modification of an existing source is subject to the PSD program and within 62 miles (100 kilometers) of a Class I Area, the facility is required to notify the appropriate federal officials, such as EPA, and assess the impacts of the proposed Project on the Class I Area. However, no Class 1 areas are within 62 miles (100 kilometers) of the Project.

2.8.1 Climate

The climate in the Project area is variable because it extends from Ohio to Louisiana. The annual average temperature, January average temperature, and July average temperature vary by between about 5°F and 8°F across the Project area. Annual average total precipitation across the Project area ranges from 38.9 to 45.2 inches. No bodies of water are large or close enough to have any significant effect on the climate. Temperatures above l00°F and below 0°F are relatively rare. Precipitation is relatively even in the winter, spring, and summer, with slightly less precipitation occurring in the fall. Snow is infrequent in the lower elevation areas of the Project and the more southern states and more frequent in the higher elevations and northern states. Drought conditions are not common for the Project area.

2.8.2 Existing Ambient Air Quality and Attainment Status

Measured ambient air pollutant concentration levels are used to determine the status of air quality for a given area. Areas that are at or below the NAAQS are designated as "attainment areas," whereas those areas that are above the NAAQS are designated "nonattainment areas." Those areas lacking data to determine attainment status are referred to as "unclassifiable areas," and are considered to be in attainment. Attainment areas that were once in nonattainment of the NAAQS for a given pollutant are referred to as "maintenance areas" for that pollutant.

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[16] The NAAQS are published at https://www.epa.gov/criteria-air-pollutants/naaqs-table, Kentucky air quality standards at http://www.lrc.ky.gov/kar/401/053/010.htm, and Ohio air quality standards at http://epa.ohio.gov/dapc/DAPCrules.aspx.

Air Quality Control Regions (AQCR) have been established by the EPA in accordance with Section 107 of the Clean Air Act of 1970. The AQCRs are defined as contiguous areas considered to have relatively uniform ambient air quality, and are treated as single geographical units for attainment determination purposes.

Based on ambient air monitoring data in the Project area for the most recent quality-checked 3-year period (2011–2013), all monitored pollutant values are below the respective NAAQS for each pollutant and averaging period for each of the sites and thus are in attainment. Background ambient air quality concentrations from monitoring stations near the Project are provided in the Project environmental resource reports.[17]

2.8.3 Federal, State, and Regional Air Quality Regulations

Operation of the Project would emit air pollutants that are regulated by federal and state rules driven by the Clean Air Act. The EPA is responsible for regulating air quality emissions from the Project. The Kentucky Division of Air Quality is the designated permitting agency for Compressor Stations 110 and 875 and construction of the new-build pipeline; and the Ohio Environmental Protection Agency would be responsible for permitting for Compressor Stations 202.5, 206.5, 211.5, and 216.5.

Title V Operating Permit Program

The Title V Major Source Operating Permit Program (40 CFR 70) is administered by the state or local jurisdiction where the source is located, and the permits are often referred to as Part 70 permits. For facilities in attainment areas, facilities with the potential to emit greater than 100 tons per year (tpy) for any criteria pollutant, 10 tpy for any single HAP, or 25 tpy for total combined HAPs are subject to the Title V program. Title V applies as described below.

- Compressor Station 110 – This existing compressor station is currently a minor Title V facility but would become a major Title V facility after the modifications are applied.
- Compressor Station 875 – This compressor station, approved as part of the Broad Run Expansion Project, would remain a minor Title V facility.
- New Compressor Stations 202.5, 206.5, 211.5, and 216.5 – The emissions for these compressor stations would fall below all major source thresholds and therefore Part 70 permitting is not applicable.

Prevention of Significant Deterioration Requirements

The New Source Review federal regulatory program includes the PSD regulations, which are intended to protect national public health and welfare while preserving the existing air quality in areas where regulated pollutant levels are in compliance with the NAAQS (i.e., attainment areas). For existing major PSD sources, modifications that exceed the PSD significant emissions increase rates are subject to the PSD regulations. For sources like the Project’s compressor stations, a PSD major source is one that emits or has the potential to emit any PSD-regulated pollutant equal to or greater than 250 tpy. For

[17] Available on the FERC eLibrary under Docket No. CP15-88-000. Resource Report 9 was filed under accession number 20150213-5341 on February 13, 2015.

existing sources that are not major PSD sources, a modification is subject to PSD regulation if it results in a major increase in emissions (i.e., greater than 250 tpy in this case). The potential to emit for each of the compressor stations is below the PSD major source threshold. In addition, the emissions increase for the modified existing compressor station is below the PSD major source threshold. Therefore, no PSD review is required.

New Source Performance Standards Requirements

The New Source Performance Standards are set forth by the EPA at 40 CFR 60, Subparts A through OOOO, and each applies to specific sources of air pollution. The relevant subparts are described below.

- Subpart A – Applies to operators of stationary sources, such as the combustion turbines and emergency generators that are subject to the New Source Performance Standards.
- Subpart KKKK – Applies to stationary combustion turbines with peak loads equal to or greater than 10 million British Thermal Units (MMBtu), such as the new turbines proposed for the Project.
- Subpart OOOO – Applies to certain activities at crude oil and natural gas production, transmission, and distribution facilities. Based on the Project and Subpart OOOO applicability criteria, Subpart OOOO may apply to the compressor stations.

National Emissions Standards for Hazardous Air Pollutants

The National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations established in 40 CFR Parts 61 and 63 regulate emission of air toxics. Part 63 NESHAP standards apply primarily to major sources of HAP, though some subparts of Part 63 include non-major area sources. The relevant subparts are described below.

- 40 CFR 61, Subpart M – Applies to Project demolition and/or renovation activities that include asbestos. It is possible that modifications at existing Compressor Stations 875 and 110 may occur at structures that historically included asbestos materials.
- 40 CFR 63, Subpart ZZZZ – Applies to reciprocating internal combustion engines, such as the Project's emergency generators. Because the emergency generators for the Project would comply with 40 CFR 60, Subpart JJJJ, and each compressor station is an area source for Part 63 purposes, compliance with Subpart JJJJ constitutes compliance with Subpart ZZZZ and no further requirements apply under 40 CFR 63, Subpart ZZZZ.

Greenhouse Gas Reporting Rule

Petroleum and natural gas facilities with GHG emissions equal to or greater than 25,000 metric tons of CO_{2e} are required to report GHGs to EPA from various processes within the facility per 40 CFR 98, Subpart W. Because all the existing and new compressor stations potentially could emit CO_{2e} in excess of 25,000 metric tons, they may be subject to this rule. Applicability would be determined after each year of operation by comparing actual emissions or fuel use to the applicability threshold.

General Conformity

Federal actions are subject to the thresholds provided in Subpart B of 40 CFR 93 for determining conformity of these actions to state or federal Implementation Plans. However, these conformity levels apply to nonattainment areas and maintenance areas. The Project would be in attainment areas, thus it would not be subject to General Conformity.

State of Kentucky

For the modifications to the new and existing compressor stations in Kentucky, portions of the following state requirements would potentially apply:

- 401 KAR Chapter 50 – Division for Air Quality; General Administrative Procedures;
- 401 KAR Chapter 51 – Attainment and Maintenance of the NAAQS;
- 401 KAR Chapter 52 – Permits, Registrations, and Prohibitory Rules (including the State Only permit);
- 401 KAR Chapter 53 – Ambient Air Quality;
- 401 KAR Chapter 57 – Hazardous Pollutants (40 CFR 61);
- 401 KAR Chapter 58 – Asbestos;
- 401 KAR Chapter 59 – New Source Standards;
- 401 KAR Chapter 60 – New Source Performance Standards;
- 401 KAR Chapter 61 – Existing Source Standards (Existing Equipment Only); and
- 401 KAR Chapter 63 – General Standards of Performance – NESHAPs.

State of Ohio

For the proposed compressor stations in Ohio, relevant state requirements would include:

- OAC 3745-17-08 Restriction of Emissions of Fugitive Dust – Requires dust suppressants for fugitive dust control from construction and demolition;
- OAC 3745-31 Applicability, Requirements, and Obligations – Permit to Install and Operate combustion turbines and Permit by Rule for each emergency generator;
- OAC 3745-31-05(A)(3) Employ Best Available Technology – Compliance with 40 CFR 60, Subpart KKKK, ensures that the Best Available Technology would be achieved;
- OAC 3745-17-07 Control of Visible Particulate Emissions from Stationary Sources – Limits the Project to 20 percent opacity on a 6-minute average, from any stack;
- OAC 3745-17-10 – Restrictions on Particulate Emissions from Fuel Burning Equipment – Limits PM emissions for combustion turbines and emergency generators to 0.02 and 0.04 lb/MMBtu, respectively;
- OAC 3745-18-06 Sulfur Dioxide Regulations General Emission Limit Provisions – Limits SO_2 to 0.5 lb/MMBtu; and
- OAC 3745-21-07 Carbon Monoxide, Ozone, Hydrocarbon Air Quality Standards, and Related Emissions Requirements Control of Emissions of Organic Materials from Stationary Sources – Control requirements for emissions of organic compounds at stationary sources.

2.8.4 Construction Emissions and Impacts

A temporary impact on ambient air quality from construction emissions and fugitive dust may result from the Project. Emissions would result from use of fossil-fueled construction equipment. In general, these emissions would be classified as temporary, localized, and insignificant. Emissions of PM_{10} and $PM_{2.5}$ during construction would represent the majority of air emissions, primarily in the form of fugitive dust. Fugitive dust would result from land clearing, grading, excavation, concrete work, and vehicle traffic on paved and unpaved roads. Emissions would be variable, but would be greater during dry periods and in areas of fine-textured soils subject to surface activity.

The emission factors used in the construction emission calculations are from MOVES2010 (EPA, 2010), EPA-published AP-42 data (EPA, 2014a), and, where appropriate, the most up-to-date formulation from NONROAD2008 (EPA, 2014b). At Compressor Station 875, construction emissions associated with the Broad Run Project are included in these construction estimates. Table 2.8-1 provides a summary of emissions estimates for the 2017 year of construction emissions (considered worst case for the Project) by AQCR. Construction emissions, for instance, would generate a total of 11,102 tons of CO_{2e} of GHGs.

Table 2.8-1

Project Emissions from Construction by Facility and Air Quality Control Region

	Total Site Emissions (tons/year)						
Facility (AQCR)	**NO_x**	**VOC**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**GHG**
New-build Pipeline & CS 110 (Huntington, WV – Ashland, KY – Portsmouth-Ironton, OH Interstate AQCR)	6.5	1.38	10.06	0.021	39.44	4.46	2,200
CS 875 (Bluegrass Intrastate AQCR)	33.0	3.4	18.1	0.04	68.8	9.5	2,202
CS 202.5 (Wilmington-Chillicothe-Logan Intrastate AQCR)	1.62	0.71	2.30	0.007	7.63	0.88	687
CS 206.5 (Parkersburg-Marietta Interstate AQCR)	1.62	0.71	2.30	0.007	7.63	0.88	687
CS 211.5 (Zanesville-Cambridge Intrastate AQCR)	1.62	0.71	2.30	0.007	7.63	0.88	687
CS 216.5 (Northwest Pennsylvania-Youngstown Interstate AQCR)	1.62	0.71	2.30	0.007	7.63	0.88	687
Off-right-of-way Tap Reconnects	12.28	1.85	25.79	0.037	20.01	2.86	2,840
Replacement Pipelines	4.93	1.56	22.21	0.08	3.67	0.63	1,112

2.8.5 Operation Emissions and Impacts

Operational emissions from the Project would permanently impact ambient air quality. As detailed in section 1.5, new facilities for the Project consist of a new-build pipeline, modifications at two compressor stations, and construction of four new compressor stations. Generally, operational Project air quality emissions would result from new natural gas fired reciprocating engines and emergency generators, and negligible emissions would result from ancillary equipment. Operational impacts are not anticipated from the new-build pipeline, the off-right-of-way tap reconnects, the replacement pipelines, or other abandonment activities. At Compressor Station 875, operational emissions associated with the Broad Run Project are included in these estimates.

Dispersion modeling, using the EPA's AERMOD model, was conducted for the new and modified emissions sources. The dispersion modeling effort was not performed for SO_2 or PM_{10}. Because of the use of natural gas fuel and the low resulting SO_2 and Pb emissions, the impact of the Project on SO_2 and Pb concentrations was assumed to be negligible. Additionally, because the $PM_{2.5}$ standard is more stringent than the PM_{10} standard, modeled compliance for $PM_{2.5}$ demonstrates modeled compliance for PM_{10}. A summary of the maximum, or worst case, modeled impacts for nitrogen dioxide (NO_2), $PM_{2.5}$, and CO is shown in table 2.8-2 for each of the compressor stations.

As table 2.8-2 shows, operational emissions from the Project would be well below the NAAQS, and table 2.8-3 provides the annual estimate of emissions for each compressor station.

Table 2.8-2

Emissions from Project Operation by Facility and Air Quality Control Region

			Total Site Emissions (tons/year)			
Facility ID, (AQCR)	**Pollutant**	**Averaging Period**	**Background Monitor Concentration (µg/m3)**	**Modeled NAAQS Impact (µg/m3)**	**Total (µg/m3)**	**NAAQS (µg/m3)**
CS 110 (Huntington, WV – Ashland, KY – Portsmouth-Ironton, OH Interstate AQCR)	NO_2	Annual	15.7	1.220	16.7	100
		1-Hour	85.2	77.32	163	188
	$PM_{2.5}$	Annual	8.13	0.111	8.25	12
		24-Hour	17.3	0.655	18.0	35
	CO	8-Hour	1,145	24.33	1,167	10,000
		1-Hour	1,718	75.94	1,794	40,000
CS 875 (Bluegrass Intrastate AQCR)	NO_2	Annual	15.7	0.9	16.6	100
		1-Hour	85.2	33.9	119.1	188
	$PM_{2.5}$	Annual	8.7	0.06	8.8	12
		24-Hour	19.0	0.6	19.6	35
	CO	8-Hour	2,176	21.7	2,198	10,000
		1-Hour	3,321	38.4	3,359	40,000
CS 202.5 (Wilmington-Chillicothe-Logan Intrastate AQCR)	NO_2	Annual	8.5	0.066	8.6	100
		1-Hour	56.4	1.519	57.9	188
	$PM_{2.5}$	Annual	10.3	0.01	10.3	12
		24-Hour	21.0	0.042	21.0	35
	CO	8-Hour	1,489	1.158	1,490	10,000
		1-Hour	2,634	4.178	2,638	40,000
CS 206.5 (Parkersburg-Marietta Interstate AQCR)	NO_2	Annual	18.3	0.074	18.4	100
		1-Hour	66.4	2.061	68.5	188
	$PM_{2.5}$	Annual	8.5	0.011	8.5	12
		24-Hour	17.0	0.048	17.0	35
	CO	8-Hour	1,832	1.813	1,834	10,000
		1-Hour	2,405	7.15	2,412	40,000
CS 211.5 (Zanesville-Cambridge Intrastate AQCR)	NO2	Annual	19.1	0.072	19.2	100
		1-Hour	73.3	9.089	82.4	188
	$PM_{2.5}$	Annual	10.8	0.008	10.8	12
		24-Hour	23.3	0.092	23.4	35
	CO	8-Hour	1,832	7.27	1,839	10,000
		1-Hour	2,405	21.045	2,426	40,000
CS 216.5 (Northwest Pennsylvania-Youngstown Interstate AQCR)	NO_2	Annual	19.1	0.034	19.1	100
		1-Hour	73.3	1.769	75.2	188
	$PM_{2.5}$	Annual	10.4	0.005	10.4	12
		24-Hour	22.7	0.034	22.7	35
	CO	8-Hour	1,832	2.069	1,834	10,000
		1-Hour	2,748	6.042	2,754	40,000

Table 2.8-3

Project Emissions from Operation by Facility

Facility (County, State)	Existing/ Proposed Source	Total Site Emissions (tons/year) NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	GHGs	HAPs
CS 110 (Rowan County, OH)	Existing [a]	4.24	0.07	0.22	<0.01	0.02	0.02	100	0.03
	Proposed + Existing	107.83	8.15	106.98	3.74	7.31	7.31	130,292	1.38
CS 875 (Madison County, OH)	Existing [b]	53.7	7.51	57.3	2.26	3.38	3.38	66,534	1.32
	Proposed + Existing	88.9	10.12	91.8	3.54	5.87	5.87	111,062	1.74
CS 202.5 (Jackson County, OH)	Proposed	38.45	6.51	70.71	2.26	4.44	4.44	79,200	1.2
CS 206.5 (Morgan County, OH)	Proposed	38.45	6.51	70.71	2.26	4.44	4.44	79,200	1.2
CS 211.5 (Tuscarawas County, OH)	Proposed	38.45	6.51	70.71	2.26	4.44	4.44	79,200	1.2
CS 216.5 (Mahoning County, OH)	Proposed	38.45	6.51	70.71	2.26	4.44	4.44	79,200	1.2

a The existing turbines at Compressor Station 110 are electrically driven.

b Compressor Station 875 has been approved and will be built as part of the Broad Run Expansion Project.

Small amounts of air emissions, including fugitive emissions, would be associated with each compressor station's condensate tank, pig launcher/receiver, and blowdowns (see section 2.9.3 for a description of blowdowns). Table 2.8-4 provides a summary of these emissions for each compressor station. These emissions when added to those provided in table 2.8-2 are well below the NAAQS and therefore would not pose a health risk to the public. Total operational GHG emissions would be 630,475 tons per year of CO_{2e}. Impacts from GHG emissions (climate change) are discussed in more detail in section 2.11.3.

Table 2.8-4

Operational Emissions from Condensate Tanks, Blowdowns, and Pig Launchers/Receivers by Facility and Air Quality Control Region

Facility ID, (AQCR)	Total Site Emissions (tons/year) VOC	HAPS	GHG
CS 110 (Huntington, WV – Ashland, KY – Portsmouth-Ironton, OH Interstate AQCR)	0.57	0.02	1,579.7
CS 875 (Bluegrass Intrastate AQCR)	0.51	0.02	821.4
CS 202.5 (Wilmington-Chillicothe-Logan Intrastate AQCR)	0.51	0.02	821.4
CS 206.5 (Parkersburg-Marietta Interstate AQCR)	0.51	0.02	821.4
CS 211.5 (Zanesville-Cambridge Intrastate AQCR)	0.51	0.02	821.4
CS 216.5 (Northwest Pennsylvania-Youngstown Interstate AQCR)	0.51	0.02	821.4

2.8.6 Air Quality Mitigation Measures

TGP has committed to mitigate impacts on ambient air quality from Project construction and operational emissions by:

- equipping each compressor station turbine with $SoLoNO_x^{TM}$ (a lean-premixed combustion technology that ensures uniform air/fuel mixture and prevents formation of regulated pollutants) to reduce NO_x emissions; and
- maintaining construction equipment and vehicles according to equipment manufacturers' specifications and complying with applicable standards and state permitting requirements to reduce emissions.

2.8.7 Air Quality Conclusion

Construction of the Project would result in temporary increases in emissions and fugitive dust from the use of fossil-fueled construction equipment. Construction emissions would not result in a significant impact on local or regional air quality.

Operation of the ACRP would result in permanent increases in emissions. However, these operational emissions would be well below the NAAQS.

2.9 Noise

Construction and operational noise from the Project would affect the local environment. Federal regulatory agencies typically assess noise impacts using two sound metrics: the equivalent sound level (L_{eq}) and the day-night sound level (L_{dn}). The energy of noise is measured in decibels (dB). The units presented for all sound levels in this section are decibels on the A-weighted scale (dBA), which filters noise frequencies to characterize the human ear's response to sound. Typically, normal human hearing can detect a 3 dBA change in sound levels, with a 6 dBA change being readily noticeable. Humans perceive a 9 dBA change in noise level as an approximate doubling or halving of noise level. The L_{eq} is the energy averaged sound level for a given period of time (e.g., hourly). An L_{dn} is also time averaged, but sound levels occurring during nighttime hours (i.e., 10:00 PM to 7:00 AM) incur a penalty of an additional 10 dBA to account for greater sensitivity to nighttime noise, such as sleep disturbance, during these times. An L_{dn} of 55 dBA is equivalent to a continuous L_{eq} noise level of 48.6 dBA.

We received comments during scoping relating to construction and operational noise from the Project, specifically relating to Compressor Station 875 and the new 7.6-mile pipeline. These comments voiced concerns that operational noise from the Project, and to a lesser extent, construction of the Project, would substantially change the acoustic environment. Concerns were related to proximity of the compressor stations to residences and disruptions to peace and tranquility common to the rural areas of the Project. One commenter noted that a ravine could increase noise at a residence within 0.5 mile of Compressor Station 875. As described in the following sections, the expected sound levels from the operation of the compressor stations were modeled using a three-dimensional model, Computer Aided Noise Abatement (CadnaA), which takes into account ground topography, vegetative cover, structures, and other features.

2.9.1 Regulatory Requirements for Noise and Vibration

In 1974, the EPA published Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA, 1974). This publication evaluates the effects of environmental noise with respect to health and safety. The document provides information for state and local governments to use in developing their own ambient noise standards. The EPA has determined that in order to protect the public from activity interference and annoyance outdoors in residential areas, noise levels should not exceed an L_{dn} of 55 dBA. We have adopted this criterion for the Project.

In addition, Commission regulations at 18 CFR 380.12(k)(4)(v)(B) require that operation of compressor stations may not result in any perceptible increase in vibration at any noise-sensitive area (NSA).

Neither Ohio nor Kentucky has state noise regulations that would apply to the Project. Tennessee and Mississippi also do not have applicable state noise regulations.

Jackson, Ohio, where Compressor Station 202.5 would be located, has a nuisance noise ordinance (Resolution 96-530) prohibiting noise disturbance; however, this noise ordinance does not prescribe numerical noise level limits. Therefore, the FERC guideline of 55 dBA L_{dn} would be the controlling limit. The Town of Richmond, Kentucky (MLV 874), has a noise ordinance that restricts construction activities (Section 98.03 of the town code). This ordinance restricts the use of equipment or tools for construction between 10:00 p.m. and 7:00 a.m. and would apply to the portions of the replacement pipeline at MLV 874 (segment 5 and portions of segments 4 and 6) that fall within the Town of Richmond limits. No other local noise ordinances would be applicable to the Project.

2.9.2 Construction Noise and Vibration Impacts

Construction of the Project would result in temporary localized elevated noise levels from the use of heavy construction equipment. The primary construction effort would include construction of the new-build pipeline, compressor stations, off-right-of-way tap reconnects, and replacement pipelines. The land use in the vicinity of the compressor stations and pipeline is detailed in section 2.5.1.

For the compressor stations, six phases, or activities, would typically be required for construction of the compressor stations: preparation of the site, excavation, placement of foundations, gas-handling and piping installation, erection of buildings, and site cleanup. Construction of the pipelines and compressor station modifications would last about 2 years. Predictions of construction noise from the Project were completed by implementing a mix of construction equipment ranging from pickup trucks (55 dBA maximum instantaneous sound level [L_{max}]) to graders (85 dBA L_{max}). Table 2.9-1 presents the composite construction noise levels for each construction phase. The calculations are based on the worst-case construction noise level associated with the earth-moving and -clearing phase of the Project and use sound source data ranging from 65 to 85 dBA L_{max} at 50 feet.

Table 2.9-1

Compressor Station Construction Phase Noise Levels

Construction Phase	Noise Level at 50 feet (dBA L_{max})
Site Clearing	84
Excavation	89
Foundations	77
Building Construction	84
Finishing	89

Table 2.9-2 provides the predicted construction noise levels at the NSA nearest to each compressor station. The calculations assume that sound attenuates as it typically does due to geometric spreading, which equates to 6 dBA per doubling of distance. The analysis also assumes that additional attenuation would occur from atmospheric effects, a reduction of about 2 dBA. Maps showing the NSA locations are provided in appendix G.

Table 2.9-2

Predicted Project Compressor Station Construction Noise Levels

Compressor Station	Distance (feet) and Direction to Nearest NSA	Existing Daytime (dBA L_{eq})	Construction Phase Noise Level (dBA L_{max})				
			Site Clearing	Excavation	Foundations	Building Construction	Finishing
CS 875	1,300/W	45.8	54	59	47	54	59
CS 110	1,400/NE	54.0	53	58	46	53	58
CS 202.5	1,800/NE	41.3	50	55	43	50	55
CS 206.5	1,900/W	39.9	58	53	51	58	53
CS 211.5	1,400/E	49.3	53	58	46	53	58
CS 216.5	1,000/S	62.7	57	62	50	57	62

For the new-build pipeline, the off-right-of-way tap reconnects, and the replacement pipelines, construction noise would be similar. Generally construction noise would include the four phases provided in table 2.9-3. NSAs are located within 1,000 feet of the pipeline, off-right-of-way tap reconnects, and replacement pipelines, with some as close as 100 feet. Sound levels ranging from 50 to 1,000 feet for each phase of construction are provided in table 2.9-3.

Table 2.9-3

Pipeline Construction Phase Noise Levels [a]

Construction Phase	Noise Level (dBA L_{max})				
	50 feet	100 feet	250 feet	500 feet	1,000 feet
Excavation	84	78	70	64	57
Pipe Laying	84	78	70	64	57
Backfilling	83	77	69	63	56
Restoration	81	75	67	61	54

a Pipelines include new-build pipeline, off-right-of-way tap reconnects, and replacement pipelines.

Temporary increases in noise levels from construction are predicted to be perceptible at nearby NSAs, but would be partially mitigated if construction is conducted during daytime hours to the extent practicable. Additionally, TGP has committed to keep construction equipment in good working order and functioning in accordance with manufacturers' specifications. Because construction noise is temporary, localized, and would cease once the Project is constructed, we conclude there would be no significant impact from construction noise associated with the Project.

2.9.3 Operation Noise and Vibration Impacts

Three-dimensional acoustic models using the CadnaA program implementing ISO 9613-2:1996, Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation (ISO, 1996) were used to analyze potential operational noise impacts at NSAs in the vicinity of the compressor stations. Noise from operation of the new-build pipeline would be negligible and was not calculated because it would not exceed the FERC criterion.

TGP conducted pre-construction sound surveys and estimated operational sound levels at nearby NSAs. Sound levels attributed to operation of the existing modified and new compressor stations are provided in table 2.9-4. The estimated noise impacts for the compressor stations incorporate mitigation measures. TGP would install the turbines and turbine-driven compressors within acoustically designed buildings and incorporate typical or custom exhaust silencers. Acoustically treated ventilation louvers would be installed at Compressor Stations 875, 110, and 206.5. Aboveground piping would include lagging, which is a composite material used to reduce flow noise levels in pipes. TGP would install low-noise lube oil coolers at Compressor Stations 875 and 110, and a low-noise gas cooler at Compressor Station 206.5.

Table 2.9-4

Locations of Nearest Noise Sensitive Areas and Estimated Noise Levels from Operation of the Project

Compressor Station	Distance (feet) and Direction of NSA to Site Center	Existing Ambient L_{dn} (dBA)	Compressor Station Operating [a] L_{dn} (dBA)	Compressor Station plus Ambient L_{dn} (dBA)	Increase in Ambient Noise Level (dB)
CS 875	1,300/W	52.3	49.9	54.3	2.0
CS 110	1,400/NE	59.8	53.2	60.7	0.9
CS 202.5	1,800/NE	41.6	44.5	46.4	4.7
CS 206.5	1,900/W	47.1	54.1	54.9	7.8
CS 211.5	1,400/E	55.4	52.5	57.2	1.8
CS 216.5	1,000/S	63.8	52.9	64.1	0.3

a Values reported for Compressor Station 875 include equipment that would be installed as part of the Broad Run Expansion Project. For Compressor Station 875 and existing Compressor Station 110, sound levels were captured in the ambient measurements, and the operational noise levels represent only the equipment that would be associated with the ACRP. Compressor Station 110 includes legacy equipment installed before 2002.

The new equipment that would be installed at the existing stations and the new compressor stations has been designed to comply with FERC regulatory limits. The operational acoustic emissions analyzed for the Project are for new equipment only, and legacy equipment at the existing compressor stations would continue to operate as currently configured. Additionally, increases in sound levels at Compressor Station 110 resulting from operation of the Project would be less than 5 dBA, which is generally considered the point at which a readily noticeable change to the acoustic environment occurs. NSAs near Compressor Stations 202.5 and 206.5 would experience changes in sound levels relative to the existing environment that would be greater than 3 dBA, which is generally the point at which humans can notice such a change. At NSAs near the other compressor stations, changes in sound levels resulting from the Project would be less than 3 dBA, which is not perceptible to average human hearing.

Based on the noise analysis above, noise levels attributable to operation of the Project would be less than 55 dBA L_{dn} at all of the NSAs. To ensure that the noise from the new compressor stations does not exceed an L_{dn} of 55 dBA at the nearest NSAs, **we recommend that**:

- **TGP should file noise surveys with the Secretary <u>no later than 60 days</u> after placing Compressor Stations 202.5, 206.5, 211.5, and 216.5 in service. If a full load condition noise survey is not possible, TGP should provide an interim survey at the maximum possible horsepower load and provide the full load survey <u>within 6 months</u>. If the noise attributable to the operation of all of the equipment at**

Compressor Stations 202.5, 206.5, 211.5, and 216.5 under interim or full horsepower load conditions exceeds an L_{dn} of 55 dBA at any nearby NSAs, TGP should file a report on what changes are needed and should install the additional noise controls to meet the level within 1 year of the in-service date. TGP should confirm compliance with the above requirement by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.

Based on the noise analysis above, noise levels attributable to operation of the Project would be less than 55 dBA L_{dn} at all of the NSAs. To ensure that the noise from existing Compressor Stations 110 and 875, after modification, does not exceed an L_{dn} of 55 dBA at the nearest NSAs, **we recommend that:**

- **TGP should file noise surveys with the Secretary no later than 60 days after placing the authorized units at Compressor Stations 110 and 875 in service. If a full load condition noise survey is not possible, TGP 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 the new/modified units at Compressor Stations 110 and 875 at interim or full load exceeds an L_{dn} of 55 dBA at any nearby NSAs, TGP should install additional noise controls to meet that level within 6 months of the in-service date. TGP should 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.**

If any of the compressor stations have extended periods of inactivity, periodic blowdown events may be required. Blowdown events are procedures used to release pressure in the compressor casing and unit piping in a controlled manner. These events would each last for about 1 minute and would be mitigated by using a blowdown silencer designed to limit the sound levels to 55 dBA L_{eq} or less. Table 2.9-5 provides the predicted blowdown sound levels at NSAs. Because TGP would implement the silencer, and because the blowdown events would last for a relatively short duration, the accompanying sound levels would have little effect on the L_{dn} at any given NSA.

Table 2.9-5

Predicted Received Blowdown Sound Levels at Noise Sensitive Areas

Compressor Station	Distance and Direction of NSA to Compressor Building (feet)	Estimated Contribution of Blowdown (dBA L_{eq})
CS 875	1,300/W	67.5
CS 110	1,400/NE	67.6
CS 202.5	1,800/NE	63.7
CS 206.5	1,900/W	71.4
CS 211.5	1,400/E	66.7
CS 216.5	1,000/S	71.2

Based on the noise analyses above and our recommendations, we conclude that operation of the Project would not have a significant impact on the noise environment in the vicinity of the Project.

2.10 Reliability and Safety

The pressurization of natural gas at a compressor station and the transportation of natural gas by pipeline involve some risk to the public in the event of an accident and subsequent release of gas. The greatest hazard is a fire or explosion following a leak or rupture at a compressor station or a major pipeline rupture.

Methane, the primary component of natural gas, is colorless, odorless, and tasteless. It is not toxic, but is classified as a simple asphyxiate, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death. Methane has an auto-ignition temperature of 1,000 °F and is flammable at concentrations between 5 and 15 percent methane by volume. Unconfined mixtures of methane in air are not generally explosive. Methane is buoyant at atmospheric temperatures and disperses rapidly in air.

2.10.1 Safety Standards

The DOT is mandated to prescribe minimum safety standards to protect against risks posed by pipeline facilities under 49 U.S.C. Chapter 601. The DOT's PHMSA administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. It develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards that set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety. PHMSA's safety mission is to ensure that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at federal, state, and local levels. The DOT pipeline standards are published in 49 CFR 190–199. Part 192 specifically addresses natural gas pipeline safety issues.

Section 5(a) of the Natural Gas Pipeline Safety Act provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing the federal standards, while Section 5(b) permits a state agency that does not qualify under Section 5(a) to perform certain inspection and monitoring functions. A state may also act as DOT's agent to inspect interstate facilities within its boundaries; however, the DOT is responsible for enforcement action. The states of Ohio, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana have been authorized by PHMSA under Section 5(a) to assume all aspects of the safety program for intrastate facilities. Ohio, among other states, has been authorized by PHMSA to act as an interstate agent on behalf of the federal government. In this role, state personnel inspect interstate pipelines and submit reports to PHMSA, which carries out compliance and enforcement action as necessary.

Under a *Memorandum of Understanding on Natural Gas Transportation Facilities* 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 the FERC regulations require that an applicant certify that it will design, install, inspect, test, construct, operate, replace, and maintain the facility for which a Certificate is requested in accordance with federal safety standards and plans for maintenance and inspection. Alternatively, an applicant must certify that it has been granted a waiver of the requirements of the safety standards by the 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 MOU to promptly alert the DOT. The MOU also provides for referring, to the Commission, 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 pipeline and aboveground facilities associated with the Project must be designed, constructed, operated, and maintained in accordance with the DOT Minimum Federal Safety Standards in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. The DOT specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion.

The DOT also defines area classifications, based on population density in the vicinity of the pipeline, and specifies more rigorous safety requirements for populated areas. The class location unit is an area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipeline. The four area classifications are defined below:

- Class 1 – location with 10 or fewer buildings intended for human occupancy;
- Class 2 – location with more than 10 but less than 46 buildings intended for human occupancy;
- Class 3 – location with 46 or more buildings intended for human occupancy or where the pipeline lies within 100 yards of any building, or small well-defined outside area occupied by 20 or more people on at least 5 days per week for 10 weeks in any 12-month period; and
- Class 4 – location where buildings with four or more stories aboveground are prevalent.

Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. For instance, pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil and 18 inches in consolidated rock. Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 36 inches in normal soil and 24 inches in consolidated rock.

Class locations also specify the maximum distance to a sectionalizing block valve (e.g., 10.0 miles in Class 1, 7.5 miles in Class 2, 4.2 miles in Class 3, and 2.5 miles in Class 4). Pipe wall thickness and pipeline design pressures, hydrostatic test pressures, MAOP, inspection and testing of welds, and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas. Preliminary class locations for the Project have been determined based on the relationship of the pipeline centerline to other nearby structures and manmade features.

The new-build pipeline would be constructed entirely in Class 1 areas. Over the life of the pipeline, TGP would monitor population changes in the vicinity of the pipeline. If a subsequent increase in population density adjacent to the right-of-way results in a change in class location for the pipeline, TGP would reduce the MAOP or replace the segment with pipe of sufficient grade and wall thickness if required, to comply with the DOT requirements for the new class location.

The replacement pipelines would cross 0.03 mile of Class 1 areas and 2.5 miles of Class 3 areas, as shown in table 2.10-1. The purpose of the replacement pipelines is to replace existing pipeline with pipe of sufficient grade and wall thickness to comply with the DOT requirements for Class 3 locations.

Table 2.10-1

Class Locations for Replacement Pipelines

Workspace ID	Length (miles)	Class
MLV 53 Replacement Pipeline	<0.1	Class 1
MLV 53 Replacement Pipeline	1.0	Class 3
MLV 874 Replacement Pipeline	1.5	Class 3

The off-right-of-way tap reconnects would be constructed through 3.9 miles of Class 1 and 2.3 miles of Class 2 areas, as shown in table 2.10-2.

Table 2.10-2

Class Locations for Off-right-of-way Tap Reconnects

Workspace ID	Length (miles)	Class
OH0030	0.2	Class 1
OH0110	0.8	Class 1
TN0190	0.2	Class 1
TN0200	0.1	Class 1
TN0210/0220	0.2	Class 1
KY0080	1.7	Class 2
KY0170	0.5	Class 2
MS0040	1.1	Class 1
MS0110	0.1	Class 2
MS0170	0.5	Class 1
MS0200	0.3	Class 1
MS0280	0.5	Class 1

TGP would incorporate the Project into its existing gas monitoring and control systems. TGP would maintain a monitoring system that includes a gas control center in Houston, Texas, that monitors system pressures, flows, and customer deliveries on its entire system. The center is staffed 24 hours per day, 7 days per week, and 365 days per year.

We received comments expressing concern about the safety of high pressure gas pipelines. Commenters expressed concerns about exposed and corroded pipelines seen in Tennessee, Kinder Morgan’s safety record, and the potential for failure or explosion based on increased pressure in existing older pipelines following construction of the Project. TGP states that the proposed abandonment associated with the ACRP would result in certain segments of pipeline operating at higher pressures and other segments operating at lower pressures. However, the higher pressures would not exceed the MAOP as regulated by PHMSA in 49 CFR 192. The pipeline segments that would operate at lower pressure following the abandonment would not fall below any required minimum operating pressures or minimum contractual pressure obligations. Before beginning operation of the four new compressor stations (202.5, 206.5, 211.5, and 216.5) and the three existing compressor stations that would be reversed under Section 2.55(a) as appurtenant facilities (Compressor Stations 47, 54, and 87), TGP would conduct a detailed records review of the design, construction, and testing of each pipeline immediately downstream of the stations following PHMSA criteria.

As described in section 2.1.2, TGP proposes activities at existing compressor stations where TGP completed remediation of PCB contamination and residual PCBs may remain. Therefore, **we recommend that**:

- **Prior to any abandonment activities at existing compressor stations, TGP should file the following information with the Secretary for review and written approval by the Director of OEP:**
  - **a. identification of any equipment, including compressor units and piping, proposed for abandonment that may be contaminated with PCBs;**
  - **b. verification that the appropriate PCB testing would be conducted on this equipment, and discussion of how any abandoned PCB-contaminated facilities would be properly disposed of; and**
  - **c. measures to be implemented to provide adequate worker safety for handling PCB-contaminated materials.**

Older compressor station piping and associated pipeline tie-ins could have been coated with asphalt material that may also contain asbestos. Such asbestos-containing materials (ACM) may be present on the facilities proposed to be abandoned at the existing compressor stations. ACMs may also have been used in insulation materials in and around compressors. TGP has not identified measures it would take to identify facilities to be abandoned that may have ACMs, or provide for the proper disposal of any ACM containing facilities. Therefore, **we recommend that**:

- **Prior to any abandonment or construction activities at existing compressor stations, TGP should file the following information with the Secretary for review and written approval by the Director of OEP:**
  - **a. identification of any known facilities to be abandoned or disturbed having ACMs;**
  - **b. protocols to comply with the appropriate requirements to identify ACMs that might be encountered;**
  - **c. if facilities with ACMs would be abandoned or disturbed, methods to separate the ACMs for proper disposal; and**
  - **d. protocols for worker protection and proper disposal of ACMs.**

2.10.2 Impact on Public Safety

As stated above, TGP would comply with DOT pipeline safety standards as well as regular monitoring and testing of the pipeline.

The available data show that natural gas transmission pipelines continue to be a safe, reliable means of energy transportation. From 1995 to 2014, there were an average of 63 significant incidents, 10 injuries, and two fatalities per year. The number of significant incidents over the more than 300,000 miles of natural gas transmission lines indicates that the risk is low for an incident at any given location. With strict observance of the pipeline safety rules and implementation of our recommendations, we conclude that operation of the Project would not represent a significant safety hazard and result in a slight increase in risk to the nearby public.

2.11 Cumulative Impacts

2.11.1 Introduction

In accordance with NEPA, we identified other actions near the Project and evaluated the potential for a cumulative impact on the environment. As defined by the CEQ, a cumulative effect is "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency…or person undertakes such other actions" (40 CFR 1508.7). CEQ guidance states that an adequate cumulative effects analysis may be conducted "by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions" (CEQ, 2005). In this analysis, we consider the impacts of past projects in the geographic scope as part of the affected environment (environmental baseline) that was described and evaluated in the preceding environmental analysis. However, present effects of past actions that are relevant and useful are also considered.

Consistent with CEQ guidance and to determine cumulative impacts, we expanded the geographic boundaries of our review into a geographic scope for each affected resource, as described below. Actions outside of the geographic scope are generally not evaluated because their potential to contribute to a cumulative impact diminishes with increasing distance from the Project.

In addition to the geographic relationship between the ACRP and other projects in the area, we also considered the temporal relationship. We considered other projects that were recently constructed (within about the last 2 years) and placed into service in the geographic scope, and reasonably foreseeable projects that may be authorized in the near future and could be constructed at about the same time period as the ACRP. Construction and restoration for the ACRP is expected to take about 2 years to complete. If the Commission were to authorize the Project, and if construction were to begin in 2017, we anticipate that work would be completed in 2019. Therefore, this cumulative impact analysis considers current and other reasonably foreseeable projects that may be constructed within the geographic scope of analysis through about 2019.

As described in the environmental analysis section of this EA, constructing and operating the Project would temporarily and permanently impact the environment. The Project would affect soils, water resources, vegetation, wetlands, wildlife, cultural resources, visual resources, air quality, noise, and some land uses. However, we conclude that these impacts would not be significant. We also conclude that nearly all of the Project-related impacts would be contained within or adjacent to the temporary construction right-of-way and ATWS. In addition, the abandonment work would occur within the existing right-of-way, and the replacement pipelines are almost entirely collocated in an existing pipeline right-of-way. Based on these conclusions and determinations, implementation of FERC's Plan and Procedures, and TGP's adherence to our recommendations, we conclude that the impacts of the Project would be highly localized.

Furthermore, the impacts of the Project would contribute only incrementally to a cumulative impact in the geographic scope. As a result, the scope of our analysis is consistent with the magnitude of the aforementioned environmental impacts. We determined that the Project would not contribute discernable cumulative impacts on groundwater and geological resources. Cumulative impacts on soils, surface water resources, vegetation and wildlife, land use, visual resources, cultural resources, socioeconomics, air quality, and noise could occur and are discussed further.

Based on the impacts of the ACRP as identified and described in this EA and consistent with CEQ guidance, we have determined that the following resource-specific geographic scopes are appropriate to assess cumulative impacts:

- **Soils, surface waters, vegetation, and wildlife:** For these resources, we evaluated other projects and actions within the hydrologic unit code (HUC) 12 sub-watersheds crossed by the ACRP. Impacts on soils, surface waters, vegetation, and wildlife would be largely contained within or adjacent to proposed ACRP workspaces. Impacts on surface water (primarily increased turbidity) could extend outside of the workspaces, but would also be limited to a relatively small area. Cumulative effects on biological resources typically are assessed within watershed boundaries due to the connectivity between biotic and abiotic resources that occurs within a drainage system. We chose the HUC 12 sub-level watershed because of the small scale of the Project's ground disturbance in relation to the area encompassing surrounding watersheds.
- **Land use:** We chose to analyze cumulative land use impacts within county boundaries because land use planning is often conducted at a county level and measurable data is more readily available at the county level for other projects that we assessed and because land use planning is often conducted at the county level. ACRP new compressor stations would contribute to an overall increase in industrial land use within the counties affected.
- **Visual resources**: We defined the geographic scope for visual resources as a 1-mile radius around the footprint of Project workspaces to encompass the viewshed potentially affected by the Project.
- **Socioeconomics:** To assess cumulative impacts on socioeconomics, we used county boundaries as the geographic scope because demographic statistics are generally assessed on a county basis.
- **Cultural resources:** The geographic scope for cumulative impacts on cultural resources consists of a 1-mile radius surrounding each ACRP workspace. We chose this geographic scope to conservatively capture the extent of potential direct and indirect impacts from ACRP. As described in section 2.7, the direct APE includes construction workspaces and the indirect APE for aboveground facilities in most cases extends to a radius of 0.5 mile.
- **Air quality:** Temporary impacts on air quality, including fugitive dust, would be largely limited to a geographic scope of about 0.25 mile from active construction. Long-term impacts on air quality would be largely contained within about a 50-kilometer radius. We evaluated other projects/actions that overlap in time and location with construction activities and those with potentially significant long-term stationary emission sources within a 50-kilometer radius of the ACRP.
- **Noise:** To assess cumulative noise impacts, we used a geographic scope consisting of a 1-mile radius. Long-term impacts on NSAs were evaluated by identifying other stationary source projects with the potential to result in significant noise that would affect the same NSAs within 1 mile of the ACRP compressor stations.

Each resource-specific geographic scope is presented in table 2.11-1.

Table 2.11-1

Geographic Scope for Resources Affected by the ACRP

Resource	Geographic Scope
Soils	HUC 12 watershed
Water Resources	HUC 12 watershed
Vegetation and Wildlife, Special-Status Species	HUC 12 watershed
Land Use	County boundary
Visual Resources	1-mile radius
Socioeconomics	County boundary
Cultural Resources	1-mile radius
Air Quality	50-kilometer radius
Noise	1-mile radius

For ACRP components that involve abandonment activities with minor ground disturbance within existing right-of-way, we used a smaller geographic scope to assess potential cumulative impacts because the impacts caused by the limited ground disturbance would not likely migrate far outside of the immediate area of activity. We defined the geographic scope as the Project footprint plus a 0.25-mile buffer to assess cumulative impacts on all resources. We identified a number of projects within this geographic scope (see appendix J) including a number of UMTP and Broad Run Flexibility Project worksites. Some of the ACRP workspaces for abandonment activities would overlap with UMTP and Broad Run Flexibility Project workspaces and impact the same resources in the area affected. However, because these minor ACRP abandonment activities would occur mostly within existing right-of-way, would be completed in a short amount of time, and would not result in significant long-term direct or indirect impacts on any resources, we determined they would have limited potential to contribute to cumulative impacts. Therefore, we do not discuss these activities further in our analysis.

2.11.2 Projects within Defined Geographic Scope

TGP provided an initial review of potential past, present, and reasonably foreseeable projects or actions that, with the Project, could result in cumulative impacts. The review focused on actions within the geographic scope developed for each resource. We further reviewed this list against potential Project impacts to develop a realistic understanding of the potential cumulative actions. We also conducted online research of federal, state, and local municipality permit actions; searched free-access databases; and communicated with local municipalities. This research, combined with the initial information provided by TGP, produced a list of 228 potential cumulative projects or actions, which is presented in appendix J. The cumulative actions that were defined within the geographic scope include the wrinkle bend replacements described below, the construction of non-jurisdictional facilities (i.e., utilities for the new compressor stations; see table 1.6-1) not included within the compressor station footprints, 80 oil and gas activities (including a number of activities associated with the UMTP Project), 21 power projects, 5 water/sewer projects, 94 transportation projects, and 28 commercial projects. There are 16 planned, proposed, or existing FERC-jurisdictional natural gas transmission projects within the geographic scope. Descriptions of these projects and the other cumulative actions we evaluated are presented in appendix J, table J-1. Additional details regarding each of the FERC-jurisdictional projects can be obtained through our website at www.ferc.gov by entering the docket number given for each project.

We received numerous comments about the potential impacts of the UMTP Project and the Broad Run Expansion Project. The majority of the facilities associated with these projects are outside the geographic scope defined for resources affected by the proposed action. Additionally, TGP has proposed to conduct a number of activities under Section 2.55(b) of the NGA and its blanket certificate. As outlined in the criteria for cumulative impacts discussed above, these projects potentially affect some of the same resources in the geographic scope. We describe the UMTP Project, the proposed wrinkle bend remediation activities, and the Broad Run Expansion Project in the following sections, and discuss the potential for these projects to result in cumulative impacts with the ACRP in section 2.11.3.

We also received comments regarding the cumulative effects of upstream hydraulic fracturing and the impacts from that industry on natural resources in the region. Oil and gas wells are not under the jurisdiction of FERC. We have identified a number of proposed and permitted oil and gas wells in the air quality, land use, and socioeconomics geographic scope for some ACRP facilities, as shown in appendix J, table J-1. None of these proposed wells are within the geographic scope for other resources. Existing wells may contribute incrementally to air quality impacts. Construction of access roads, drilling pads, and gathering lines result in changes to land use and cover that can adversely affect ecosystems and result in erosion, sedimentation, and habitat fragmentation. Drilling, production, and operation of wells also result in increased emissions of air pollutants. However, we lack quantitative and meaningful information regarding potential future gas production in the geographic scope, and natural gas production-related impacts are not sufficiently reasonably foreseeable so as to be included in a cumulative impacts analysis.

UMTP Project and Overlap with ACRP

As previously stated, many of these modifications under the UMTP Project would occur at locations where ACRP activities would also take place. Of these 219 UMTP Project sites, 130 would overlap with ACRP minor abandonment activities, which we discussed previously. At an additional 15 locations, UMTP Project activities would overlap with larger ACRP new construction activities. These locations are listed in table 2.11-2. The UMTP Project modifications would use construction methods similar to those described in section 1.10.1. UMTP would also abandon in place pipeline segments at the Ohio, Dix, Tennessee, and Red River crossings and would use horizontal directional drilling (HDD) to install new pipeline segments beneath the rivers.

Table 2.11-2

Overlapping ACRP and UMTP Project Facilities

ACRP [a] Facility	County, State	UMTP Activity
Compressor Stations		
CS 206.5	Morgan, OH	CS 209 short pipeline bypass
CS 211.5	Tuscarawas, OH	Tuscarawas NGL Storage Facility; Scio-Hopedale Lateral
CS 110	Rowan, KY	Pump Station PS04
Off-right-of-way Tap Reconnects		
OH0030	Tuscarawas, OH	Install straight pipe; CS 214 short pipeline bypass
OH0110	Morgan, OH	Install straight pipe
KY0080	Rowan, KY	Install straight pipe; Pump Station PS04
KY0170	Madison, KY	Install straight pipe
TN0190	Hickman, TN	Install straight pipe
TN0200	Hickman, TN	Install straight pipe
TN0210/TN0220	Perry, TN	Install straight pipe; Pump Station PS12
MS0040	Benton, MS	Snow Lake pipeline
MS0110	Panola, MS	Install straight pipe
MS0170	Quitman, MS	Install straight pipe
MS0200	Tallahatchie, MS	Install straight pipe
MS0280	Sunflower, MS	Install straight pipe

a ACRP abandonment activities with minor ground disturbance are not included.

Section 2.11.4 contains more detailed information regarding the UMTP Project and its impacts.

Wrinkle Bend Remediation

As discussed in section 1.7.2, to prepare the abandoned line for transfer to UMTP, TGP would remediate sections of the pipeline containing wrinkle bends at as many as 2,800 locations, resulting in impacts on up to 1,205 acres of land. TGP has not yet identified the number or locations of wrinkle bends to be remediated. In some instances, wrinkle bend replacements would require work outside of TGP's existing right-of-way and would be performed under TGP's blanket certificate. TGP has indicated that the remediation work could also be completed by UMTP after transfer of the abandoned line but prior to placement of the line into NGL service; these activities would not be under FERC jurisdiction.

Resource-specific impacts of wrinkle bend remediation activities are unknown because TGP states that the locations for remediation activities have not been identified. Each wrinkle bend replacement would require a workspace about 75 feet wide by 250 feet long, in which TGP or UMTP would excavate to expose and remove the segment of pipe (about 40 feet long) containing the wrinkle bend. The pipe segment would be replaced and hydrostatically tested. The affected area would then be restored.

Broad Run Expansion Project and Overlap with ACRP

TGP's Broad Run Expansion Project was approved by the Commission under Docket CP15-77-000 on September 6, 2016, to expand the capacity of its pipeline system to provide up to 200,000 dekatherms per day of firm incremental transportation services and to replace older, less efficient compression facilities with new, more efficient compression facilities. The Broad Run Expansion Project will modify compression at two compressor stations in Kentucky and construct four new compressor stations in West Virginia, Kentucky, and Tennessee, including Compressor Station 875 in Madison County, Kentucky.

The Broad Run Expansion Project could add to cumulative impacts associated with the ACRP in Kentucky, where the geographic scope overlaps. The greatest potential for cumulative impacts would be at Compressor Station 875. TGP proposes to add one 10,771 hp compressor unit to the approved Compressor Station 875. Compressor Station 875 will be a bidirectional, natural-gas-fired compressor station with one 16,000 hp turbine compressor unit. TGP will also install a compressor building, motor control center, gas cooler, gas filter, fiber communications, cathodic protection system, SCADA equipment and communications, and miscellaneous pipe, valves, and fittings for gas handling. These facilities would be classified as Section 2.55(b) activities.

The Order for the Broad Run Expansion Project, issued by the Commission on September 6, 2016, determined that the project would not result in significant impacts on the environment. The Broad Run Expansion Project's resource-specific potential cumulative impacts with the ACRP are discussed in section 2.11.3.

2.11.3 Cumulative Impact Analysis

This section discusses the potential for cumulative impacts on each resource that could result from the ACRP when combined with other projects we identified in the geographic scope. We have also considered the projects within the geographic scope of the ACRP project components that involve abandonment activities with minor ground disturbance (as noted in appendix J, table J-1). We discuss the potential cumulative impacts on the following resources: soils, water resources, vegetation, wildlife, special status species, land use and visual resources, cultural resources, air quality, climate change, and noise.

Where there is potential for impacts to occur, we included a discussion of the resource impacts associated with the proposed non-jurisdictional facilities (water and powerline utilities described in section 1.6) associated with ACRP compressor stations under the appropriate resource. In general, for most resources, we concluded that the impacts from the non-jurisdictional water and power facilities can be discounted because any impacts would be minor.

Table 2.11-3 shows the total potential impacts of the ACRP along with other projects that we identified in the geographic scope and discuss in our cumulative impacts analysis.

Table 2.11-3

Summary of Cumulative Actions Evaluated for the ACRP

Cumulative Action Name	New Pipeline (miles)	New or Modified Compressor or Pump Stations (number)	Construction Footprint (acres)	Forested Land Affected (acres)	GHG Emissions Construction (tons per year)	GHG Emissions Operation (tons per year)	Wetlands Affected (acres)	Waterbodies Crossed (number)	Prime Farmland Affected during Construction (acres)
ACRP	15.9	6	532	112	8,475	563,840	5.7	53	118 [a]
UMTP Project	239 [b]	23	3,486	1,995	5,529	349 [c]	142	452	337
Broad Run Expansion Project FERC Docket No. CP15-77	0	6	240	111.5	7,685	640,242	0.3	13	23.6
NEXUS Gas Transmission Project FERC Docket No. CP16-22	257	4	5,011	29.8 [d]	62,709 [e]	635,555	129.32 [d]	385 [d]	714.83 [d]
Ohio Pipeline Energy Network FERC Docket No. CP14-68	76	7	1,564	405	17,401	99,345 [f]	191.6	107	3,832.8
Rover Gas Pipeline Project [g] FERC Docket No. CP15-93	511	10	9,601	2,991	354,729 [e]	821,874	160.01	864	5,928
Leach Xpress Project FERC Docket No. CP15-514	161	5	3,162	1,381	96,404	497,021	16.1	1,083	805.5 [h]
Texas Eastern Appalachian Lease Gas Pipeline Compressor Station FERC Docket No. CP16-23	5	2	213	29.8 [d]	27,325	272,509	129.32 [d]	385 [d]	714.83 [d]
Gulf Markets Expansion Project System Modifications and Additional Compression FERC Docket No. CP15-90	0	8	50	0	1,240	28,872	0	0	20.3
Trunkline Backhaul Project Modifications to Allow for Bi-directional Flow FERC Docket No. CP15-96	0	4	168	29.8 [d]	7,152	0	129.32 [d]	385 [d]	714.83 [d]
Access South Project, Adair Southwest Project, and Lebanon Extension Project FERC Docket No. CP16-3-000	20	13	1,394	NA	--	--	NA	NA	NA

Table 2.11-3

Summary of Cumulative Actions Evaluated for the ACRP

Cumulative Action Name	New Pipeline (miles)	New or Modified Compressor or Pump Stations (number)	Construction Footprint (acres)	Forested Land Affected (acres)	GHG Emissions Construction (tons per year)	GHG Emissions Operation (tons per year)	Wetlands Affected (acres)	Waterbodies Crossed (number)	Prime Farmland Affected during Construction (acres)
REX Zone 3 Capacity Enhancement Project New and Modified Compressor Stations FERC Docket No. CP15-137	0	5	81	2.0	40,519	882,415	0	0	30
Northern Supply Access Project New and Modified Compressor Stations [g] FERC Docket No. CP15-513	0	9	146	0.8	594	117,550	0	2	8.24
Rayne Xpress Expansion Project Two Greenfield Compressor Stations and Associated Piping FERC Docket No. CP15-539	0	2	32	0.5	493	331,860	137.6 [i]	1,083 [i]	30.1
Gulf XPress Project [g] FERC Docket No. CP16-361	0	9	198	22.2	20,868	1,359,544	NA	NA	121.8
Carroll County Power Plant, Carroll County, Ohio 700-MW natural gas power plant	0	0	17	NA	--	1,345,883	NA	NA	NA
127-HP Natural Gas Generator Dominion East Ohio Gas	0	0	--	NA	--	25.257	NA	NA	NA
500kw oil emergency generator Youngstown State University	0	0	--	NA	--	165.91	NA	NA	NA
Lordstown Power Plant Clean Energy Future – Lordstown, LLC.	0	0	--	NA	--	79,644	NA	NA	NA
South Field Energy Electric Generation Facility and 345-kV Transmission Line South Field Energy	0	0	--	NA	--	4,124,388	NA	NA	NA

Table 2.11-3

Summary of Cumulative Actions Evaluated for the ACRP

Cumulative Action Name	New Pipeline (miles)	New or Modified Compressor or Pump Stations (number)	Construction Footprint (acres)	Forested Land Affected (acres)	GHG Emissions Construction (tons per year)	GHG Emissions Operation (tons per year)	Wetlands Affected (acres)	Waterbodies Crossed (number)	Prime Farmland Affected during Construction (acres)

Acreages and information presented are estimates only, and represent the total impacts of the cumulative action, not the impacts in the geographic scope of the ACRP.

NA = The project is not within the geographic scope for this resource.

-- Indicates that information is not available.

a Does not include tap removal/reconnects, gas disconnects, crossover removals, and launcher/receiver disconnects. The wrinkle bend replacements under Section 2.55(b) would have an additional estimated construction footprint of 1,200 acres and the non-jurisdictional facilities would have an estimated footprint of 33 acres based on a 50-foot right-of-way.

b Pipeline installed by horizontal directional drilling techniques not included.

c These emissions are from the UMTP pump stations only. The pump stations would use electric pumps; therefore, operation emissions would be limited to vented emissions of evaporated natural gas liquid resulting from station blowdown and draindown activities.

d Rover Pipeline, Panhandle Backhaul, and Trunkline Backhaul Projects (CP15-93, CP15-94, and CP15-96) are presented as combined totals because the projects were analyzed together in one EIS.

e Includes emissions from open burning of cleared vegetation.

f Requested allowable emissions.

g Information taken from FERC Certificate application and may not include ongoing project modifications.

h Estimated based on 110-foot pipeline construction right-of-way.

i Leach Xpress Project and Rayne Xpress Expansion Project (CP15-514 and CP15-539) are presented as combined totals because the projects were analyzed together in one EIS.

Soils

As previously stated, to assess cumulative impacts on soils, we defined the geographic scope as the HUC 12 watershed. Although we chose to analyze cumulative impacts within this geographic scope, the actual impacts of ACRP activities and the potential for cumulative impacts on soils would be limited to a much smaller area because TGP would be required to follow its Plan and Procedures, which are designed to prevent soils from leaving the area of construction. We identified 32 actions within the HUC 12 watershed that could result in cumulative impacts on soils. These projects are described in appendix J, table J-1. The wrinkle bend replacements would have temporary impacts on about 1,200 acres of soils and some could occur potentially within ACRP worksites. The non-jurisdictional facilities associated with the ACRP compressor stations would disturb about 33 acres, adding to soil impacts within ACRP compressor station sites. The following analysis focuses on the projects for which we have enough information to provide a meaningful discussion. These include the Broad Run Expansion Project, Leach Xpress Project, Broad Run Flexibility Project, and UMTP Project. We provide information on the overall footprint and impacts associated with each of these projects in table 2.11-3.

TGP would construct Compressor Station 875 for the Broad Run Expansion Project, which would affect 48.5 acres of soils during construction, of which 24.9 acres would be permanent. The ACRP would modify this compressor station, disturbing 23.6 acres of soils during construction, which would contribute to cumulative effects on soils at this site. The ACRP would not add additional permanent impacts at this site.

We determined that the Leach Xpress Project would be constructed in the same HUC 12 watersheds as ACRP Compressor Stations 202.5 and 206.5. Compressor Station 202.5 would affect a total of 23.5 acres of soils, of which 14.5 acres would be permanent. Compressor Station 206.5 would affect 29.7 acres of soils, of which 9.7 acres would be permanent. The Leach Xpress Project would have a total construction footprint of 3,162 acres. The Leach Xpress Project would affect about 65.3 acres in the HUC 12 watersheds shared with the ACRP.

TGP recently performed modifications at Compressor Station 110 as part of the Broad Run Flexibility Project, which included adding cooling and modification of pig launcher/receiver traps. The amount of soils disturbed for this work is not known, but the work was confined to the existing station footprint. The modifications at Compressor Station 110 proposed as part of the ACRP would disturb 3.5 acres of soils. FERC-regulated projects (such as the ACRP, Broad Run Expansion Project, Leach Xpress Project, and Broad Run Flexibility Project) are required to be consistent with our Plan and Procedures to minimize impacts on soils.

The following proposed UMTP Project facilities would be within the geographic scope of ACRP activities: the Tuscarawas NGL Storage Facility, Pump Stations PS04 and PS12, the Snow Lake pipeline, the Scio-Hopedale lateral, and short pipeline bypasses at CS 214 and CS 209. For most of these UMTP Project components, only a small area intersects with the ACRP geographic scope. The Tuscarawas NGL Storage Facility is collocated with ACRP Compressor Station 211.5 (see figure 2-1). The ACRP would affect 21.2 acres of soils during construction at Compressor Station 211.5, 14.1 acres of which would be permanent impacts. The Tuscarawas NGL Storage Facility would disturb an additional 68.3 acres during construction, of which 61.3 acres would be permanent. A total of 75.4 acres of soils would be permanently disturbed at this site.

Figure 2-1. Compressor Station 211.5 and Tuscarawas NGL Facility

In addition to the projects described in appendix J, section 2.1.1 identified four active mines near the ACRP and potentially within our defined geographic scope for the ACRP. One of these mines is within the Compressor Station 216.5 site but would no longer be operated when the compressor station is built. Future expansions at the other three mines could disturb soils in the same watersheds as Compressor Stations 211.5 and 216.5, and the new-build pipeline.

Because direct effects on soils from ACRP would be localized and limited primarily to the period of construction, and TGP would follow its Plan to restore soils to pre-existing conditions after construction activities are completed, there is limited potential for the ACRP to contribute to significant cumulative impacts on soils. We conclude that the Project’s incremental addition to cumulative effects on soils would negligible due to the temporary and limited local ground disturbance associated with Project activities and TGP’s implementation of erosion control measures.

Surface Water Resources

Within the defined geographic scope for water resources (HUC 12 watershed), we identified 32 actions that could result in cumulative impacts. These projects could contribute to cumulative impacts on surface water resources and water quality in the watersheds where ACRP compressor stations, replacement pipelines, and Off-right-of-way Tap Reconnects OH0030, KY0170, KY0080, and TN0210/0220 would be constructed through sedimentation, caused by erosion of soils, and turbidity, caused by in-water work. Of the 32 projects, we have enough information to provide a meaningful discussion of the Broad Run Expansion Project, Leach Xpress Project, Broad Run Flexibility Project, and UMTP Project.

Compressor Station 875 facilities for the Broad Run Expansion Project would cross one waterbody and would not affect any wetlands. The activities at Compressor Station 875 for the ACRP would not cross waterbodies or affect wetlands. However, the minor ground disturbance associated with the ACRP modifications at this compressor station could result in erosion and cause sedimentation of surrounding waterbodies. The MLV 874 replacement pipeline would cross four waterbodies and result in temporary impacts on 0.4 acre of wetlands. Due to TGP’s implementation of its Plan and Procedures, it is unlikely that surrounding waterbodies would be affected at these sites.

We determined that the Leach Xpress Project would be constructed in the same HUC 12 watersheds as ACRP Compressor Stations 202.5 and 206.5. At these compressor stations, ACRP would result in the permanent filling of two intermittent waterbodies and one ephemeral waterbody. The Leach Xpress Project would affect eight waterbodies and one wetland within the shared HUC 12 watersheds according to the NWI database.

The following proposed UMTP facilities would be within the ACRP geographic scope: the Tuscarawas NGL Storage Facility, Pump Stations PS04 and PS12 the Snow Lake Pipeline, the Scio-Hopedale lateral, and short pipeline bypasses at Compressor Stations 214 and 209. At several of these, there are ACRP worksites where cumulative impacts could occur in the surrounding watershed and could contribute to cumulative impacts on water resources. In Rowan County, Kentucky, Compressor Station 110 is collocated with UMTP Project Pump Station PS04, which is also in the same watershed with ACRP Off-right-of-way Tap Reconnect KY0080. ACRP activities at Compressor Station 110 would temporarily affect one intermittent stream, and KY0080 would cross intermittent and perennial streams. No wetlands would be affected at either of these facilities. Because UMTP Project Pump Station PS04 would affect three intermittent streams, there is potential for cumulative impacts on water resources in this watershed. No wetlands would be affected at PS04. Another site where cumulative impacts on water resources could occur is in the watershed affected by the ACRP Off-right-of-way Tap Reconnect MS0040 in Benton County, Mississippi, which would cross four waterbodies and permanently impact 4.1 acres of forested wetlands. This worksite would occur in the same watershed as UMTP's Snow Lake Pipeline. Because the UMTP Snow Lake Pipeline would affect a pond, one perennial stream, and two forested wetlands, there is potential for cumulative impacts on water resources in this watershed.

No surface water or wetland resources would be affected at ACRP Off-right-of-way Tap Reconnect TN0210/TN0220 or UMTP Pump Station PS12, which are in the same watershed. Likewise, no surface water or wetlands would be affected at either ACRP Compressor Station 211.5 or the collocated UMTP Tuscarawas NGL Facility. The Scio-Hopedale lateral is in the same watershed as Compressor Station 211.5 and would cross a number of waterbodies and wetlands. However, because Compressor Station 211.5 would not affect surface water or wetlands, no cumulative effects would occur. Similarly, the ACRP facilities that are in the same geographic scope as the short pipeline bypasses at Compressor Stations 214 and 209 (Off-right-of-way Tap Reconnect OH0030 and Compressor Station 206.5, respectively) would not affect surface waters or wetlands.

As discussed in previous sections of this EA, we conclude that construction and operation of the ACRP would cause largely minor and temporary impacts on water resources. TGP would stabilize disturbed areas, restore the contours and elevations of waterbodies and wetlands to preconstruction conditions, and revegetate disturbed riparian areas to prevent erosion of exposed soils and migration of sediments. Turbidity plumes caused by in-water work in waterbodies would persist for a short duration and it is unlikely that turbidity caused by other projects within the geographic scope would overlap both the spatial and temporal extents of that caused by ACRP. FERC-regulated projects must be constructed using measures that are consistent with our Plan and Procedures, which contain measures to avoid and minimize impacts on water resources. The UMTP Project and most other non-FERC-regulated projects would follow similar BMPs required by the COE or state agencies to avoid impacts on water resources. The COE would also establish the need for appropriate mitigation for unavoidable temporary and permanent impacts on waterbodies and wetlands for the ACRP and any impacts from other projects that occur within the shared watershed boundaries. Therefore, the potential for significant cumulative impacts would be minimized. We conclude that the Project would not contribute to significant cumulative effects on water resources.

Vegetation, Wildlife, and Special Status Species

In the geographic scope (HUC 12 watershed), we identified 32 actions that could result in cumulative impacts on vegetation and wildlife. These projects are described in appendix J, table J-1. The following discussion focuses on the projects for which we have enough information to provide a meaningful discussion. These include the Leach Xpress Project, Broad Run Expansion Project, and UMTP Project. We provide information on the overall footprint and impacts associated with each of these projects in table 2.11-3. This table also includes total impacts on forested land for these projects and several other projects in the geographic scope for which the information is available (Rayne Xpress Expansion, Gulf XPress, and Rover Pipeline Projects).

As previously stated, the Leach Xpress Project is within the geographic scope of ACRP Compressor Stations 202.5 and 206.5, which would contribute to removal of vegetation and wildlife habitat within the affected watersheds. Compressor Station 202.5 would affect a total of 23.5 acres, of which 14.5 acres (7 acres of forest) would be permanent. Compressor Station 206.5 would affect 29.7 acres, of which 9.7 acres (3.9 acres of forest) would be permanent. The Leach Xpress Project has a total construction footprint of 3,162 acres. The Leach Xpress Project would disturb 65.3 acres within the HUC 12 watersheds affected by ACRP.

At Compressor Station 875, the Broad Run Expansion Project would result in disturbance to 48.5 acres of wildlife habitat, of which 24.9 acres would be permanently converted. The ACRP modifications to Compressor Station 875 would add an additional 23.6 acres of temporary impacts to wildlife habitat within the affected watershed. ACRP modifications would not add additional permanent habitat conversion at this site. The MLV 874 replacement pipeline would result in temporary impacts on an additional 9.2 acres of wildlife habitat in this watershed, including 0.4 acre of wetlands.

The following UMTP Project facilities could also result in cumulative impacts on vegetation and wildlife within the ACRP geographic scope: Pump Stations PS04 and PS12, the Tuscarawas NGL Storage Facility, the Scio-Hopedale lateral, the Snow Lake pipeline, and short pipeline bypasses at Compressor Stations 214 and 209. The specific areas previously noted in the water resources section where the UMTP Project and ACRP overlap could also result in cumulative impacts on vegetation and wildlife habitat. One watershed of note is that which includes ACRP Compressor Station 211.5, Off-right-of-way Tap Reconnect OH0030, and two UMTP facilities: the Tuscarawas NGL Storage Facility and Scio-Hopedale lateral. Compressor Station 211.5 would affect forest habitat and other upland habitat types as would the UMTP Project components in the same watershed. ACRP Compressor Station 211.5 would permanently affect 0.4 acre of forest. ACRP Off-right-of-way Tap Reconnect OH0030 would not affect forest, the UMTP Tuscarawas NGL Storage Facility would permanently impact 1.0 acre of forest, and the UMTP Project Ohio laterals would permanently impact 7.6 acres of forest (including 0.6 acre of forested wetland).

There are a few additional locations where UMTP Project facilities overlap with the ACRP geographic scope and cumulative impacts could occur on vegetation and wildlife. UMTP Pump Station PS12, which would permanently impact 4.7 acres, is within the same watershed as ACRP Off-right-of-way Tap Reconnects TN190, TN0200/TN210, and TN220, which combined would impact 2.4 acres of undeveloped upland. These ACRP sites and UMTP Pump Station PS12 would affect upland habitat for some species; however, cumulative impacts would be minimal due to the large amount of available upland habitat in the area. ACRP Off-right-of-way Tap Reconnect OH0030, which would permanently affect 1.0 acre of land, is in the same watershed as the short pipeline bypass for UMTP at CS 214, which would affect 0.8 acre. ACRP Compressor Station 206.5, which would permanently affect 10.8 acres of land, is in the same watershed as the short pipeline bypass for UMTP at CS 209, which would affect 1.4 acres. Again, the cumulative impacts on vegetation and wildlife would be minimal due to the large amount of available upland habitat in the area compared to the amount of land permanently affected by the projects.

In general, cumulative effects on wildlife from the ACRP in combination with other projects in the geographic scope could occur due to loss of available habitat. Highly mobile wildlife species are likely to move away from construction and avoid the impacts. Less mobile species that are confined to habitat within the geographic scope are more likely to be affected. Migratory birds could also be affected by the cumulative loss of forested areas. Similar to ACRP, UMTP would conduct vegetation removal outside the breeding season in order to minimize impacts on nesting bird species or would consult with USFWS to perform migratory bird nesting surveys to identify and avoid nesting birds within the proposed activity area.

Cumulative impacts on fish and aquatic species could occur due to an increase in sedimentation and turbidity from in-water work, loss of freshwater habitat, streambank erosion, or fuel and chemical spills. We expect that most of the projects in the geographic scope would be designed to minimize impacts on waterbodies, and therefore fisheries and aquatic resources. Cumulative impacts could occur if other projects are constructed in the same segment of a waterbody or in a proximal upstream segment and have similar construction timeframes as the ACRP. In our EA, we concluded that ACRP would not have significant impacts on fish because TGP would use dry crossing methods (i.e., dam and pump, or flume) for all fish-bearing waterbodies and follow TGP's Procedures to minimize impacts on waterbodies and fish. Therefore, we do not anticipate that the ACRP would contribute to a significant cumulative impact on fish or other aquatic species.

Cumulative impacts on sensitive species, particularly federally listed bat species, could occur due to loss of forested habitat. Other federal actions would require consultation with the USFWS to minimize or avoid impacts from habitat loss and adhere to seasonal clearing restrictions to avoid direct take of individuals. For the Broad Run Expansion Project, TGP has consulted with regional USFWS field offices to develop avoidance and mitigation plans as well as a Myotid Bat Conservation Plan to offset the loss of potential habitat for the Indiana bat and northern long-eared bat. Consultation with the USFWS is ongoing for the UMTP Project and the ACRP.

All FERC-regulated projects would follow our Plan and Procedures, or project-specific Plan and Procedures with approved alternative measures, to minimize impacts on vegetation and wildlife habitat and restore habitat to preconstruction conditions, except where permanent facilities would be located. Because some ACRP activities would include construction of permanent facilities, there is potential for ACRP impacts to interact cumulatively with impacts from other projects with permanent impacts, including an increase in impervious surfaces and the loss of vegetative groundcover, mature forest, and terrestrial and freshwater habitats. However, due to the limited extent of the ACRP impacts, as concluded in this EA, any cumulative impacts attributed to the ACRP would be minor and would not result in a significant cumulative impact.

Land Use

Within the defined geographic scope, we identified 66 actions that could result in cumulative impacts on land use. These projects are described in appendix J. The following discussion focuses on the projects for which we have enough information to provide a meaningful discussion on potential cumulative impacts. These include the Broad Run Expansion Project, Leach Xpress Project, Rover Gas Pipeline Project, Rayne Xpress Expansion Project, Gulf XPress Project, and the UMTP Project. We provide information on the overall footprint and impacts associated with each of these projects in table 2.11-3.

The ACRP would permanently convert a total of 43.2 acres of agricultural, forest, and open land to industrial use where aboveground facilities are located. Except for the fenced areas of the compressor stations, impacts on land use would be mainly short-term because TGP would restore disturbed areas not needed for operations. Cumulative impacts on forest land would be long-term because of the time required for trees to regrow.

The Broad Run Expansion Project would alter land use where it converts 24.9 acres of land to the new Compressor Station 875 in Madison County, Kentucky that would then be modified by ACRP. The ACRP modifications to Compressor Station 875 and the MLV 874 replacement pipeline would not add additional permanent land use conversion at this compressor station site.

The UMTP Project and ACRP facilities would overlap in Tuscarawas County, Ohio, at the Tuscarawas NGL Storage Facility and Compressor Station 211.5 location (see figure 2-1). Combined, these facilities would permanently affect 75.4 acres of land that would be converted to industrial use. Other projects in Tuscarawas County include the Rover Gas Pipeline Project, four recently permitted oil and gas wells, two electric utility projects, two transportation projects, and one commercial project. The Rover Gas Pipeline would have a total construction footprint of 9,601 acres for the project, but only a fraction of this would be in Tuscarawas County. Seven projects would occur within Mahoning County, where Compressor Station 216.5 would be built, and include one recently permitted oil or gas well, two electric utility projects, two transportation projects, and two commercial projects. We do not have quantitative information regarding the land use affected by these other projects in Tuscarawas and Mahoning Counties; however, they would contribute to an increase in industrial land in these counties.

The ACRP would affect about 118.5 acres of prime farmland, 38.8 acres of which would be permanent from the construction of compressor stations. The total impacts on prime farmland of other projects in the geographic scope for which the information is available (UMTP, Broad Run Expansion, Leach Xpress, Rayne Xpress Expansion, Gulf XPress, and Rover Pipeline Projects) are shown in table 2.11-3. When considering other projects in the geographic scope, there would be a cumulative decrease in prime farmland. However, compared to the amount of prime farmland available in the geographic scope, the cumulative effect would be minor. For example, the majority of the permanent prime farmland impacts from the ACRP would be in three counties: at Compressor Station 211.5 in Tuscarawas, Ohio (21.2 acres), at Compressor Station 206.5 in Morgan, Ohio (12.9 acres), and at Compressor Station 875 in Madison, Kentucky (4.5 acres). Total prime farmland in each of those counties is 255,096 acres, 112,657 acres, and 131,445 acres, respectively.

Because the amount of land that the ACRP would permanently convert is relatively small (43.2 acres) when assessed with other projects both overall and within counties affected, we conclude that the ACRP's incremental impacts would not result in a significant cumulative effect on land use.

Visual Resources

For visual resources, we considered a 1-mile buffer around the Project footprint to encompass the viewshed potentially affected by the Project. Within this geographic scope, we identified 16 actions that could result in cumulative impacts on visual resources: UMTP Project, Broad Run Expansion Project, Broad Run Flexibility Project, three transportation projects consisting of resurfacing or reconstruction of existing roads, and the non-jurisdictional power facilities associated with ACRP compressor stations. We do not have specific information regarding the impacts of the Broad Run Flexibility Project or the transportation projects on visual resources. Because they involve existing facilities, we would expect primarily temporary impacts associated with construction activities.

Construction of the non-jurisdictional powerlines to the new ACRP compressor stations would result in pole structures that would likely be visible to nearby residents, but the lines would be similar in nature to existing utilities in the area and would not span large distances. Based on the limited scope and land requirements for the planned powerline facilities, we do not believe the non-jurisdictional power and telephone lines would result in significant visual impacts.

The UMTP Tuscarawas NGL Storage Facility would be within 1 mile of the Town of Newport, Ohio, and would be collocated with the ACRP Compressor Station 211.5 in Tuscarawas County, Ohio. TGP identified two sensitive viewpoints from which the facility would be visible; one on Blizzard Ridge Road SE (CR30), and the second on Edie Hills Road SE (CR34). A visual simulation of the Tuscarawas NGL Storage Facility as seen from the Edie Hills Road viewpoint is shown in figure 2-2. Construction of the UMTP Tuscarawas NGL Storage Facility (collocated with ACRP Compressor Station 211.5) and its non-jurisdictional powerlines could result in cumulative impacts on visual resources in Tuscarawas County, Ohio.

Figure 2-2. Visual Simulation of Tuscarawas NGL Storage Facility from Edie Hills Road SE

Socioeconomics

We identified 66 actions within the defined geographic scope, including 25 transportation actions, 9 commercial projects relating to the development of mineral resources (such as the Schlumberger Technology Corporation Cement Mix Plant in Tuscarawas County), 6 electrical power projects (including the Kentucky River Lock & Dam No. 11 Hydroelectric Project), 1 water utility project, and 25 oil and gas projects (including the Rover and Utopia East Pipeline Projects, Broad Run Expansion Project, Broad Run Flexibility Project, UMTP Project, and the Rayne, Gulf, and Leach Xpress Projects) that could contribute to cumulative effects on socioeconomics (see appendix J, table J-1). These projects would provide short-term jobs and increased economic activity and tax revenues, similar to the ACRP.

For example, the Broad Run Expansion Project is anticipated to provide short and long-term beneficial effects on socioeconomic resources through short-term increases of skilled and un-skilled construction jobs (about 400 job-years), property tax revenues, and purchases of construction materials, lodging and meals. UMTP would build and operate the Tuscarawas NGL Storage Facility in Ohio, the Scio-Hopedale lateral, and four pump stations within the geographic scope of ACRP. To construct the Tuscarawas NGL Storage Facility, an estimated 225 to 300 workers would be hired for 1 to 2 years, with a total payroll of about $30 million. Operation of the Tuscarawas NGL Storage Facility would require about 35 permanent full-time employees. These actions would provide short- and long-term beneficial effects on socioeconomic resources by providing construction jobs, spending on lodging and meals during construction, and increased property tax revenues. The new Dickson and Snow Lake pipelines and work at the short pipeline segments to bypass Compressor Stations 87, 96, 209, and 214 would also be within the geographic scope.

The Leach Xpress Project and ACRP would both occur in Morgan and Jackson Counties. The Leach Xpress Project is not anticipated to have long-term adverse effects on housing, property values, transportation, and infrastructure. The project is anticipated to have short and long-term beneficial effects on the economy and tax revenue. Columbia Gas expects the Leach Xpress Project to use a maximum construction workforce of 3,215 individuals, of which approximately 75 percent is anticipated to be non-local. Columbia Gas estimates that a peak total workforce of 600 workers could be present within a single county during periods of coinciding construction spreads. The Leach Xpress Project would add a total of 15 to 20 permanent jobs. Although we do not know how many of these would be in Jackson and Morgan Counties, we expect none to occur in Morgan County and a small percentage of the total to occur in Jackson County.

Overall, the ACRP could contribute minor short and long-term beneficial cumulative effects on socioeconomic resources in the counties affected when combined with other present and future actions.

Cultural Resources

The ACRP could have direct impacts on historic property through construction within site boundaries, or indirect impacts if visual or audible effects from construction or operation of facilities nearby cause changes in the setting or character of properties. Potential cumulative impacts include changes to viewsheds surrounding historic standing architecture listed on or eligible for listing on the NRHP. Such changes could include long-term impacts from new aboveground construction and temporary impacts from dust caused by construction and travel. Nine historic properties were identified in the APE for the ACRP.

Cumulative impacts on cultural resources would only occur if other projects were to affect the same historic properties as ACRP. Although adverse effects have not yet been assessed for some historic properties, TGP would be required to avoid, minimize, or mitigate adverse effects prior to beginning construction activities for ACRP, in accordance with Section 106 of the NHPA.

We identified the following projects within the region of influence that would have potential to affect cultural resources: the UMTP Project, wrinkle bend remediation activities, the Broad Run Expansion Project, the Broad Run System Flexibility Project, TGP maintenance activities, non-jurisdictional facilities associated with ACRP compressor stations, and five transportation projects.

Two NRHP-eligible cultural resources were identified within the indirect APEs for ACRP locations where UMTP Project activities would occur within the geographic scope: TUS-1093-10 and TUS-1095-13 near Compressor Station 211.5 in Ohio. These properties are also within the indirect APE for the proposed UMTP Tuscarawas NGL Storage Facility. TGP concluded that Compressor Station 211.5 (at workspace OH0025) would not have adverse effects on these historic properties. The Ohio SHPO has not yet concurred with this assessment.

Archaeological surveys have been completed for all ACRP workspaces where UMTP Project activities would also occur. Architectural surveys have not been completed for three ACRP off right-of-way tap reconnects where UMTP Project activities would occur within the geographic scope: OH0030, MS0040, and MS0200. TGP has recommended architectural surveys at these locations are unnecessary and there would be no adverse effects. The SHPOs of the respective states have not yet concurred with this recommendation.

The Antiquities Act of 1906, NHPA, Archaeological and Historic Preservation Act of 1974, and the Archaeological Resources Protection Act of 1979 protect cultural resources on federal and tribal lands. The Native American Graves Protection and Repatriation Act would provide for the treatment of Native American graves and items of cultural patrimony found on federal lands.

Any project with a federal nexus would have to adhere to Section 106 of the NHPA, including those projects listed in appendix J that are federal actions. The federal agencies that would manage those projects would have to follow the regulatory requirements of 36 CFR 800. Under those regulations, the lead federal agency, in consultation with the SHPO, would have to identify historic properties in the APE, assess potential impacts, and resolve adverse effects through an agreement document that outlines a treatment plan.

Because it is not fully known how other foreseeable actions would affect cultural resources, we cannot make any definitive quantitative statements about the nature of cumulative impacts on historic properties from other projects. However, we can conclude that given the federal laws and regulations that protect cultural resources, it is not likely that there would be significant cumulative impacts on historic properties resulting from this Project in addition to other projects.

Air Quality

In the defined geographic scope for air quality (50-kilometer radius), all of the actions identified in appendix J, table J-1, could contribute to cumulative effects on air quality. The following discussion focuses on the projects for which we have enough information to provide a meaningful discussion on potential cumulative impacts. These include the Carroll County (Ohio) Energy Project, Broad Run Expansion Project, and UMTP Project. We have also included the total impacts on GHGs during construction and operation for a number of other projects for which the information was available in table 2.11-3.

The Carroll County (Ohio) Energy Project, which includes a 700-megawatt natural gas combined-cycle electric generating facility, would be about 38 kilometers from Compressor Station 211.5 and the UMTP Tuscarawas NGL Storage Facility. The Carroll County (Ohio) Energy Project would emit over 1.3 million tons of GHGs per year during operation. The proposed pump stations for the UMTP Project would be electrically powered and emit small amounts of GHG during operation; however, the Tuscarawas NGL Storage Facility emissions have not yet been estimated by TGP. A proposed 127-hp natural gas generator for Dominion East Ohio Gas would also emit GHGs within the geographic scope of Compressor Station 211.5, as shown in table 2.11-3.

Within the geographic scope of ACRP Compressor Station 216.5, a 500-kw oil emergency generator at Youngstown State University, the Lordstown Power Plant, and the South Field Energy Electric Generation Facility would contribute to impacts on air quality. The ACRP proposes additional compression at Compressor Station 875 (to be constructed as part of the Broad Run Expansion Project). Analysis of the Broad Run Expansion Project was included in the construction and operational emissions for Compressor Station 875 in section 2.8.

For UMTP Project construction within the ACRP geographic scope, in general, emissions from construction would need to occur simultaneously and in close proximity with ACRP in order for a cumulative effect to occur. The exact construction schedule for the UMTP Project is not known at this time; however, to provide context, if one of the UMTP Project pump and meter station construction efforts overlapped with the ACRP new-build pipeline and Compressor Station 110, air quality emissions would still be below *de minimis* conformity standards.

The Leach Xpress Project would contribute to impacts on air quality within the geographic scope of ACRP Compressor Stations 202.5 and 206.5. Construction of these two compressor stations would produce a total of 1,374 tons of GHG. Compressor Stations 202.5 and 206.5 each would emit about 79,200 tons per year during operation. As indicated in table 2.11-3, the Leach Xpress Project would produce a total of 96,404 tons of GHGs during construction and 497,021 tons per year of GHGs during operation. However, GHG emissions from the Leach Xpress Project within the geographic scope of ACRP would be approximately 24,000 tons during construction and 212,506 tons per year during operation.

Overall, it is not likely that the ACRP would contribute to significant cumulative degradation of air quality. The ACRP would be constructed and operated in attainment areas. In general, ACRP construction, when combined with other actions occurring simultaneously within the geographic scope, could generate cumulative emissions of air contaminants and fugitive dust from the use of heavy equipment and construction worker travel to and from the worksites. If this were to occur, the cumulative impact would be localized and temporary in nature. ACRP and most other projects would employ BMPs such as application of water to reduce fugitive dust at construction sites. On the other hand, ACRP operation would have a permanent and incremental effect on regional air quality where compressor stations are located. Operations would result in the increased emissions of criteria pollutants at Compressor Stations 110 and 875, resulting in the continued need to operate under a Title V air permit. Cumulative impacts on air quality from operation of ACRP and similar projects in the geographic scope, including the UMTP Project, would not be significant because projects would have to follow the requirements of the Clean Air Act and total emissions from operation of permanent facilities would be below the applicable standards. Based on these factors, the Project, when assessed with other actions in the geographic scope, would not cause a significant degradation of air quality.

Climate Change

Climate change is the change in climate over time, whether due to natural variability or as a result of human activity, and cannot be represented by single annual events or individual anomalies. For example, a single large flood event or particularly hot summer is not an indication of climate change, while a series of floods or warm years that statistically change the average precipitation or temperature over years or decades may indicate climate change.

The U.S. Global Change Research Program was established by Presidential Initiative in 1989 and mandated by Congress in the Global Change Research Act of 1990 to "assist the Nation and the world to understand, assess, predict, and respond to human-induced and natural processes of global change" (15 U.S.C. 2931). The U.S. Global Change Research Program notes the following environmental impacts that may be attributed to climate change in the Southeast region (Carter et al., 2014):

- rising sea level;
- increasing temperatures and associated increase in frequency, intensity, and duration of extreme heat events; and
- decreased water availability.

GHG emissions are a primary cause of climate change (EPA, 2014c). Of the GHGs emitted, CO_2 is the most prevalent, accounting for 82 percent of all U.S. emissions in 2012 (EPA, 2014d). Methane (CH_4) is the second most prevalent, accounting for 9 percent of the total U.S. emissions (EPA, 2014e). Between 1990 and 2012, natural gas and petroleum systems accounted for 29 percent of CH_4 emissions in the United States. Although the amount of CH_4 emitted into the atmosphere is significantly less than that of CO_2, the comparative impact of CH_4 on climate change over a 100-year period is more than 20 times greater (EPA, 2014e). Fugitive CH_4 emissions are common in natural gas systems and can occur during natural gas production, transmission, storage, and distribution (EPA, 2014f).

On August 1, 2016, the CEQ published the *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews.* The CEQ guidance memo outlines how NEPA analysis and documentation should address GHG emissions and the impacts of climate change. As recommended in this new guidance, to the extent practicable, the FERC staff has presented the direct and indirect GHG emissions associated with construction and operation of the projects and the potential impacts of GHG emissions in relation to climate change. The GHG emissions associated with construction and operation of the ACRP are discussed in section 2.8. Currently, there is no standard methodology to determine how the proposed project's incremental contribution to GHGs would translate into physical effects on the global environment. The GHG emissions from the construction and operation of the ACRP would be negligible compared to the global GHG emission inventory. However, emissions during construction and compressor station emissions during operation of the Project would increase the atmospheric concentration of GHGs, and TGP would be required to report CO_2 emissions as discussed in section 2.8. Because we cannot determine the Project's incremental physical impacts on the environment caused by climate change, we cannot determine whether the Project's contribution to cumulative impacts on climate change would be significant.

Noise

We identified 16 actions within the defined geographic scope for noise (1-mile radius) that could add to the cumulative noise impacts: wrinkle bend replacements, non-jurisdictional facilities associated with ACRP compressor stations, the UMTP Project, the Broad Run Expansion Project, the E-Systems Project, the Broad Run System Flexibility Project, and 5 transportation projects (Resurfacing SR165, KY-32 Reconstruction, and KY-377 Reconstruction). In section 2.9.3, we demonstrated that ACRP would result in a noise increase of about 2 dBA over the Broad Run Expansion Project facilities. This change in noise level would not be perceptible to human hearing.

Within the geographic scope for cumulative noise impacts, the UMTP Project would construct and operate two facilities that could contribute to cumulative noise impacts: Pump Station PS04 and the Tuscarawas NGL Storage Facility. Pump Station PS04 would be built near Compressor Station 110. Acoustic modeling shows that the pump station in addition to the Compressor Station 110 would increase sound levels at NSAs by at most 0.8 dBA, a change that is not perceptible to the human ear. The Tuscarawas NGL Storage Facility would be collocated with ACRP Compressor Station 211.5. Noise modeling shows Compressor Station 211.5 in combination with the NGL storage facility would result in an increase of about 2.0 dBA over the noise level predicted for ACRP alone. A 2.0 dBA change is not a perceptible change in sound level. No cumulative noise impacts are anticipated.

Some of the wrinkle bend remediation work could create minor cumulative noise impacts with ACRP's larger ground-disturbing activities at certain sites if they were to occur at the same time. Construction of the non-jurisdictional power facilities associated with ACRP compressor stations would be temporary and generally expected to last less than 1 week at each location.

Because the estimated sound levels for the ACRP would comply with FERC guidelines and, where applicable, local regulatory noise limits, cumulative noise impacts would not be likely on NSAs surrounding ACRP facilities. For construction of the ACRP compressor stations and new-build pipelines, noise impacts from multiple projects would need to occur simultaneously and in close proximity with ACRP activities in order for a cumulative effect to occur. Because construction schedules are unknown for most of the other projects and the fact that noise generated by construction activity is limited to the time period of construction, it is impossible to assess the potential cumulative impacts. Operational noise from other projects would also need to occur at the same time and place as ACRP noise generating operational facilities (compressor stations). Aside from the UMTP facilities described above, our cumulative analysis did not identify circumstances where more than one other project would occur simultaneously in the same region of influence with the ACRP. We conclude that construction and operation of the ACRP would not result in significant cumulative effects on noise receptors.

Conclusions

Overall, we conclude that the ACRP's contribution to cumulative impacts would be relatively minor, and would be further mitigated by our recommended additional measures to reduce the environmental impacts associated with the Project. Consequently, an insignificant cumulative effect is anticipated when the impacts of the Project are added to other projects in the geographic scope of resources affected by the ACRP.

2.11.4 Related Facilities – UMTP Project

Because stakeholders provided numerous comments on the related UMTP facilities, we include in this section the best available information regarding the overall resource-specific impacts for the UMTP Project as a whole. Although the Commission has no authority to approve or deny the UMTP Project and no ability to require any avoidance or minimization of related impacts, we provide information here to inform stakeholders and decision-makers. The proposed UMTP Project is shown in figure 2-3.

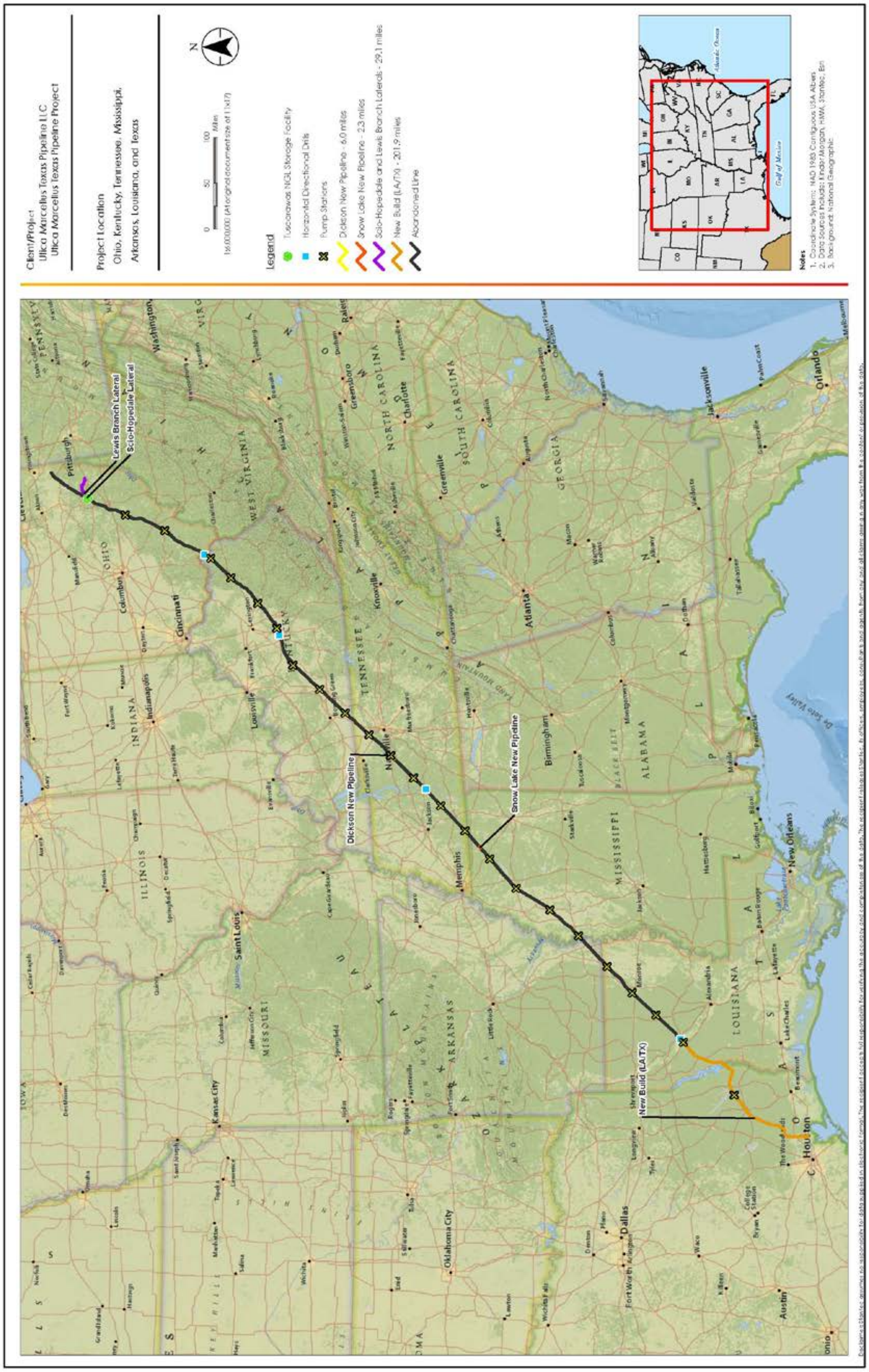

Figure 2-3. UMTP Project Overview

The UMTP Project would transport NGLs from existing processing plants in Ohio to Mont Belvieu, Texas. The UMTP Project would have an initial design capacity of 150,000 barrels per day of NGL, with the ability to deliver up to about 450,000 barrels per day of NGL to facilities on the Gulf Coast. UMTP would construct the following new facilities as part of the UMTP Project:

- a new 201.8-mile-long segment of 24-inch-diameter pipeline (new LA/TX pipeline) connecting TGP's abandoned pipeline in Natchitoches Parish, Louisiana, to Chambers County, Texas (50.4 miles in Louisiana and 151.4 miles in Texas), including a new meter station at the end of the pipeline in Chambers County, Texas;
- the Scio-Hopedale lateral, a new 27.7-mile-long multi-pipeline lateral with between four and six 12-inch- to 16-inch-diameter pipelines from the Hopedale Plant in Harrison County, Ohio, to the Scio Plant in Harrison County, Ohio, and terminating at the Tuscarawas NGL Storage Facility;
- the Lewis Branch lateral, a new 1.4-mile-long, multi-pipeline lateral with two 12-inch-diameter pipelines from the Lewis Plant to a connection on the Scio-Hopedale lateral in Harrison County, Ohio;
- the Tuscarawas NGL Storage Facility, a storage and distribution facility collocated with ACRP's Compressor Station 211.5 in Tuscarawas County, Ohio, containing six 50,000-barrel propane spheres, three 50,000-barrel butane spheres, three refrigerated 200,000-barrel butane tanks, five refrigerated 200,000-barrel propane tanks, two 250,000-barrel internal floating roof gasoline tanks, two 250,000-barrel internal floating roof condensate tanks, and appurtenant facilities;
- the Dickson pipeline, a new 6.0-mile-long, 24-inch-diameter pipeline connecting discontinuous segments of the converted pipeline, and associated access roads in Dickson County, Tennessee;
- the Snow Lake pipeline, a new 2.3-mile-long, 24-inch-diameter pipeline connecting discontinuous segments of the converted pipeline, and associated access roads in Benton County, Mississippi;
- 23 new NGL pump stations and associated access roads between Muskingum County, Ohio, and Jasper County, Texas, 11 of which would be built at or adjacent to existing TGP compressor stations;
- 35 MLVs and associated access roads between Tuscarawas County, Ohio, and Natchitoches Parish, Louisiana;
- two laydown yards for the Scio-Hopedale and Lewis Branch laterals; and
- three new meter stations in Harrison County, Ohio, associated with the Hopedale, Scio, and Lewis plants in Harrison County, Ohio.

Construction of these facilities would follow standard construction methods similar to those described for the ACRP in sections 1.10.2 through 1.10.4.

During operation of the Tuscarawas NGL Storage Facility, UMTP would store inbound propane and butane in pressurized spheres holding 50,000 barrels at ambient temperature and between 40 and 200 pounds per square inch gauge (psig). Propane would then be cooled to about minus 70°F and transferred to 200,000-barrel insulated tanks and stored at 1 psig. Butane would be cooled to 20°F and stored at 1 psig. When shipped out of the facility, the propane and butane would be heated by a hot oil circulation system to approximately 50°F and pressurized to approximately 600 psig. The Tuscarawas

NGL Storage Facility would also store gasoline and condensate in tanks with internal floating roofs at atmospheric pressure. As with the other streams, the pressure would be increased to 600 psig for shipment on the NGL pipeline system.

The UMTP Project would also modify TGP's abandoned pipeline. Modifications to the pipeline would occur at a total of 219 sites where segments of pipe with old connections to existing natural gas pipeline systems would be replaced with straight pipe and at four locations where straight pipe would be installed to bypass compression units disconnected as part of the ACRP.

The following section describes, by resource, the general impacts that would occur from the overall UMTP Project, whereas the cumulative impact analysis above included only the portion of the UMTP Project that was within the ACRP geographic scope. We requested this information from TGP to inform decision makers and stakeholders.

Appendix K provides a summary of the permits, approvals, and consultations UMTP would obtain prior to construction of the new facilities.

Soils

Potential impacts on soils from the UMTP Project would be similar to those described for ACRP and would consist of short-term direct impacts from ground-disturbing activities during construction and long-term impacts from operation of aboveground facilities. To reduce potential impacts, UMTP would implement UMTP Project Construction Standards, which are similar to methods implemented for ACRP. UMTP would also limit grading to provide adequate staging and access to the project area to conserve existing vegetation.

Water Resources and Wetlands

The UMTP Project would cross 452 waterbodies, including 9 major waterbodies (Ohio, Dix, Tennessee, Red, Sabine, Angelina, Neches, Trinity, and Old Rivers). A total of 55 waterbodies, including the 9 major waterbodies, would be crossed using the HDD method. An additional 246 waterbodies would be crossed using open cut methods and 94 waterbodies would be crossed using dry crossing methods. The 452 waterbodies crossed include 101 perennial, 134 intermittent, and 131 ephemeral, as well as 15 waterbodies designated as open water. The flow type for 71 waterbodies crossed has not yet been determined.

Construction of the UMTP Project would affect about 142 acres of wetlands. Of this total, about 1.2 acres would be permanently converted to industrial uses within the operational footprint. About 79 acres of forested (PFO) or scrub (PSS) wetland within the 142 acres would be permanently converted to and maintained as emergent wetland to facilitate monitoring and visual inspection of the pipeline. Finally, the remaining 39 acres of forested wetlands within the construction disturbance area would be allowed to revert to pre-construction conditions. TGP has not received survey permission for all areas to be disturbed by the UMTP Project, and has used NWI data to estimate wetlands impacts in unsurveyed areas.

Municipal or sensitive watershed areas that may be affected by the UMTP Project include 41 Drinking Water Unusually Sensitive Areas and 1 National Sole Source Aquifer crossed by planned construction activities. These occur along the converted pipeline in counties in Ohio, Kentucky, Tennessee, Mississippi, Louisiana, and Texas, and along lateral pipelines in Ohio and new-build pipeline and meter stations in Texas and Louisiana.

Construction impacts on waterbodies and wetlands would be similar in nature, but greater in magnitude, to those described for the ACRP. Use of the HDD method at waterbody crossings would minimize direct impacts on waterbodies, but could result in indirect impacts through an inadvertent release of drilling fluids that could affect water quality within the waterbody. An inadvertent release occurs when the drilling fluid (composed mostly of water and bentonite clay) finds pathways through natural fissures in the soil and rock along the drill path. Impacts on waterbodies from an inadvertent release would include temporary increases in turbidity. Crossing methods for waterbodies and wetlands would be designed to minimize impacts and would be in compliance with Nationwide Permit 12 permit conditions determined by the COE and other applicable state and local regulations. UMTP would follow the measures outlined in its Construction Standards, which TGP states would be similar to the methods for the ACRP, which are described in section 1.10. UMTP would also follow its SPCC Plans and state-specific stormwater pollution prevention plans.

We received a number of comments on the potential for leaks during operation of the UMTP Project and the impact of those leaks on waterbodies and other resources. Leaks of NGL could result in contamination of groundwater or surface water. The NPS noted the potential for impacts on Mammoth Cave National Park, which would be crossed by the UMTP Project. In a letter dated May 18, 2015, the NPS cited concerns about spills affecting Mammoth Cave National Park, the longest known cave system in the world, and the surrounding karst topography and "groundwatersheds" extending outside Park boundaries.

Vegetation and Wildlife

Potential impacts on vegetation and wildlife associated with the UMTP Project and methods to reduce, avoid, or mitigate those impacts would be similar to those presented for the ACRP. Construction of UMTP would disturb approximately 2,000 acres of forested land. These impacts would be considered long-term due to the time required for the trees to grow back to pre-construction conditions. Construction would also impact about 400 acres of agricultural land and 580 acres of open land. In total, the UMTP Project would affect about 3,500 acres of land during construction and about 1,740 acres of land would be within permanent right-of-way. Loss of vegetative groundcover, mature forest, and other habitats would have direct and indirect impacts on wildlife. The removal of forested vegetation would fragment habitats and could change wildlife movement.

Migratory birds of concern that could be affected by the UMTP Project are largely the same species described as priority migratory birds for the ACRP, with the addition of several species that may be affected by the UMTP Project in Texas. Similar to the ACRP, UMTP would conduct pre-construction vegetation removal associated with the UMTP Project outside the breeding season in order to minimize impacts on nesting bird species or would coordinate with the USFWS field office and perform migratory bird nesting surveys to identify and avoid nesting birds within the proposed activity area.

The UMTP Project would not affect any unique or sensitive vegetation communities or wildlife habitats in Ohio, Tennessee, or Arkansas. In Kentucky, the UMTP Project would temporarily and permanently affect portions of the Green River Bioreserve Megasite in Barren and Taylor Counties, Ohio, and would temporarily affect the North Fort of Triplett Creek Corridor Macrosite in Rowan County, Ohio. The UMTP Project would cross a high priority (Tier 1) priority conservation area in Barren County, Kentucky. In Mississippi, the UMTP Project may impact dry oak-hickory forest woodland habitat in Marshall County. There also would be temporary and permanent impacts on water oak-willow oak series communities in Texas. In Louisiana, 17 natural communities could potentially be affected by the UMTP Project (see table 2.11-4).

Table 2.11-4

Natural Communities in Louisiana Potentially Affected by the UMTP Project

Natural Community	Parish
Bayhead Swamp	Jackson
Bottomland Hardwood Forest	Natchitoches, Sabine, Vernon
Calcareous Prairie	Sabine and Vernon
Cypress-Tupelo Swamp	Natchitoches
Flatland Ponds	Vernon
Fleming Calcareous Prairie	Natchitoches
Forested Seeps	Natchitoches and Sabine
Hardwood Slope Forest	Jackson, Natchitoches, and Ouachita
Mixed Hardwood/Loblolly Pine Forest	Jackson, Natchitoches, Ouachita, Vernon
Pine Flatwoods	Vernon
Saline	Sabine
Sandstone Glade/Prairie	Natchitoches, Sabine
Shortleaf/Pine Oak Hickory Forest	Natchitoches
Small Stream Forest	Natchitoches, Sabine, Vernon
Western Acidic Longleaf Pine Savannah	Natchitoches
Western Hillside Seepage Bog	Natchitoches, Vernon
Western Upland Longleaf Pine Forest	Natchitoches, Sabine, Vernon
Western Xeric Sandhill Woodland	Natchitoches, Vernon

In Texas, the UMTP Project area is within the coastal zone associated with the 1-mile buffer of Cedar Bayou, a tidal river in Chambers County, Texas, and therefore the UMTP Project area in Texas would be subject to the requirements of the Coastal Zone Management Act. The Texas Parks and Wildlife Department identified six Ecologically Significant Stream Segments within the UMTP Project area in Texas: Pine Island Bayou, Sabine River, Neches River, Angelina River, Big Sandy Creek, and Trinity River. The Angelina River is considered a mussel sanctuary under Texas Administrative Code. The Texas Parks and Wildlife Department recommends that actions avoid sedimentation and construction be conducted during periods with low rainfall. UMTP would use the HDD crossing method to minimize impacts at the crossing of the Angelina River. No impacts would be associated with the Angelina Neches/Dam B WMA in Tyler County, Texas, because the Project would occur downstream of the WMA. No impacts would be associated with the Trinity River NWR in Liberty County as no construction activities would take place in the NWR. UMTP, along with proponents of other oil and gas actions, would be required to consult with state agencies to determine the construction timing window to avoid unnecessary impacts on these resources.

In addition, based on spatial locations in the Texas Natural Diversity Database, the UMTP Project would affect about 54 acres in three sensitive or protected vegetation types or plant communities. These include Bald Cypress-Water Tupelo Series, the Water Oak-Willow Oak Series, and Water Oak-Willow Oak Series.

No essential fish habitat was identified within the UMTP Project area (National Oceanic and Atmospheric Administration, National Marine Fisheries Service, 2016). Furthermore, the use of HDD crossing methods and other techniques would be implemented in order to reduce impacts on fisheries resources.

We received a number of comments on the potential for inadvertent releases during operation of the UMTP Project and the impact of those leaks on wildlife. Leaks of NGL could result in adverse effects on aquatic wildlife or terrestrial wildlife that use water for drinking or as habitat for their prey species.

Threatened and Endangered Species

As stated in section 2.4.1 of the EA, we have included information on potential effects of the UMTP Project on federally listed species. TGP conducted research and surveys and provided effect determinations for special status species that have the potential to be affected by the UMTP Project. There are 108 special status species that were assessed in detail for the UMTP Project. This includes 36 federally listed wildlife species, 9 federally listed plant species, and 2 candidate species that were identified through consultation with USFWS field offices in Ohio, Kentucky, Tennessee, Mississippi, Arkansas, Louisiana, and Texas. In appendix J, tables J-2 through J-8 summarize the federally listed species potentially occurring in each state and TGP's proposed effect determination for each.

Four federally listed bat species have the potential to occur within the UMTP Project area: the Indiana bat, northern long-eared bat, gray bat, and Virginia big-eared bat. The Indiana bat has been documented near the UMTP Project in Kentucky, Ohio, and Tennessee, and the northern long-eared bat has been documented near the UMTP Project in Ohio and Tennessee. UMTP would execute a forest-dwelling bat Conservation MOA with the USFWS Kentucky Field Office to allow for the removal of forested habitat within the range of the Indiana bat. Removal of forested habitat for the northern long-eared bat would not be considered take under the final 4(d) rule established on January 14, 2016. For these species, TGP's effect determinations ranged from may affect, but *not likely to adversely affect* to *no effect,* depending on the state and the species (see appendix J, tables J-2 through J-8).

Two federally listed endangered bird species, the least tern and red-cockaded woodpecker, were assessed in detail for the UMTP Project. Both species have a high potential for occurrence in the UMTP Project area. The least tern was documented along the Red River in Bossier Parish, Louisiana, and potential habitat may be present within the UMTP Project area in Natchitoches Parish, Louisiana. Red-cockaded woodpeckers have been documented in close proximity to several portions of the UMTP Project in Louisiana and Texas. TGP's effect determinations for the least tern ranged from may affect, but *not likely to adversely affect* to *no effect*, depending on the state (see appendix J, tables J-2 through J-8). TGP's effect determinations for red-cockaded woodpeckers are pending completion of surveys within UMTP Project workspaces.

The UMTP Project would cross groundwater basins in Barren and Marion Counties, Kentucky, in which the endangered Kentucky cave shrimp and candidate Tatum Cave beetle, respectively, are known to be or are potentially present. Designated critical habitat for Kentucky cave shrimp is also present in Barren County, but more than 10 miles from the existing pipeline. During construction, the UMTP Project could directly affect habitat for the two species through impacts on caves, sinkholes, or other karst features. In addition, indirect effects could also occur because of impacts on water quality from stream channel or bank disturbance, or discharge such as from hydrostatic testing. TGP states that no cave, sinkholes, or karst features would be within UMTP Project workspaces in Barren and Marion Counties. TGP further states that no stream channel or bank disturbance is proposed in Marion County, and no wetland or waterbodies occur within UMTP Project workspaces in Barren County. TGP's effect determination for Kentucky cave shrimp and Tatum Cave beetle in Kentucky is *no effect*.

The UMTP Project would cross watersheds containing federally listed freshwater mussel species and their critical habitat. TGP evaluated potential effects on 12 species of federally listed freshwater mussel species were assessed in detail: fanshell, fat pocketbook, orangefoot pimpleback, pink mucket, rabbitsfoot, ring pink, rough pigtoe, sheepnose, slabside pearlymussel, snuffbox, spectaclecase, and white wartyback. Desigated critical habitat for rabbitsfoot includes reaches of the Green River in Green County, Kentucky, and the Duck River in Hickman County, Tennessee. Although the potential for these species to occur within the UMTP Project area is moderate, low, or unlikely for all 12 species, indirect impacts on the species due to in-water work associated with the UMTP Project is possible. The UMTP Project crosses rabbitsfoot critical habitat in the Green River and the Duck River, but both of these crossings are associated with the already existing pipeline, and no new crossings of the Green River and Duck River are proposed. For these species, TGP's effect determinations ranged from may affect, but *not likely to adversely affect* to *no effect*, depending on the state and the species (see appendix J, tables J-2 through J-8).

In Allen and Taylor Counties, Kentucky, the UMTP Project would cross watersheds in which the federally listed endangered diamond darter has potential to occur. Designated critical habitat for diamond darter includes the Green River in Green, Hart, and Edmonson, Counties, Kentucky (USFWS, 2015d). No streams occur in the UMTP Project workspaces in Allen or Taylor Counties and thus potential impacts on the diamond darter are not expected. The UMTP Project crosses diamond darter critical habitat in the Green River, but this crossing is associated with the already existing pipeline, and no new crossings through the Green River are proposed. TGP's effect determination for diamond darter in Kentucky is *no effect*.

The UMTP Project would cross watersheds in which the federally listed endangered pallid sturgeon has potential to occur in Washington County, Mississippi; Chicot County, Arkansas; and Natchitoches Parish, Louisiana. The pallid sturgeon uses large, turbid, free-flowing rivers and their tributaries with strong current over firm gravel or sandy substrates (NatureServe, 2015). TGP has not identified suitable habitat for the the pallid sturgeon in UMTP Project workspaces in Mississippi, Arkansas, or Louisiana. No in-stream work is proposed as part of the UMTP Project in Washington County, Mississippi, or Natchitoches Parish, Louisiana, and no workspaces would occur within 0.5 mile of the Mississippi River. In Arkansas, pallid sturgeon is restricted to the Mississippi River, and no UMTP Project workspaces would occur within 0.5 mile of the Mississippi River. The TGP effect determination for pallid sturgeon is *no effect*.

The federally listed endangered pygmy madtom is potentially present in watersheds crossed by the UMTP Project. Pygmy madtom are known to occur in the lower Duck River in Hickman and Humphries Counties, Tennessee, and the middle Clinch River in Hancock County, Tennessee. The existing pipeline that would be used for NGL transport crosses these waterbodies, but no construction activities are proposed at these crossings. No UMTP Project workspaces are in Hickman, Humphries, or Hancock Counties, Tennessee. TGP's effect determination for pallid sturgeon is *no effect*.

During operation of the UMTP Project, impacts on aquatic species described above could occur as a result of leaks from the pipeline, which could contaminate groundwater in karst systems in groundwater basins with Kentucky cave shrimp and could contaminate surface water in watersheds containing other federally listed mussel and fish species. The USFWS requested that TGP evaluate the structural soundness of the existing pipeline in the groundwater basins and watersheds containing federally listed endangered species and critical habitat. The USFWS also asked TGP to replace portions of the pipeline likely to fail in the foreseeable future due to the age of the pipeline or other factors. The Commission has no jurisdiction to require TGP to replace portions of the pipeline after it has been abandoned and sold to an affiliate (UMTP) for future use as an NGL transportation line. The DOT is mandated to prescribe minimum safety standards to protect against risks posed by pipeline facilities under 49 U.S.C. Chapter 601. UMTP would comply with applicable regulations and requirements to ensure safe operation of the UMTP Project. UMTP would meet PHMSA requirements for conversion of service, which are described in detail under the reliability and safety section below.

TGP conducted reconnaissance surveys and species-specific investigations for federally listed plant species within the UMTP Project area and assessed six species of federally listed plant species in detail. No individuals or populations of federally listed plants were identified in the UMTP Project area; however, suitable habitat was identified for five of the six species. For these species, additional surveys could be necessary to determine presence/absence or coordination with the USFWS may be necessary to mitigate impacts. TGP's effect determinations for federally listed plant spcies ranged from may affect, but *not likely to adversely affect* to *no effect*, depending on the state and the species (see appendix J, tables J-2 through J-8). However, effect determinations for two species (Price's potato-bean and Short's bladderpod) are pending completion of species-specific surveys within UMTP Project workspaces.

Land Use

About 2,000 acres of forest land would be affected by construction of the UMTP Project. About 400 acres of agricultural land would be disturbed during construction of which about 220 acres would be within the permanent right-of-way. About 340 acres of prime farmland would be affected during construction. Except for locations with aboveground facilities, agricultural land could continue to be used for agricultural purposes. About 580 acres of open land would be disturbed during construction, of which about 270 acres would be within the operational right-of-way of the UMTP Project. Long-term impacts would occur from the permanent operational footprints of facilities, and the removal of forest land, which accounts for a substantial proportion of land cover along the Scio-Hopedale and Lewis Branch laterals in Ohio, and along the route of the new LA/TX pipeline.

UMTP Project activities and associated land requirements are summarized in table 2.11-5.

Table 2.11-5

Summary of Land Requirements Associated with the UMTP Project

Facility	Land Affected during Construction (acres)	Land Affected during Operation (acres)
New Pipeline Construction in Louisiana	631.3	305.3
New Pipeline Construction in Texas	1,855.0	919.2
Scio-Hopedale Lateral	394.5	206.5
Lewis Branch Lateral	19.0	8.4
Tuscarawas NGL Gas Storage Facility	70.4	63.3
Dickson Pipeline	79.0	36.8
Dickson Pipeline Access Roads	1.1	1.1
Snow Lake Pipeline	36.4	14.4
Snow Lake Pipeline Access Roads	0.9	0.9
Pump Stations	220.3	102.9
Pump Station Access Roads	7.2	7.2
MLVs	32.1	2.0
MLV Access Roads	36.8	36.8
Laydown Yards for Ohio Laterals	24.3	0.0
Meter Sites in Ohio	4.2	3.0
Modifications to Conversion Line	9.6	1.4
HDD Crossings	62.7	25.5
HDD Crossing Access Roads	3.6	3.6
Project Total	3,488.4	1,738.3

Recreation and Visual Resources

The centerline of the new Dickson pipeline would be about 400 feet from the Montgomery Bell State Park in Dickson County, Tennessee. The centerline of UMTP's Snow Lake pipeline would be about 140 feet from the Holly Springs National Forest in Benton County, Mississippi. The centerline of the new LA/TX pipeline would be 20 feet from the Big Thicket National Preserve and about 130 feet from the Angelina Neches/ Dam B Wildlife Management Area. The Scio-Hopedale lateral would cross Conotton Creek Trail in Harrison County, Ohio at two locations.

Operation of these pipelines would not be expected to affect the recreational resources of these public lands, designated areas, or recreation sites. The auditory and visual intrusion from construction activities would affect the visitor experience. The removal of forest would be easily noticed by visitors to the areas of construction. Since forested areas would take years to re-vegetate, these would be long-term major impacts on the visual resources.

The UMTP Tuscarawas NGL Storage Facility would be near two sensitive viewpoints from which the facility would be visible as described in section 2.11.3: one on Blizzard Ridge Road SE (CR30), and the second on Edie Hills Road SE (CR34). TGP states that with the exception of the Tuscarawas NGL Storage Facility, the aboveground facilities associated with the UMTP Project would not be visible from sensitive viewpoints.

Socioeconomics

The types, though not the magnitude, of general socioeconomic impacts associated with the UMTP Project would be similar to those associated with the ACRP. Details regarding the effects of the Tuscarawas NGL Storage Facility on socioeconomic resources are described in section 2.11.3. During construction of the UMTP Project, short-term impacts would occur, including increased traffic along some roadways from the delivery of equipment and materials and the movement of workers, and the use of temporary housing accommodations by nonlocal construction workers. Short-term beneficial impacts would result from purchases of equipment fuel and some construction materials, and from expenditures by nonlocal construction workers on housing, transportation, food, and entertainment.

Operation of the UMTP Project would not affect traffic, permanent housing, or public services due to the low number of new hires. Based on the specific requirements for each jurisdiction, UMTP would pay *ad valorem* taxes based on the assessed value of the UMTP Project facilities.

We received a number of comments on the potential for inadvertent releases during operation of the UMTP Project and subsequent social and economic impacts.

Cultural Resources

TGP completed archaeological and historical architectural investigations of the APEs for most proposed construction workspaces for the UMTP Project between November 2013 and October 2015. Surveys were not conducted for the converted pipeline, which would be converted in place and would not affect cultural resources. Additional archaeological and architectural surveys are pending landowner permissions in most states. Archaeological investigations consisted of pedestrian survey, visual inspection, shovel test pits, surface collection, evaluative testing, and deep testing at construction areas where ground disturbance could directly affect archaeological sites. Historic architecture surveys identified and evaluated NRHP eligibility for standing historic architecture near proposed pump stations and pipeline laterals where construction and operation could cause indirect visual effects.

Cultural resource surveys for the UMTP Project identified a total of 47 archaeological sites, 28 archaeological isolated finds, and 104 historic architectural resources. These include 24 archaeological sites and 7 architectural resources that are listed on, eligible for, potentially eligible for, or unevaluated for the NRHP. Indirect effects on the architectural resources are unknown for all but one NRHP-listed resource, which would be screened from view of the UMTP Project and would not be affected. The UMTP Project would avoid or have no impact on three archaeological sites. UMTP has recommended avoidance, evaluative testing, or data recovery for the remaining 21 archaeological sites and is consulting with the SHPO in each state to resolve potential adverse effects to historic properties in compliance with Section 106 of the NHPA. UMTP would also implement an inadvertent discovery plan to minimize potential impacts on unknown resources.

Air Quality

Air emissions associated with construction and operation of the UMTP Project would be localized. Construction emissions would result from heavy equipment burning fossil fuels and fugitive dust from ground-disturbing activities (see table 2.11-6). The UMTP Project pump and metering stations would be electrically powered, and the only operational emissions would be limited to pump station flares. Table 2.11-7 provides the annual operational air emissions associated with pump station operation. Total operational emissions would be below the *de minimis* standards for conformity. TGP has not yet provided estimates of emissions from the Tuscarawas NGL Storage Facility. UMTP would construct and operate its project such that it complies with federal, state, and local air quality regulations.

Table 2.11-6

Construction Emissions for UMTP Project Pump and Meter Stations

	Total Site Emissions (tons/year)						
Facility	**NO_x**	**VOC**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**GHGs**
UMTP Project Pump and Meter Stations	8.9	1.0	6.7	0.03	22.0	2.7	5,529
Conformity de Minimis	**100**	**100**	**-**	**100**	**100**	**100**	**-**

Table 2.11-7

Operation Emissions for UMTP Pump Stations

	Station Drainout (1 event per year)		MSS [a] Blowdown (4 events per year)		Total (Drainout and Blowdown)
Emissions	**tons/event**	**tons/year**	**tons/event**	**tons/year**	**tons/year**
Vented	23.0	23.0	8.4	33.8	56.8
VOC	14.0	14.0	5.2	20.6	34.7
HAP	2.4	2.3	0.9	3.5	5.9
CO_2e	11.1	11.1	4.1	16.3	27.4

a MSS – maintenance, start-up, and shutdown

Noise

Noise associated with construction and operation of the UMTP Project would be localized. Construction noise would result from the use of heavy equipment at UMTP Project sites such as the pump stations. Operationally, noise from the UMTP Project would be associated mostly with the Tuscarawas NGL Storage Facility (discussed in section 2.11.3) and the pump stations. Electrically driven pumps at the pump stations would generate noise at levels that would attenuate to background within 0.5 mile of each pump station. Sound levels at NSAs closer to each pump station may be perceptible depending on background sound levels. Table 2.11-8 provides sound levels at various distances from two theoretical pump stations, with Scenario 1 representing a pump station with one electrical 1,500 hp pump and Scenario 2 representing a pump station with two electrical 1,500 hp pumps. Additionally, TGP anticipates noise from blowdown events at each pump station similar to those that would result at ACRP compressor stations; however, blowdown events would be infrequent and temporary, which would minimize effects. Nevertheless, periodic noise from these blowdown events could impact nearby NSAs.

Table 2.11-8

Noise Levels for UMTP Pump Stations

	Sound Level (dBA L_{dn})					
Scenario	**Property Line**	**Property Line +100 feet**	**Property Line +150 feet**	**Property Line +250 feet**	**Property Line +350 feet**	**Property Line +500 feet**
Scenario 1	61.6	56.2	54.4	51.4	49.2	46.3
Scenario 2	66.4	61.7	60.1	57.1	54.9	52.0

Reliability and Safety

The UMTP Project would convert about 964 miles of abandoned natural gas pipeline to carry NGLs. The transportation of NGLs by pipeline involves some risk to the public in the event of an accident and subsequent release of liquid. The DOT is mandated to prescribe minimum safety standards to protect against risks posed by pipeline facilities under 49 U.S.C Chapter 601. The DOT's PHMSA administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials, including NGLs, by pipeline. The DOT pipeline standards are published in 49 CFR 190-199. Part 195 specifically addresses safety issues for the transportation of hazardous liquids by pipelines.

UMTP would comply with applicable regulations and requirements to ensure safe operation of the UMTP Project. UMTP would meet PHMSA requirements for conversion of service (i.e., conversion from natural gas to NGL) (79 FR 56121–56122; PHMSA, 2014b). These requirements include:

- review of design, construction, and operations and maintenance records or performing testing to ensure safe operation;
- visual inspection of the right-of-way, all aboveground segments, and selected underground segments;
- correction of all known unsafe defects and conditions;
- verification of design pressure through hydrostatic testing under CFR 195.5(a);
- performing record maintenance throughout the life of the pipeline; and
- complying with corrosion control measures listed in Part 195, Subpart H within 1 year of service.

The Tuscarawas NGL Storage Facility would be designed and constructed in accordance with 29 CFR 1910.119, "Process Safety Management of Highly Hazardous Chemicals" and American

Petroleum Institute (API) Standard 2510 "Design and Construction of LPG Facilities." Liquefied petroleum gases (LPG), which include NGLs, would be stored in pressurized tanks built to American Society of Mechanical Engineers Section VIII or refrigerated tanks built to API Standard 620. Gasoline and condensate would be stored in floating roof tanks built to API Standard 650. Facility design and layout, containment and fire protection systems would use API Standard 2510, the National Fire Protection Association Standard 58 for the storage of LPGs, and other National Fire Protection Association standards and local building, electrical and fire codes for design guidance. Piping systems would be designed, constructed and tested in accordance with American Society of Mechanical Engineers Standard B31.3.

TGP states that the UMTP Project would comply with 49 CFR Parts 194 and 195 and has been designed to minimize the susceptibility of the system to cyclical fatigue due to changes in operating temperature, pressure gradient, and pressure fluctuations. UMTP would follow the measures in PHMSA's advisory bulletin "Guidance for Pipeline Flow Reversals, Product Changes, and Conversion to Service" (PHMSA, 2014b), which may include the following:

- addition of electrical pumps at existing compressor stations and addition of new pump stations;
- replacement of MLVs and meters;
- adjustments to valve spacing as needed based on requirements for liquids; and
- adjusting the leak detection systems based on requirements for liquids.

Within 1 year of the start of operation of the UMTP Project, UMTP would comply with CFR section 195.452(a)(3), and develop a written integrity management program to identify each pipeline segment, the date it begins operation, and address risk on each pipeline segment.

Conclusions

The UMTP Project would affect a number of resources, including soils, water resources, wetlands, vegetation, wildlife, federally listed species, land use, cultural resources, air quality, and noise. Most of the impacts would occur during construction, particularly in areas of ground disturbance such as installation of new pipeline. During operation, the Tuscarawas NGL Storage Facility would have impacts on air quality, noise, and the viewshed. The pump stations would have noise impacts. In the event of a leak, impacts could occur primarily on water resources, wildlife, and listed species. The most sensitive areas relative to a potential leak would be at waterbody and wetland crossings and in areas of karst.

3.0 ALTERNATIVES

In accordance with NEPA and FERC policy, we evaluated alternatives to the Project. These alternatives included the no-action alternative, abandonment by removal, system alternatives, and capacity restoration facility alternatives. The evaluation criteria used for developing and reviewing alternatives were:

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

In the alternatives analysis we looked at the objectives of the Project in two steps. The first objective of the Project is to disconnect and abandon[18] segments of TGP's existing pipeline system, which would be removed from interstate natural gas service. The second objective of the Project is to construct and operate new natural gas infrastructure to maintain the service and capacity of the remaining existing natural gas system at its current level of about 9 billion cubic feet per day in order to meet TGP's firm transportation contract commitments to existing customers. We first analyze the no-action alternative. We then analyze alternatives to the proposed abandonment, followed by a discussion of the alternatives evaluated for the proposed capacity restoration facilities.

3.1 No-Action Alternative

Under the no-action alternative, TGP would not abandon the existing lines or construct the capacity restoration facilities and none of the adverse or beneficial impacts of the Project (as described in section 2.0) would occur. If the Project is not completed, TGP's customers would continue to pay the expense of ongoing operations and maintenance of the pipeline proposed to be abandoned, possible future pipeline replacements, and eventual abandonment liability for the abandoned line. Such costs are expected to exceed the ongoing costs of operating and maintaining the Project's replacement facilities. In addition, ongoing maintenance, repair, and replacement of aging segments of the pipeline would cause some level of environmental impact along the right-of-way. It is unknown whether these impacts would be greater than, similar to, or less than the impacts analyzed in section 2.0 of this EA. However, given the minimal footprint of the ACRP, it is unlikely that the impacts of maintaining the existing system would be significantly less. Further, we conclude that the no-action alternative would not satisfy the Project objectives.

3.2 Pipeline Abandonment Alternative

One possible alternative to the proposed abandonment-in-place is abandonment by removal. Under this alternative, the pipeline would be taken out of service and removed from the right-of-way. If this alternative was implemented, TGP would be required to either file another application or amend its current application. Removal would result in a considerably greater amount of ground disturbance than the abandonment proposed by TGP. Therefore, we conclude that abandonment by removal would not provide a significant environmental advantage over the proposed Project and do not consider it further.

3.3 Capacity Restoration Facility Alternatives

Using the evaluation criteria, we assessed various alternatives to the proposed capacity restoration facilities. In the following section, we first discuss system alternatives. We then discuss an alternative to the overall proposed design of the capacity restoration facilities; in other words, an alternative to the combination of looping and compression to achieve the necessary capacity stated in the Project's objectives.

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[18] In utility law, the term "abandon" refers to government authorization for a utility to cease provision of a particular service and/or shut down a particular facility.

3.3.1 System Alternatives

System alternatives would use other existing, modified, or proposed facilities to meet the objectives of the proposed Project. A system alternative would make it unnecessary to construct all or part of the Project, although modifications or expansion of existing or proposed pipeline systems may be required. These 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 Project. The purpose of identifying and evaluating system alternatives is to determine whether the environmental impacts associated with construction and operation of the Project could be avoided or reduced by using another pipeline system, while still meeting the objectives of the Project. Although other existing natural gas pipeline systems are in the region, we are not aware of system pipeline alternatives that would meet the objectives of the proposed Project.

In addition to TGP's pipeline system, figure 3-1 shows several existing natural gas pipeline systems, including the Columbia Gas System and the Columbia Gulf Transmission System, and the Spectra Energy Texas Eastern Transmission System. In order to meet the purpose and need of the Project, the other pipeline companies likely also would need to build new pipeline facilities and add compression and/or looping to their existing systems in order to deliver the additional capacity to the natural gas system remaining in Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, and Ohio. Construction of these facilities would likely result in impacts similar to or greater than the impacts resulting from the proposed Project and would therefore not provide an environmental advantage over the proposed action. For these reasons, we have eliminated pipeline system alternatives from further consideration.

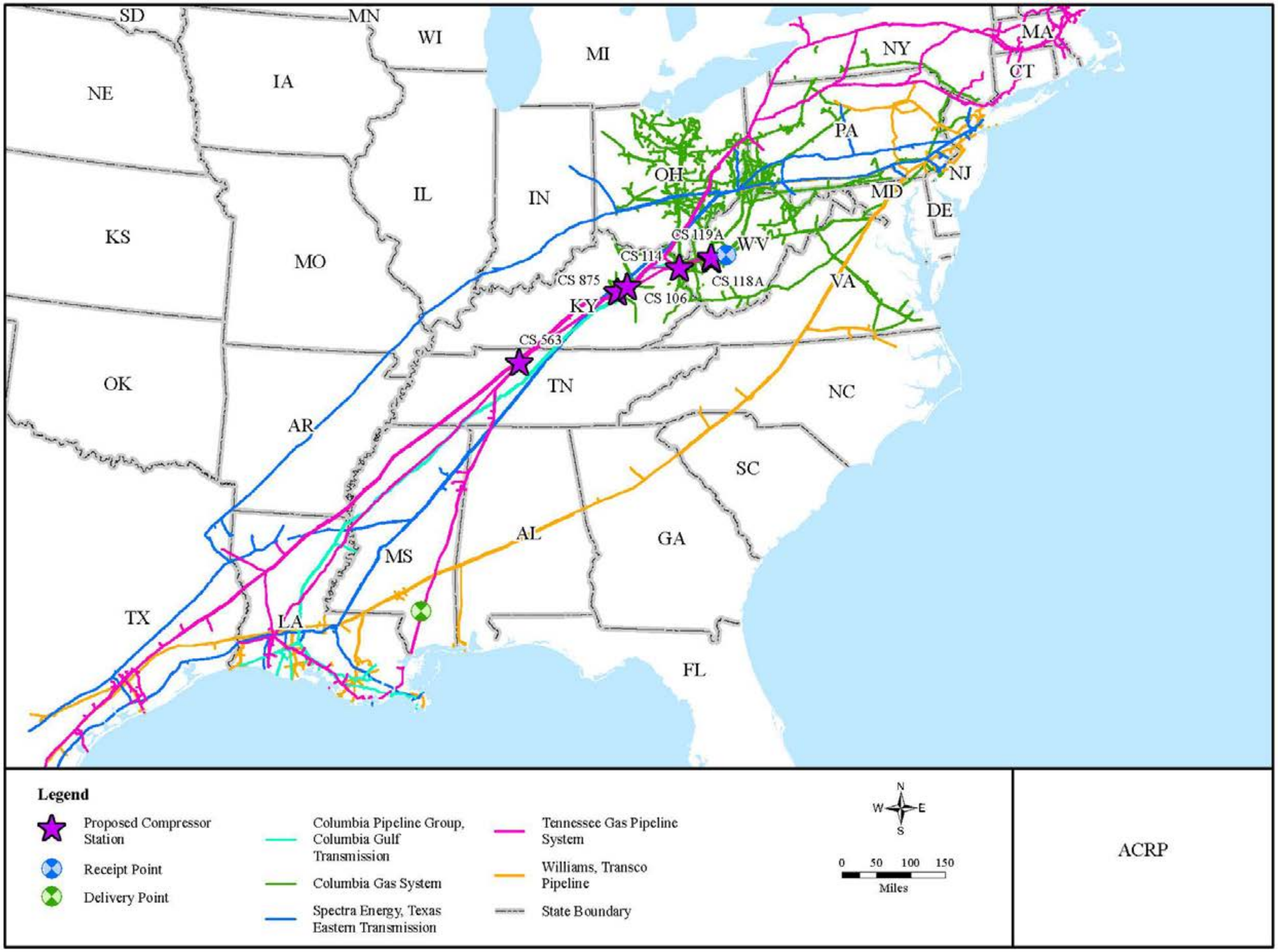

Figure 3-1. Other Pipeline System Alternatives

3.3.2 Alternative to Overall Design of Capacity Restoration Facilities

Generally, pipeline capacity can be increased by adding compression, looping, or a combination of both. We examined a compression alternative in which TGP would construct a fifth new midpoint compressor station between existing Compressor Stations 200 and 110 in place of the proposed new-build pipeline. This alternative would eliminate the long-term impacts of the 7.7-mile-long new-build pipeline, which would permanently affect about 47 acres of land for operation and clear about 80 acres of forest. However, construction of another new midpoint compressor station would also have environmental impacts, including the clearing and permanent use of at least 20 acres of land. A new midpoint compressor station would also have long-term effects on air quality and noise. Because the new-build pipeline would have no operational air quality or noise impacts, we cannot conclude that building additional compression would have a significant environmental advantage over the proposed new-build pipeline and did not consider this alternative further. Table 3.3-1 presents a comparison between the proposed ACRP, including the 7.7-mile-long new-build pipeline, and the alternative of replacing the new-build pipeline with a fifth new midpoint compressor station.

Table 3.3-1

Compression-Only Alternative

Environmental Factor	Proposed ACRP	Alternative Fifth New Compressor Station
Number of New Compressor Stations	4	5
Miles of New-build Pipeline	7.7	0
Land Required for Operation (acres) [a]	256	225
Forested Land Impacts (acres)	112	32
Operational Air Emissions [b]		
GHGs (tons per year)	558,154	637,354
Hazardous Air Pollutants (tons per year)	7.92	9.12

a We have assumed about 15 acres of non-forested land would be needed for operation of the fifth compressor station.

b We have assumed the fifth compressor station would have the same emissions as each of the four midpoint compressor stations proposed for ACRP.

3.4 Alternative Route for New-build Pipeline

We looked at an alternative route to the new-build pipeline to evaluate whether another route would meet our evaluation criteria and reduce impacts from constructing the proposed new-build pipeline. A route alternative deviates from a proposed pipeline alignment for a substantial length and distance in an effort to reduce overall environmental impacts. The purpose of the pipeline is to reduce pressure drop associated with the abandonment of the 100-3 pipeline between Compressor Stations 200 and 110. As currently proposed, the pipeline would be collocated with the existing 100-5 pipeline.

For our review, TGP provided information on an alternative route to the north of the proposed route. For this alternative, the length of the pipeline would need to increase to obtain the same hydraulic benefit, and the pipeline would not be collocated in an existing pipeline corridor. To obtain the same hydraulic benefit as the proposed 7.7-mile-long new-build extension of the 100-7 pipeline, an alternative pipeline route ending immediately downstream of Compressor Station 200 would result in a 9.7-mile-long pipeline, and would also require the installation of an additional pig launcher and receiver. This alternative pipeline route is shown in figure 3-2, and table 3.4-1 compares the alternative pipeline route to the proposed route using a number of environmental factors.

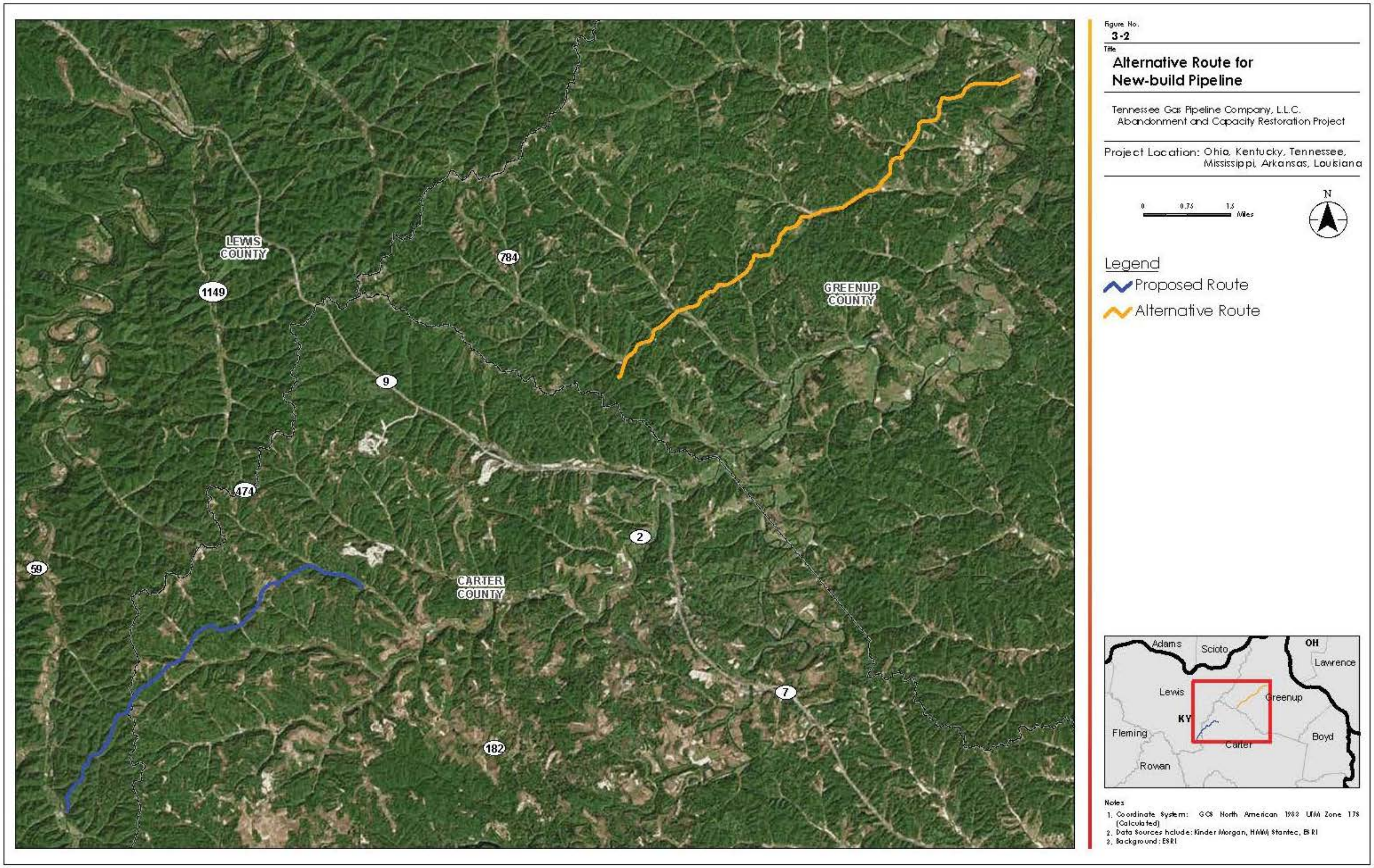

Figure 3-2. Alternative Route for New-build Pipeline

Table 3.4-1

New-build Pipeline Alternative

Environmental Factor	Proposed 7.7-mile-long New-build Route	Alternative 9.7-mile-long New-build Route
Steep Slopes (miles)	5.9	<0.1
Land Use (acres)		
Agriculture	3.5	10.2
Forest	30.9	40.6
Open Land	11.0	4.3
Industrial/Commercial	0.3	4.1
Residential	0.6	0.0
Number of Perennial Waterbodies Crossed	7	7
Number of Intermittent Waterbodies Crossed	9	7
Number of Ephemeral Waterbodies Crossed	3	0
Prime Farmland/Farmland of Importance (acres)	18.7	13.6
Number of Residences within 50 feet	1	4

The alternative route would not cross steep slopes and would affect less prime farmland than the proposed route. However, the proposed route would permanently clear less acres of forest (31 acres) than the alternative route (41 acres). The alternative route would affect more land overall because of its greater length. We determined that the alternative route would not provide a significant environmental advantage over the proposed action, and we eliminated this alternative from further consideration.

3.5 Alternative New Compressor Station Locations

The factors considered for an aboveground facility are different from those considered for a pipeline route because an aboveground facility is a fixed location rather than a linear facility and because, unlike a pipeline, an aboveground facility is visible during operations and, in most cases, generates noise and air emissions. In evaluating alternative locations, we consider the size of the parcel, the availability of the parcel, current land use as well as adjacent land use, location accessibility, engineering requirements, and impacts on the natural and human environments. TGP conducted hydraulic modeling and field surveys to determine the sites for the new compressor stations that would meet the Project’s objectives. In consideration of all the relevant factors, we did not identify any alternative locations for compressor stations that would satisfy our evaluation criteria. Further, we received no stakeholder comments suggesting an alternative compressor station site.

3.6 Alternatives Conclusion

Our review of the proposed facilities did not identify any substantial adverse impacts. Therefore, we did not identify any alternatives that could provide a significant environmental advantage over the proposed project, and we identified no alternatives that could satisfy all three of our evaluation criteria. Further, we received no suggested alternatives from stakeholders.

4.0 STAFF'S CONCLUSIONS AND RECOMMENDATIONS

We conclude that approval of the ACRP would not constitute a major federal action significantly affecting the quality of the human environment. This finding is based on the above environmental analysis, TGP's application and supplements, and implementation of its SPCC Plans, Discovery Plans, site-specific residential plan, *Plan for the Unanticipated Discovery of Potentially Contaminated Soils or Groundwater*, *Invasive Species Management Plan*, *Winter Construction Plan*, and other plans, TGP's Plan and Procedures, and our recommended mitigation measures. We recommend that the Commission Order contain a finding of no significant impact and that the following mitigation measures be included as conditions of any Certificate the Commission may issue.

1. TGP shall follow the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests) and as identified in the EA, unless modified by the Order. TGP must:

   a. request any modification to these procedures, measures, or conditions in a filing with the Secretary;

   b. justify each modification relative to site-specific conditions;

   c. explain how that modification provides an equal or greater level of environmental protection than the original measure; and

   d. receive approval in writing from the Director of OEP **before using that modification**.

2. The Director of OEP has delegated authority to take whatever steps are necessary to ensure the protection of all environmental resources during construction and operation of the Project. This authority shall allow:

   a. the modification of conditions of the Order; and

   b. the design and implementation of any additional measures deemed necessary (including stop-work authority) to assure continued compliance with the intent of the environmental conditions as well as the avoidance or mitigation of adverse environmental impact resulting from Project construction and operation.

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

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

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

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

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

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

   a. implementation of cultural resources mitigation measures;

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

   c. recommendations by state regulatory authorities; and

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

6. **Within 60 days of the acceptance of the Certificate and before construction begins**, TGP shall file an Implementation Plan with the Secretary for review and written approval by the Director of OEP. TGP must file revisions to the plan as schedules change. The plan shall identify:

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

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

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

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

   e. the location and dates of the environmental compliance training and instructions TGP will give to all personnel involved with construction and restoration (initial and refresher training as the Project progresses and personnel change), with the opportunity for OEP staff to participate in session(s);

   f. the company personnel and specific portion of TGP's organization having responsibility for compliance;

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

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

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

(2) the environmental compliance training of onsite personnel;

(3) the start of construction; and

(4) the start and completion of restoration.

7. TGP shall employ at least one EI per construction spread. The EIs 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, TGP shall file updated status reports with the Secretary on a **biweekly basis until all abandonment, construction, and restoration activities are complete**. On request, these status reports will also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:

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

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

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

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

e. the effectiveness of all corrective actions implemented;

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

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

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

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

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

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

    b. identifying which of the Certificate conditions TGP has complied with or will comply with. This statement shall also identify any areas affected by the Project where compliance measures were not properly implemented, if not previously identified in filed status reports, and the reason for noncompliance.

12. **Prior to construction at Compressor Station 216.5**, TGP shall file with the Secretary the geotechnical investigation report for the compressor station site, stamped and sealed by the professional engineer-of-record registered in the state of Ohio. This report shall include an evaluation of the site suitability for Compressor Station 216.5 and provide mitigation recommendations if necessary.

13. **Prior to construction**, TGP shall file with the Secretary the location, by milepost, of all private wells within 150 feet of construction workspaces:

    a. TGP shall conduct, with the well owner's permission, pre- and post-construction monitoring of well yield and water quality for these wells; and

    b. **within 30 days of placing the facilities in service**, TGP shall file a report with the Secretary discussing whether any complaints were received concerning well yield or water quality and how each complaint was resolved.

14. **Prior to construction at workspaces MS0290 and MS0320**, TGP shall file with the Secretary documentation of consultation with the local agencies responsible for WHPAs regarding mitigation measures for protection of the WHPAs at these workspaces.

15. **Prior to construction**, TGP shall file with the Secretary, for review and approval by the Director of OEP, its project-specific Procedures that incorporate:

    a. the site-specific alternative measures listed in table 2.2-6 of the EA, including use of specific ATWS within 50 feet of certain waterbodies;

    b. confirmation that TGP will not perform routine vegetation maintenance over the full right-of-way width;

    c. confirmation that TGP will not use a construction right-of-way width greater than 75 feet in wetlands; and

d. confirmation that TGP will not discharge water from trench dewatering to any waterbody.

16. **Prior to construction**, TGP shall file its final *Invasive Species Management Plan* with the Secretary for review and written approval by the Director of OEP.

17. **Prior to construction**, TGP shall file with the Secretary the results of its consultation with state agencies regarding the approved construction timing window(s) for in-water work and construction plans that demonstrate consideration of the recommendations.

18. **Prior to construction**, TGP shall file with the Secretary a Migratory Bird Conservation Plan, along with documentation of consultation with the USFWS. The plan shall identify acreages of bird habitat that will be affected by the Project (both temporary and permanent), assess the related effects of habitat loss and forest fragmentation to migratory birds, and identify mitigation measures to address the impacts.

19. **Prior to construction**, if any bald eagle nests are discovered within 1,500 feet of the Project construction workspaces, TGP shall file with the Secretary documentation of consultation with the appropriate USFWS field office and state agencies regarding appropriate avoidance and minimization measures.

20. TGP shall not begin construction activities within areas of potential effect **until**:

a. TGP completes surveys (or provides confirmation from USFWS that no surveys are needed) for gray bat, Virginia spiraea, whorled sunflower, running buffalo clover, Short's bladderpod, and Price's potato-bean. Before the initiation of surveys, TGP shall consult with the USFWS for appropriate survey methods and periods for each species. The survey reports and any USFWS comments shall be filed with the Secretary. The survey reports shall include the following information:

(1) name(s) and qualifications of the person(s) conducting the survey;

(2) method(s) used to conduct the survey;

(3) date(s) of the survey;

(4) area surveyed (include the mileposts surveyed, as applicable); and

(5) proposed mitigation that would substantially minimize or avoid the potential impacts.

b. TGP files with the Secretary the final MOA with the USFWS Kentucky Field Office for Indiana bats and northern long-eared bats.

c. FERC staff completes ESA consultation with the USFWS and TGP has received written notification from the Director of OEP that construction or use of mitigation may begin.

21. **Prior to construction**, TGP shall file with the Secretary, for review and approval by the Director of OEP:

a. revised site-specific plans for residences less than 50 feet from the construction right-of-way for the MLV 874 replacement pipeline. These plans shall be on aerial photography background, indicate all distances between the construction workspace and the residence, and show all residential features such as driveways; and

b. evidence of landowner concurrence for the construction work area within 10 feet of a residence, including all the structures identified in table 2.5-1.

22. **Prior to construction**, TGP shall file with the Secretary, for review and written approval by the Director of OEP, a visual impact mitigation plan for Compressor Stations 202.5 and 211.5 that includes the following measures:

a. maintaining existing foliage, to the maximum extent practicable, around the compressor station;

b. installing vegetative screening around the station boundaries;

c. installing slatted fencing around the compressor station boundaries;

d. painting buildings and equipment inside the stations in colors that reduce contrast with the natural environment; and

e. installing downward-facing, shielded lights to mitigate off-site exposure.

23. TGP shall not begin construction of facilities and/or use staging, storage, or temporary work areas and new or to-be-improved access roads **until**:

a. TGP files with the Secretary:

(1) remaining cultural resources survey reports;

(2) site evaluation reports, avoidance plans, or treatment plans, as necessary; and

(3) comments on the reports and plans, including Discovery Plans, from the SHPOs and interested Indian tribes.

b. The ACHP has been afforded an opportunity to comment if historic properties will be adversely affected.

c. The FERC staff reviews and the Director of OEP approves all cultural resources reports and plans, and notifies TGP in writing that either treatment measures (including archaeological data recovery) may be implemented 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: **"CONTAINS PRIVILEGED INFORMATION - DO NOT RELEASE."**

24. TGP shall file noise surveys with the Secretary **no later than 60 days** after placing Compressor Stations 202.5, 206.5, 211.5, and 216.5 in service. If a full load condition noise survey is not possible, TGP shall provide an interim survey at the maximum possible horsepower load and provide the full load survey **within 6 months**. If the noise attributable to the operation of all of the equipment at Compressor Stations 202.5, 206.5, 211.5, and 216.5 under interim or full horsepower load conditions exceeds an L_{dn} of 55 dBA at any nearby NSAs, TGP shall file a report on what changes are needed and shall install the additional noise controls to meet the level **within 1 year** of the in-service date. TGP shall confirm compliance with the above requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls.

25. TGP shall file noise surveys with the Secretary **no later than 60 days** after placing the authorized units at Compressor Stations 110 and 875 in service. If a full load condition noise survey is not possible, TGP 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 the new/modified units at Compressor Stations 110 and 875 at interim or full load exceeds an L_{dn} of 55 dBA at any nearby NSAs, TGP shall install additional noise controls to meet that level **within 6 months** of the in-service date. TGP 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.

26. **Prior to any abandonment activities at existing compressor stations**, TGP shall file the following information with the Secretary for review and written approval by the Director of OEP:

    a. identification of any equipment, including compressor units and piping, proposed for abandonment that may be contaminated with PCBs;

    b. verification that the appropriate PCB testing will be conducted on this equipment, and discussion of how any abandoned PCB-contaminated facilities will be properly disposed of; and

    c. measures to be implemented to provide adequate worker safety for handling PCB-contaminated materials.

27. **Prior to any abandonment or construction activities at existing compressor stations**, TGP shall file the following information with the Secretary for review and written approval by the Director of OEP:

    a. identification of any known facilities to be abandoned or disturbed having ACMs;

    b. protocols to comply with the appropriate requirements to identify ACMs that might be encountered;

    c. if facilities with ACMs will be abandoned or disturbed, methods to separate the ACMs for proper disposal; and

    d. protocols for worker protection and proper disposal of ACMs.

5.0 LIST OF PREPARERS

<u>Federal Energy Regulatory Commission</u>

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B.A., Environmental Planning, 2002, Elmhurst College

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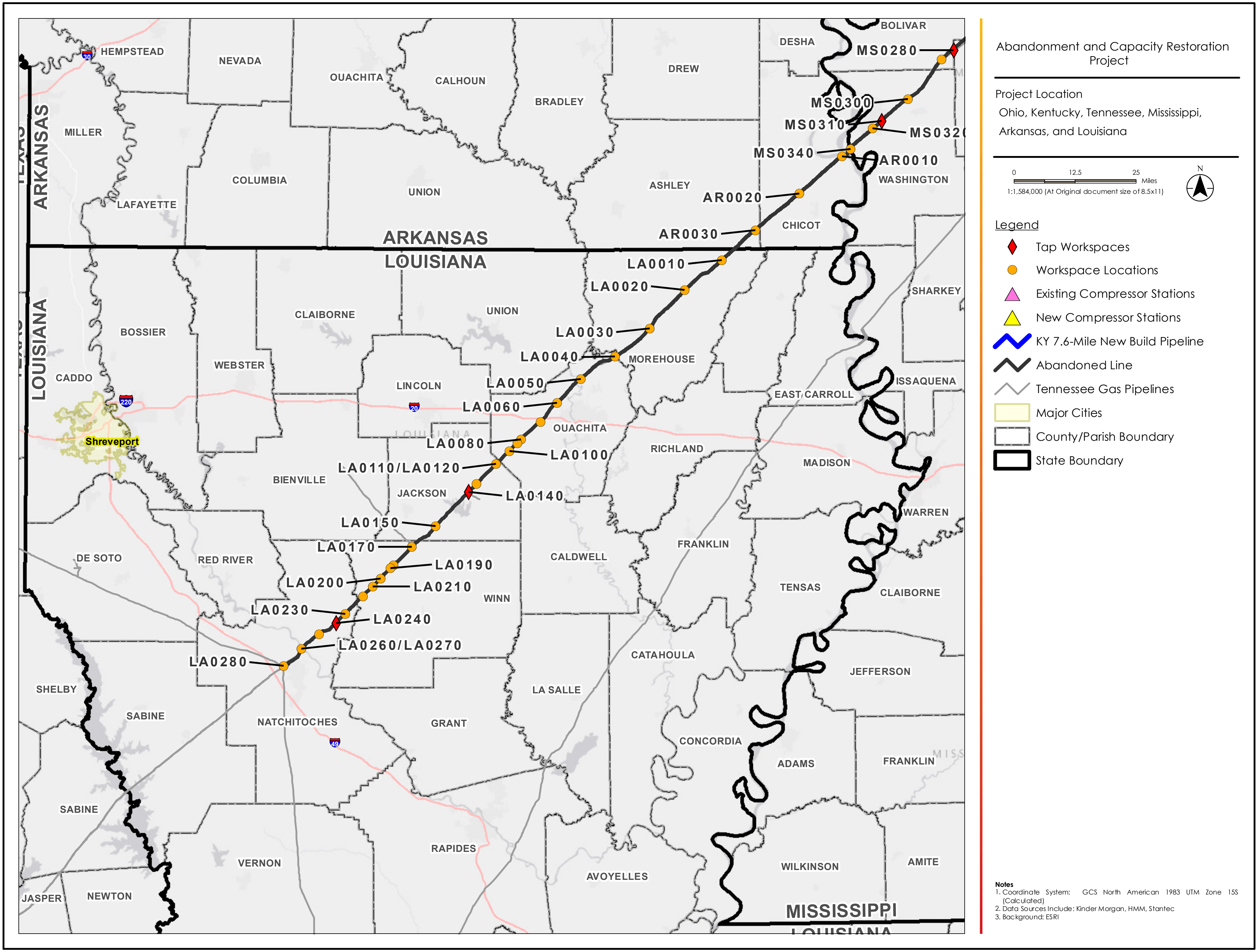
HDR is a third party contractor assisting the Commission staff in reviewing the environmental aspects of the project application and preparing the environmental documents required by NEPA. Third party contractors are selected by Commission staff and funded by project applicants. Per the procedures in 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.

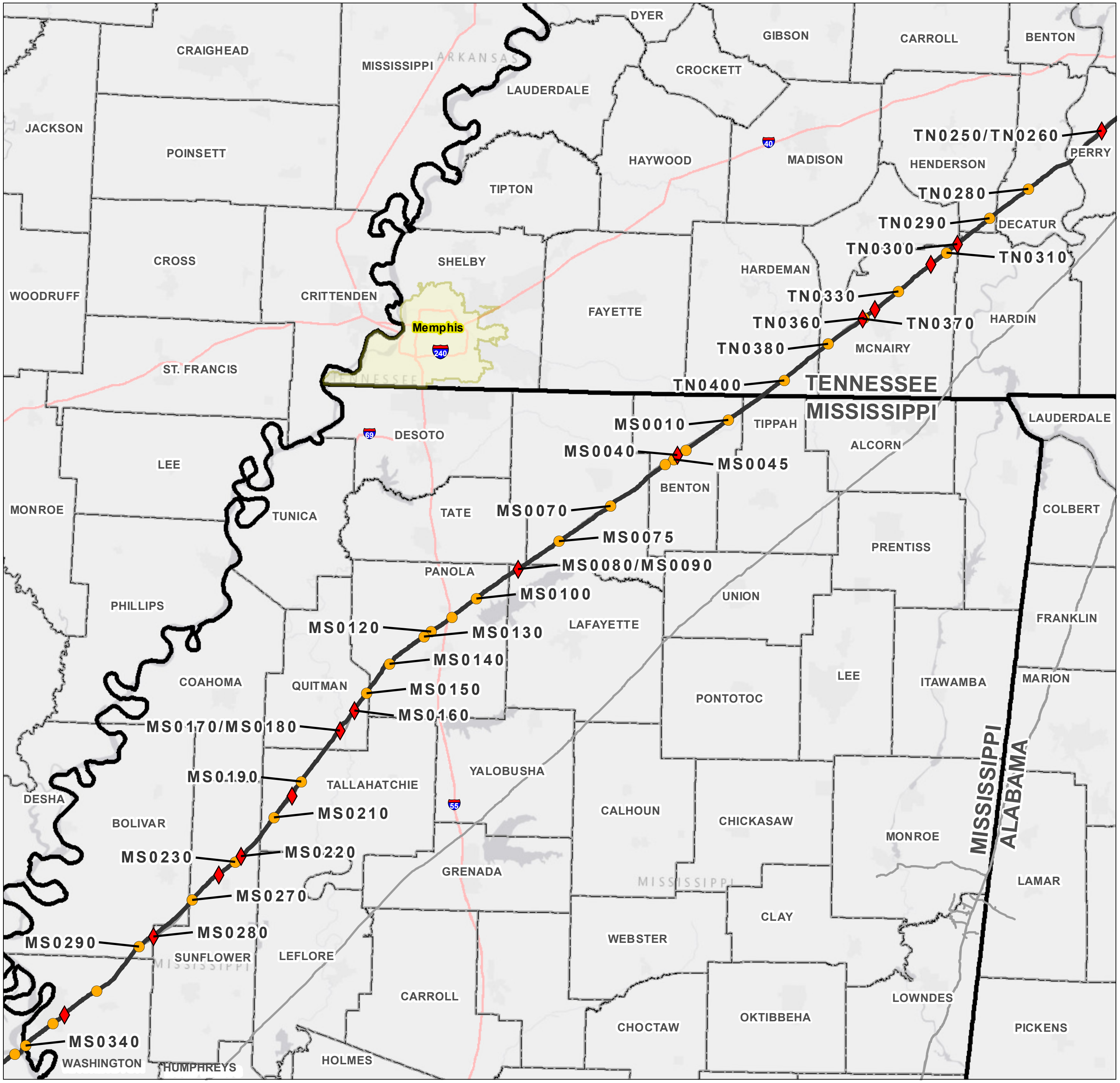
Appendix A

Maps of the Proposed Facilities

Project Location Maps



Abandonment and Capacity Restoration Project
Project Location
Ohio, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana
0 12.5 25 Miles
1:1,584,000 (At Original document size of 8.5x11)
N
Legend
Tap Workspaces
Workspace Locations
Existing Compressor Stations
New Compressor Stations
KY 7.6-Mile New Build Pipeline
Abandoned Line
Tennessee Gas Pipelines
Major Cities
County/Parish Boundary
State Boundary
Notes
1. Coordinate System: GCS North American 1983 UTM Zone 15S (Calculated)
2. Data Sources Include: Kinder Morgan, HMM, Stantec
3. Background: ESRI
ARKANSAS
LOUISIANA
MISSISSIPPI
TEXAS
Shreveport
MS0280
MS0300
MS0310
MS0320
MS0340
AR0010
AR0020
AR0030
LA0010
LA0020
LA0030
LA0040
LA0050
LA0060
LA0080
LA0100
LA0110/LA0120
LA0140
LA0150
LA0170
LA0190
LA0200
LA0210
LA0230
LA0240
LA0260/LA0270
LA0280
BOLIVAR
DESHA
DREW
HEMPSTEAD
NEVADA
OUACHITA
CALHOUN
BRADLEY
MILLER
COLUMBIA
UNION
ASHLEY
WASHINGTON
LAFAYETTE
CHICOT
CLAIBORNE
BOSSIER
WEBSTER
CADDO
LINCOLN
MOREHOUSE
SHARKEY
ISSAQUENA
EAST CARROLL
RICHLAND
MADISON
BIENVILLE
JACKSON
WARREN
DE SOTO
RED RIVER
CALDWELL
FRANKLIN
TENSAS
WINN
CATAHOULA
JEFFERSON
SHELBY
SABINE
NATCHITOCHES
GRANT
LA SALLE
CONCORDIA
ADAMS
VERNON
RAPIDES
AVOYELLES
WILKINSON
AMITE
JASPER
NEWTON



Abandonment and Capacity Restoration Project

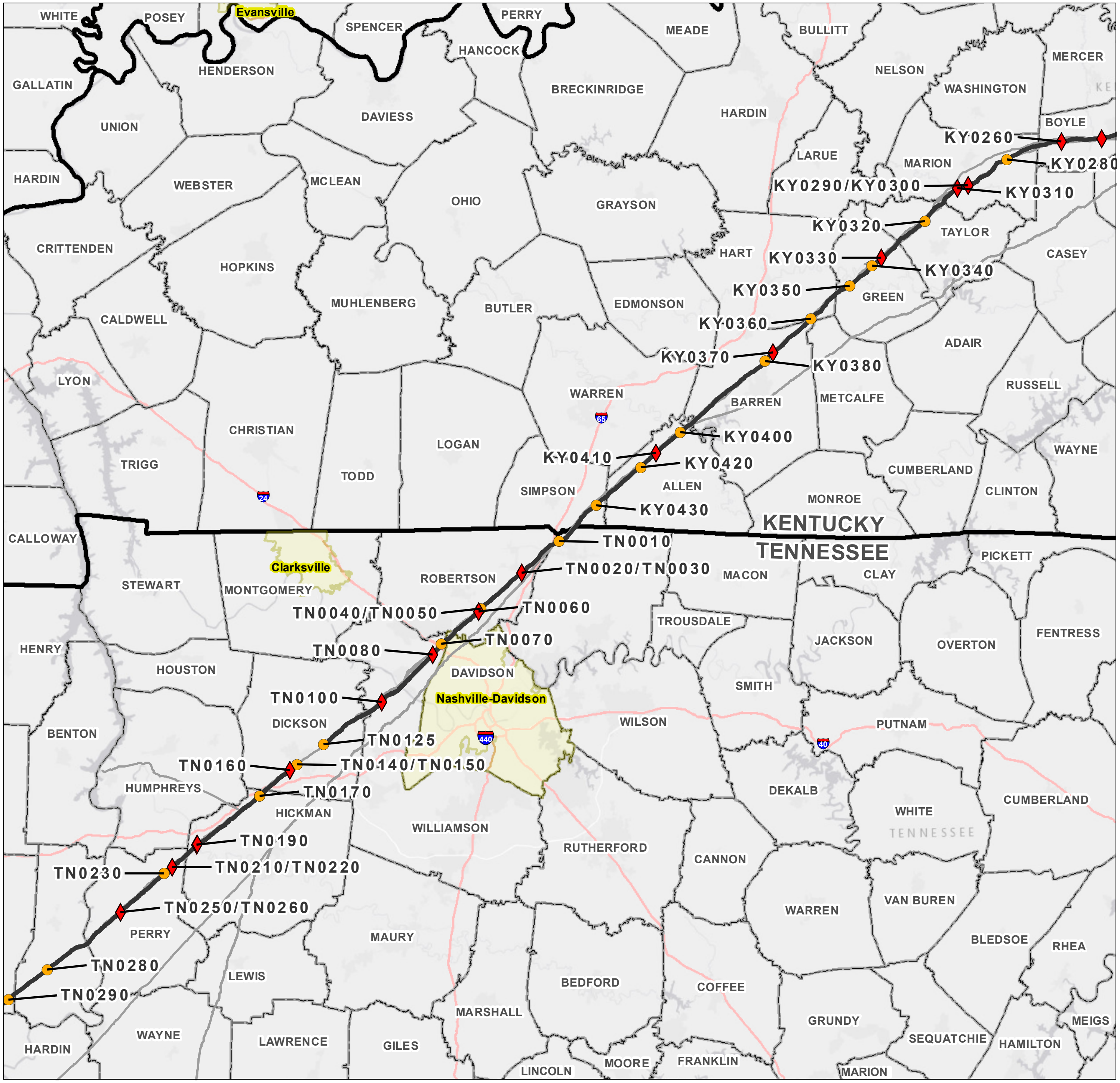
Project Location
Ohio, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana

0 12.5 25 Miles
1:1,584,000 (At Original document size of 8.5x11)

N

Legend
- Tap Workspaces
- Workspace Locations
- Existing Compressor Stations
- New Compressor Stations
- KY 7.6-Mile New Build Pipeline
- Abandoned Line
- Tennessee Gas Pipelines
- Major Cities
- County/Parish Boundary
- State Boundary

Notes
1. Coordinate System: GCS North American 1983 UTM Zone 16S (Calculated)
2. Data Sources Include: Kinder Morgan, HMM, Stantec
3. Background: ESRI



Abandonment and Capacity Restoration Project

Project Location
Ohio, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana

0 12.5 25 Miles
1:1,584,000 (At Original document size of 8.5x11)
N

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- Tap Workspaces
- Workspace Locations
- Existing Compressor Stations
- New Compressor Stations
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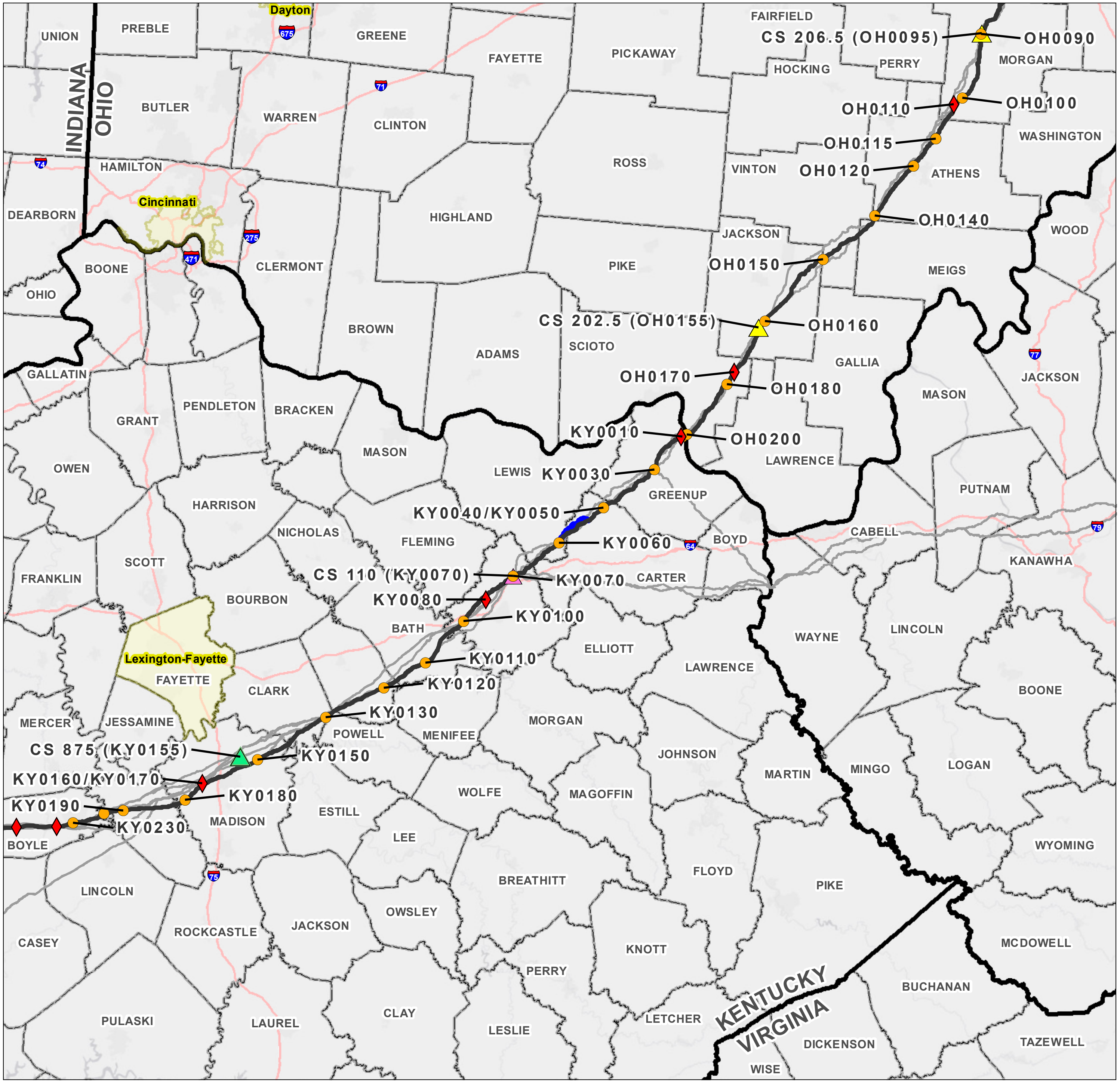
- Abandoned Line
- Tennessee Gas Pipelines
- Major Cities
- County/Parish Boundary
- State Boundary

Notes
1. Coordinate System: GCS North American 1983 UTM Zone 16S (Calculated)
2. Data Sources Include: Kinder Morgan, HMM, Stantec
3. Background: ESRI

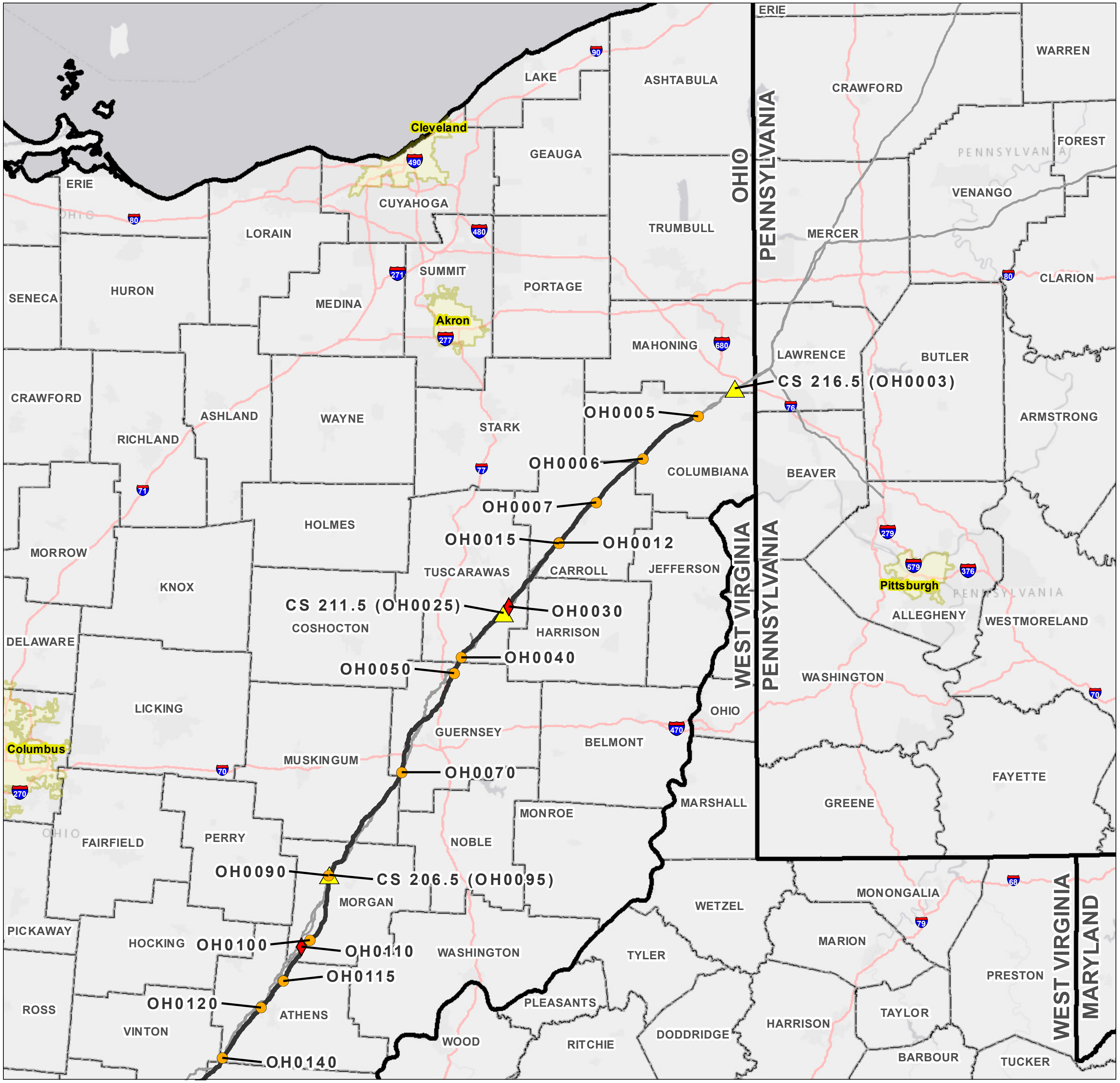


Abandonment and Capacity Restoration Project

Project Location
Ohio, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana

Legend
- Tap Workspaces
- Workspace Locations
- Existing Compressor Stations
- New Compressor Stations
- CS 875 will be built as part of TGP's Broad Run Expansion Project and would be modified as part of the ACRP
- KY 7.6-Mile New Build Pipeline
- Abandoned Line
- Tennessee Gas Pipelines
- Major Cities
- County/Parish Boundary
- State Boundary

Notes
1. Coordinate System: GCS North American 1983 UTM Zone 17S (Calculated)
2. Data Sources Include: Kinder Morgan, HMM, Stantec
3. Background: ESRI



Abandonment and Capacity Restoration Project

Project Location

Ohio, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana

0 12.5 25 Miles

1:1,584,000 (At Original document size of 8.5x11)

N

Legend

- Tap Workspaces
- Workspace Locations
- Existing Compressor Stations
- New Compressor Stations
- KY 7.6-Mile New Build Pipeline
- Abandoned Line
- Tennessee Gas Pipelines
- Major Cities
- County/Parish Boundary
- State Boundary

Notes

1. Coordinate System: GCS North American 1983 UTM Zone 17T (Calculated)
2. Data Sources Include: Kinder Morgan, HMM, Stantec
3. Background: ESRI

Compressor Stations

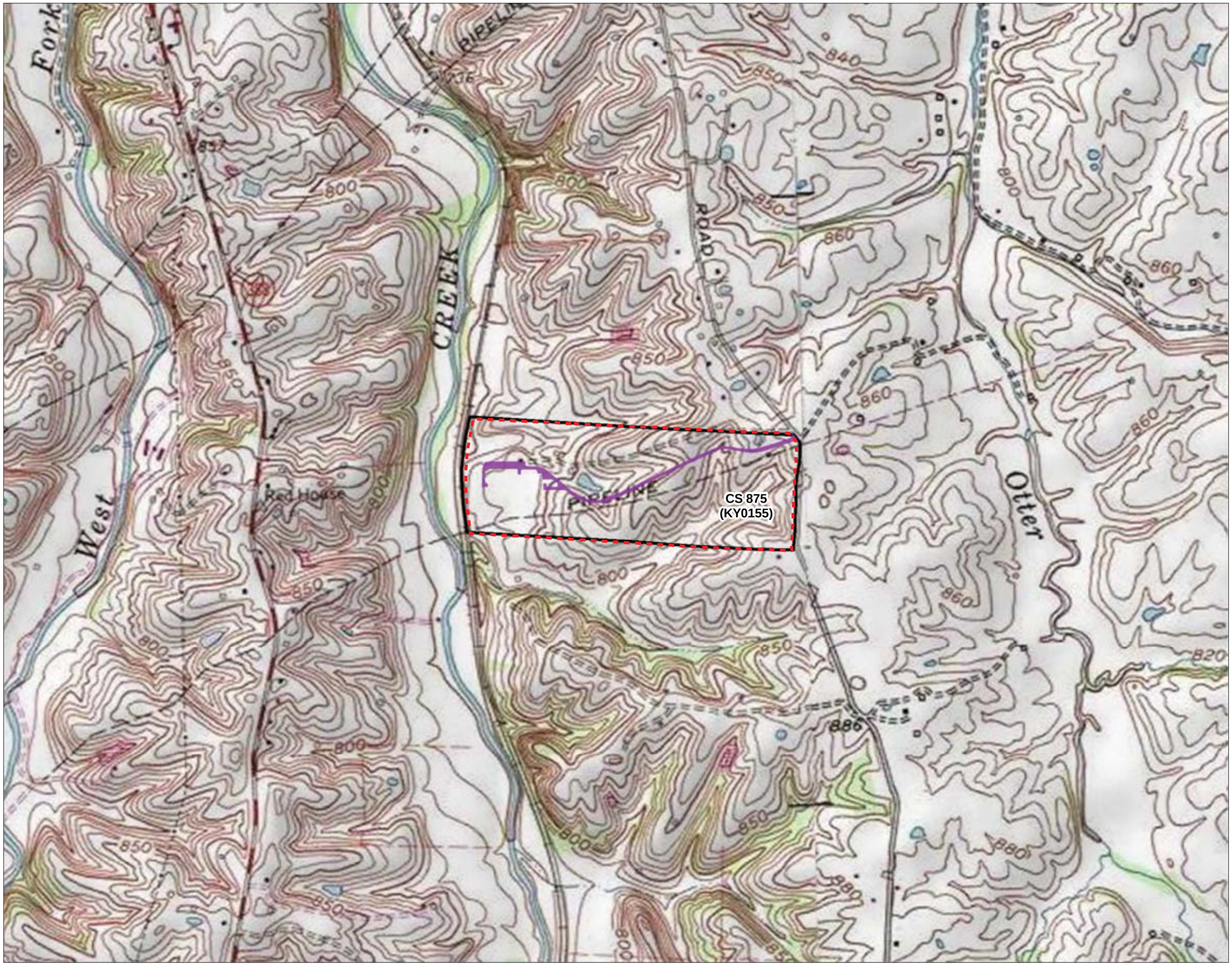


Figure No.

Title

Compressor Station 875

Client/Project

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

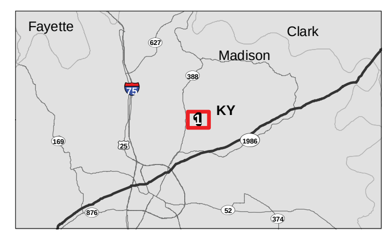
Project Location: Ohio, Kentucky, Tennessee, Tennessee, Mississippi, Arkansas, Louisiana

0 500 1,000 Feet

N

Legend

- Permanent Access Road
- Temporary Access Road
- Fenced Areas
- Approx. CS Property Line



Notes

1. Coordinate System: GCS North American 1983 UTM Zone 16S (Calculated)
2. Data Sources Include: Kinder Morgan, HMM, Stantec, NADS, ESRI
3. Background: ESRI

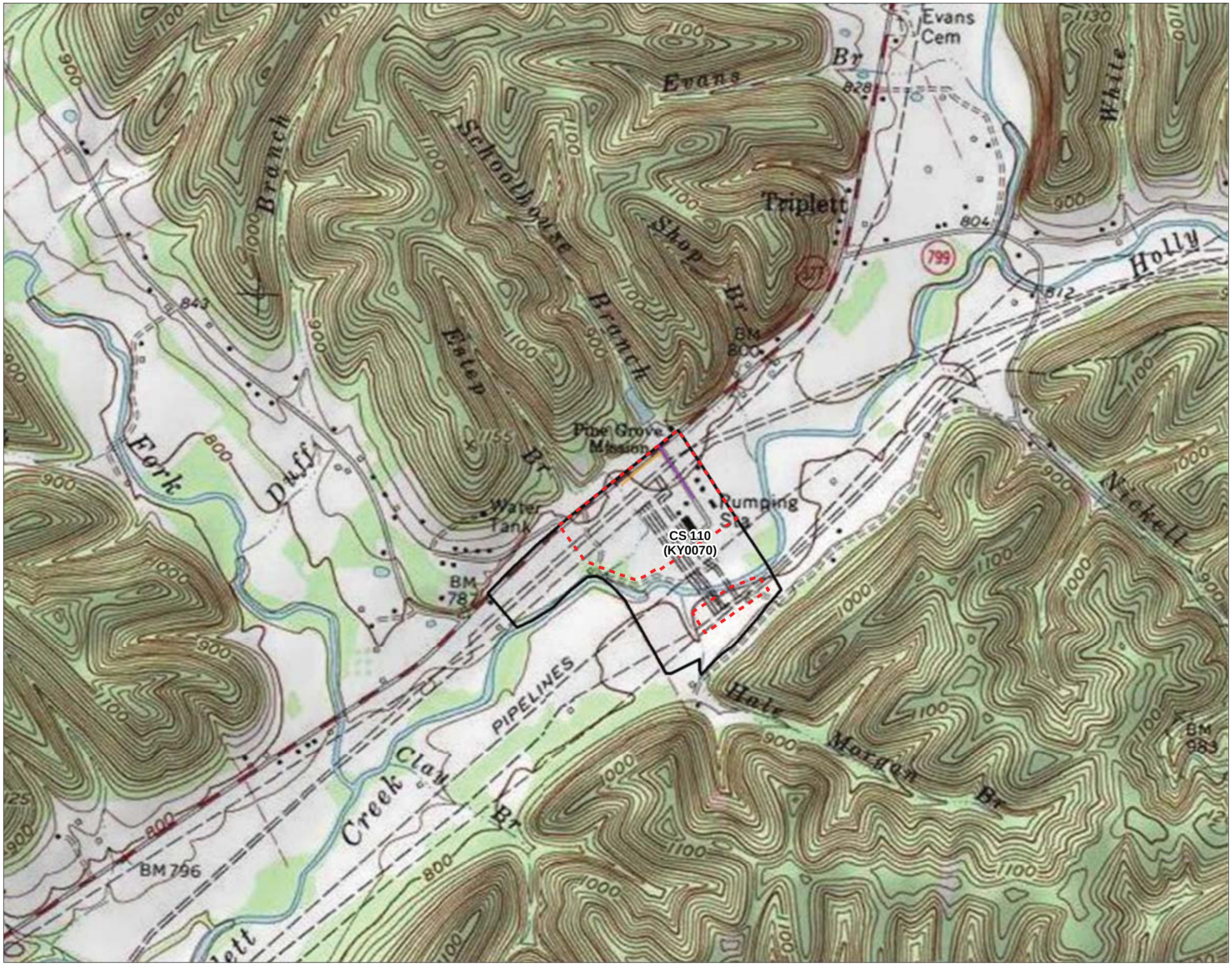


Figure No.

Title

Compressor Station 110

Client/Project

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

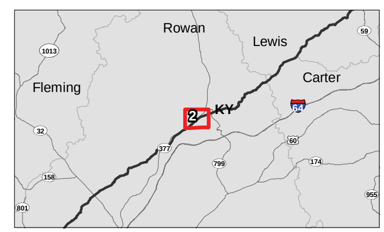
Project Location: Ohio, Kentucky, Tennessee, Tennessee, Mississippi, Arkansas, Louisiana

0 500 1,000 Feet

N

Legend

- Permanent Access Road
- Temporary Access Road
- Fenced Areas
- Approx. CS Property Line



Notes

1. Coordinate System: GCS North American 1983 UTM Zone 17S (Calculated)
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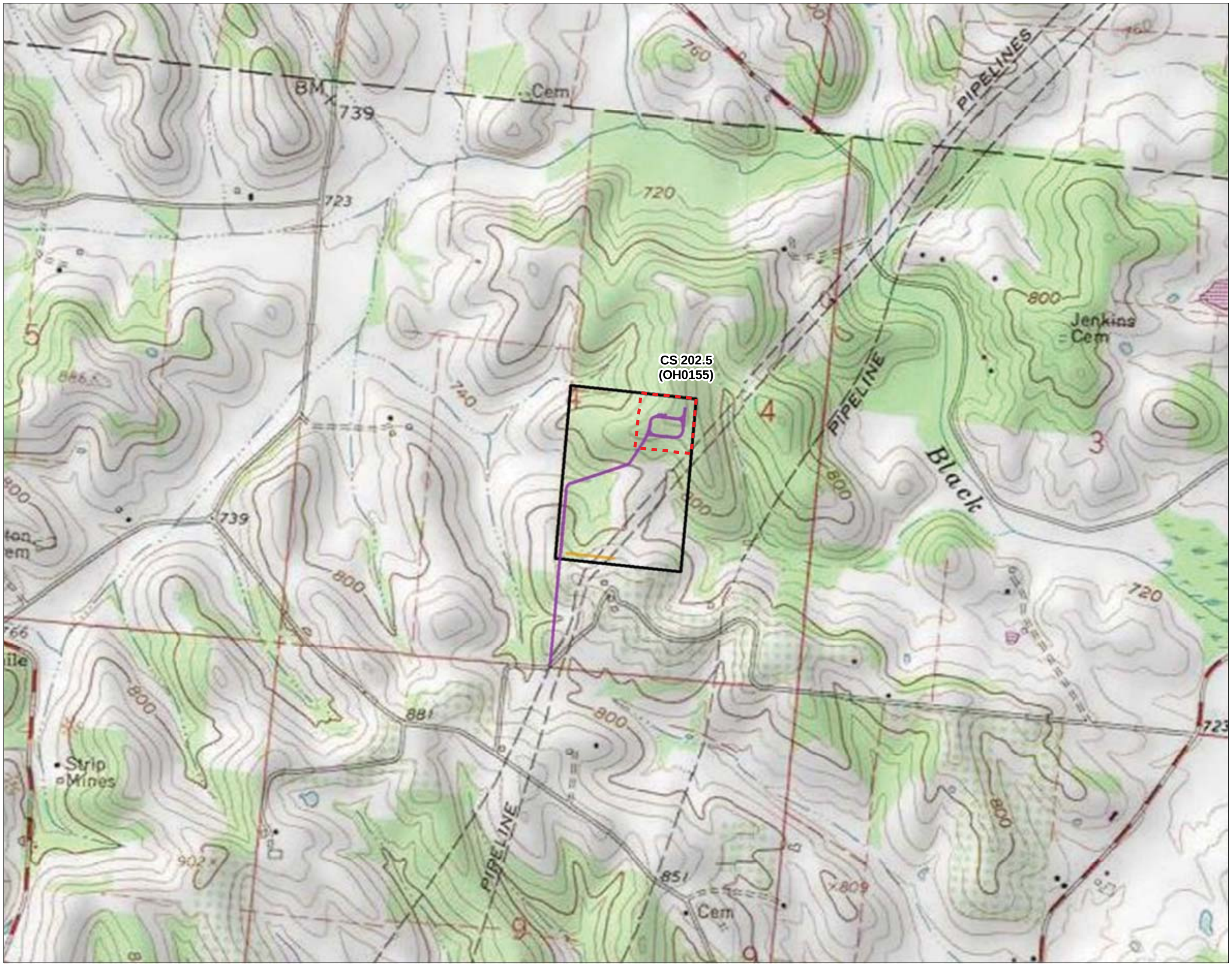

Figure No.

Title

Compressor Station 202.5

Client/Project

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

Project Location: Ohio, Kentucky, Tennessee, Tennessee, Mississippi, Arkansas, Louisiana

0 500 1,000 Feet

N

Legend

- Permanent Access Road
- Temporary Access Road
- Fenced Areas
- Approx. CS Property Line

Notes

1. Coordinate System: GCS North American 1983 UTM Zone 17S (Calculated)
2. Data Sources Include: Kinder Morgan, HMM, Stantec, NADS, ESRI
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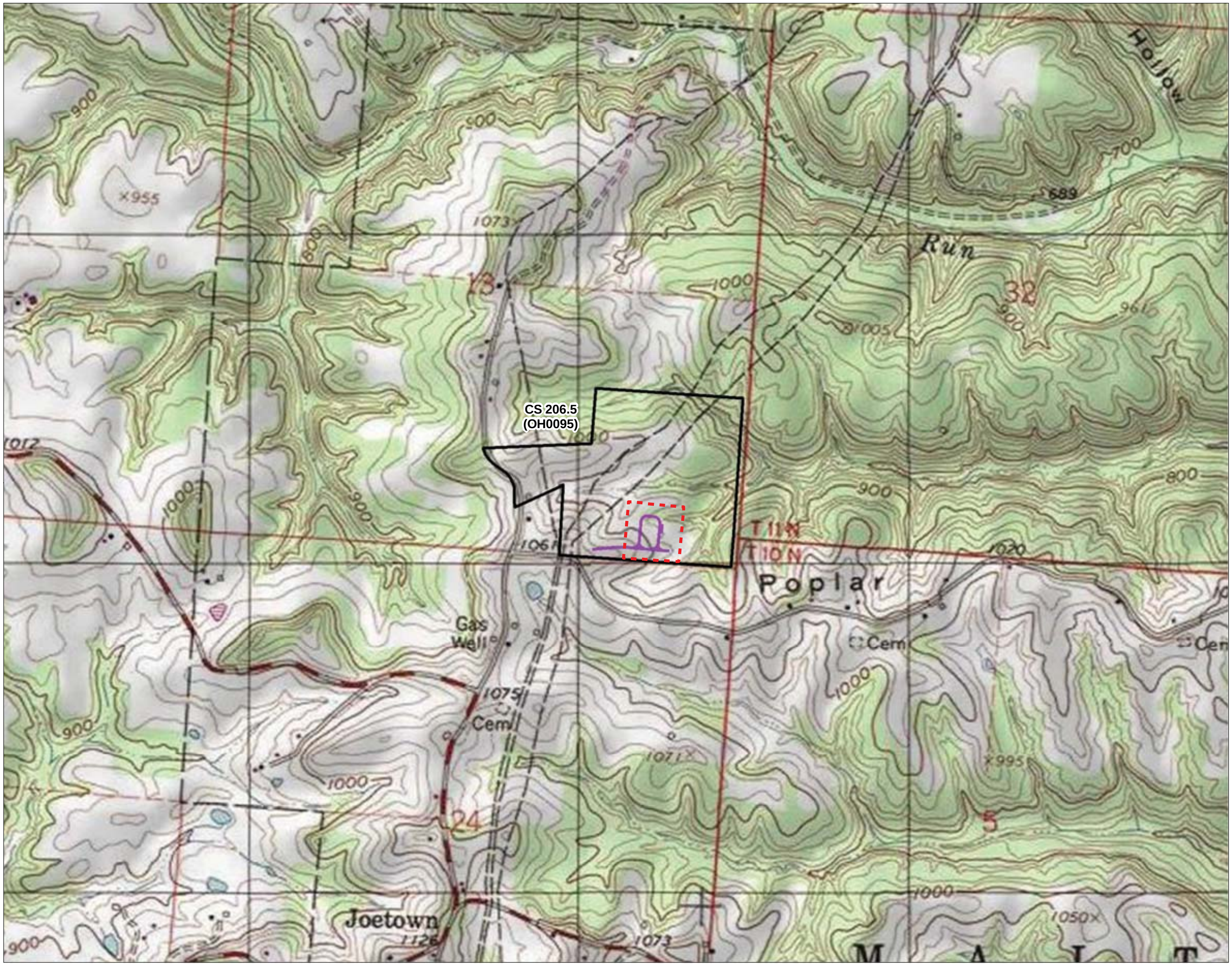


Figure No.

Title

Compressor Station 206.5

Client/Project

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

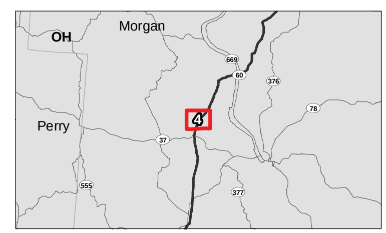
Project Location: Ohio, Kentucky, Tennessee, Tennessee, Mississippi, Arkansas, Louisiana

0 500 1,000 Feet

N

Legend

- Permanent Access Road
- Temporary Access Road
- Fenced Areas
- Approx. CS Property Line



Notes

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2. Data Sources Include: Kinder Morgan, HMM, Stantec, NADS, ESRI
3. Background: ESRI

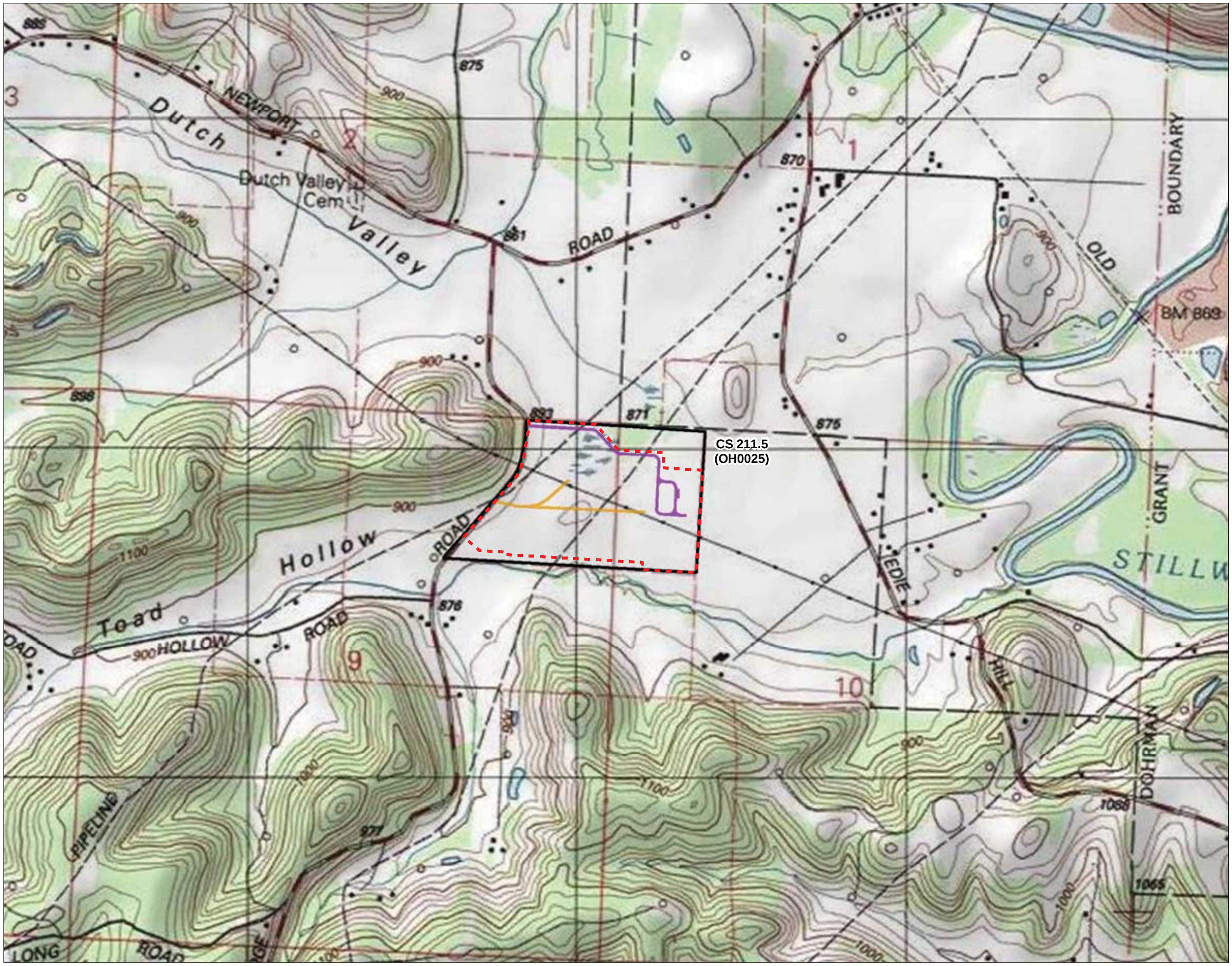


Figure No.

Title

Compressor Station 211.5

Client/Project

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

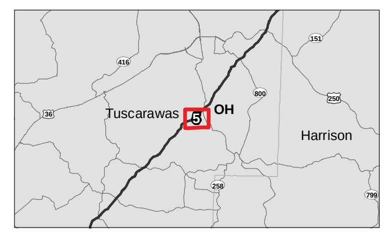
Project Location: Ohio, Kentucky, Tennessee, Tennessee, Mississippi, Arkansas, Louisiana

0 500 1,000 Feet

N

Legend

- Permanent Access Road
- Temporary Access Road
- Fenced Areas
- Approx. CS Property Line



Notes

1. Coordinate System: GCS North American 1983 UTM Zone 17T (Calculated)
2. Data Sources Include: Kinder Morgan, HMM, Stantec, NADS, ESRI
3. Background: ESRI

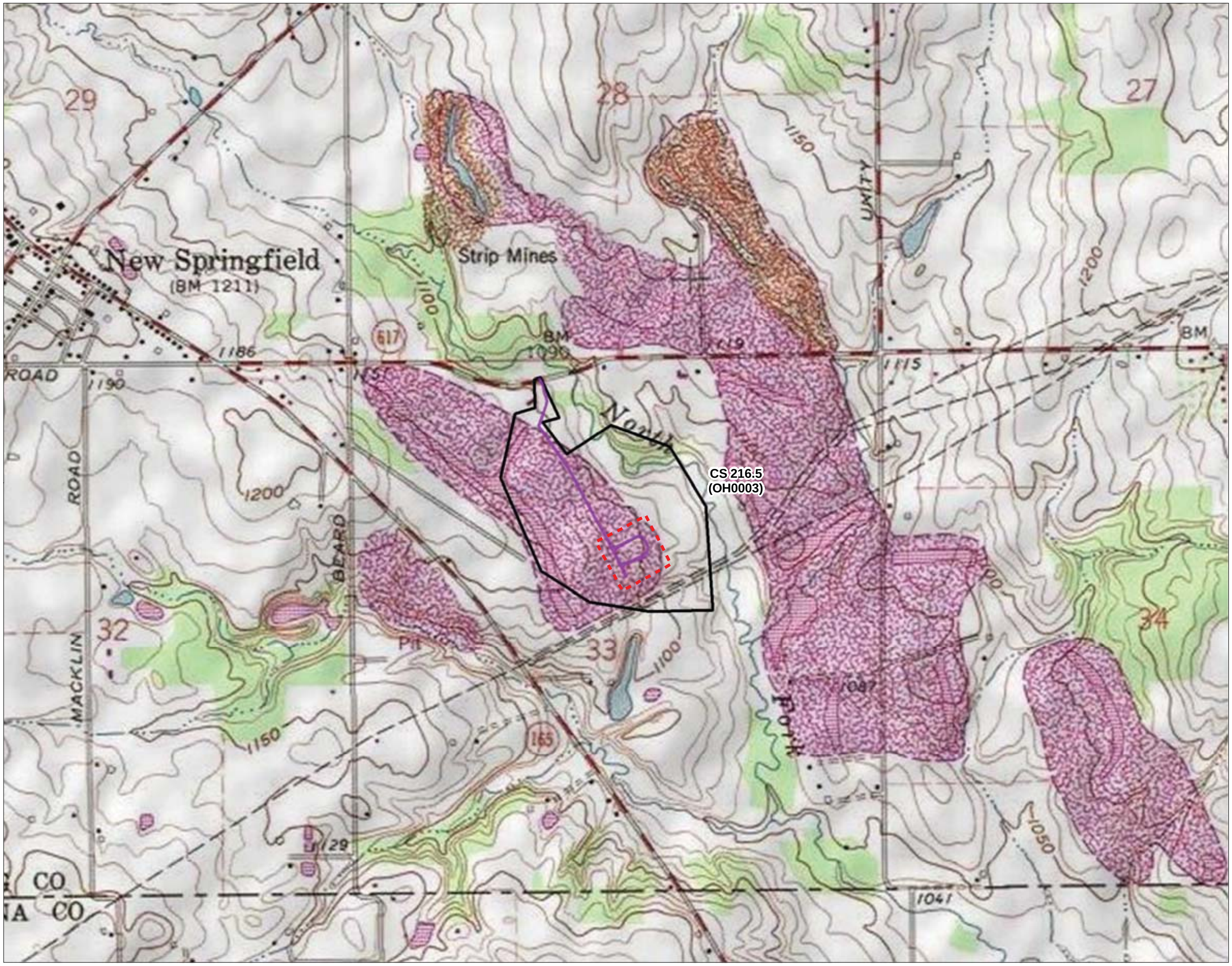


Figure No.

Title

Compressor Station 216.5

Client/Project

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

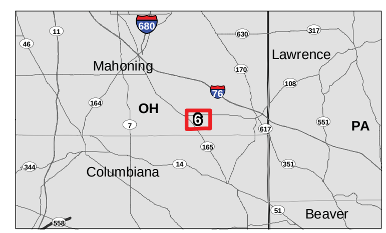
Project Location: Ohio, Kentucky, Tennessee, Tennessee, Mississippi, Arkansas, Louisiana

0 500 1,000 Feet

N

Legend

- Permanent Access Road
- Temporary Access Road
- Fenced Areas
- Approx. CS Property Line



Notes

1. Coordinate System: GCS North American 1983 UTM Zone 17T (Calculated)
2. Data Sources Include: Kinder Morgan, HMM, Stantec, NADS, ESRI
3. Background: ESRI

New-build Pipeline

Figure No.

Title

New-build Pipeline

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

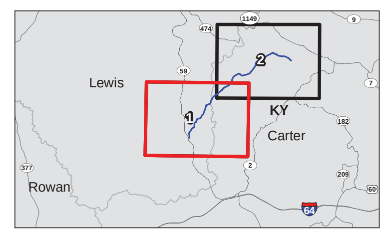
Project Location: Ohio, Kentucky, Tennessee, Mississippi, Arkansas, Louisiana

0 1,000 2,000 Feet

N

Legend

- Mileposts
- Proposed Centerline
- Permanent Easement
- Temporary Workspace
- Additional Temporary Workspace
- Temporary Access Road
- National Wetlands Inventory



Notes

1. Coordinate System: GCS North American 1983 UTM Zone 17S (Calculated)
2. Data Sources Include: Kinder Morgan, Stantec
3. Background: USGS 7.5' Topographic Quadrangle

Figure No.

Title

New-build Pipeline

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

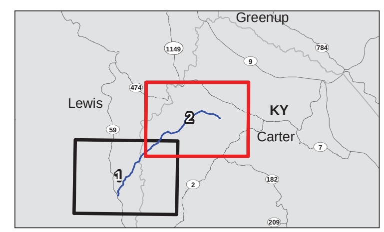
Project Location: Ohio, Kentucky, Tennessee, Mississippi, Arkansas, Louisiana

0 1,000 2,000 Feet

N

Legend

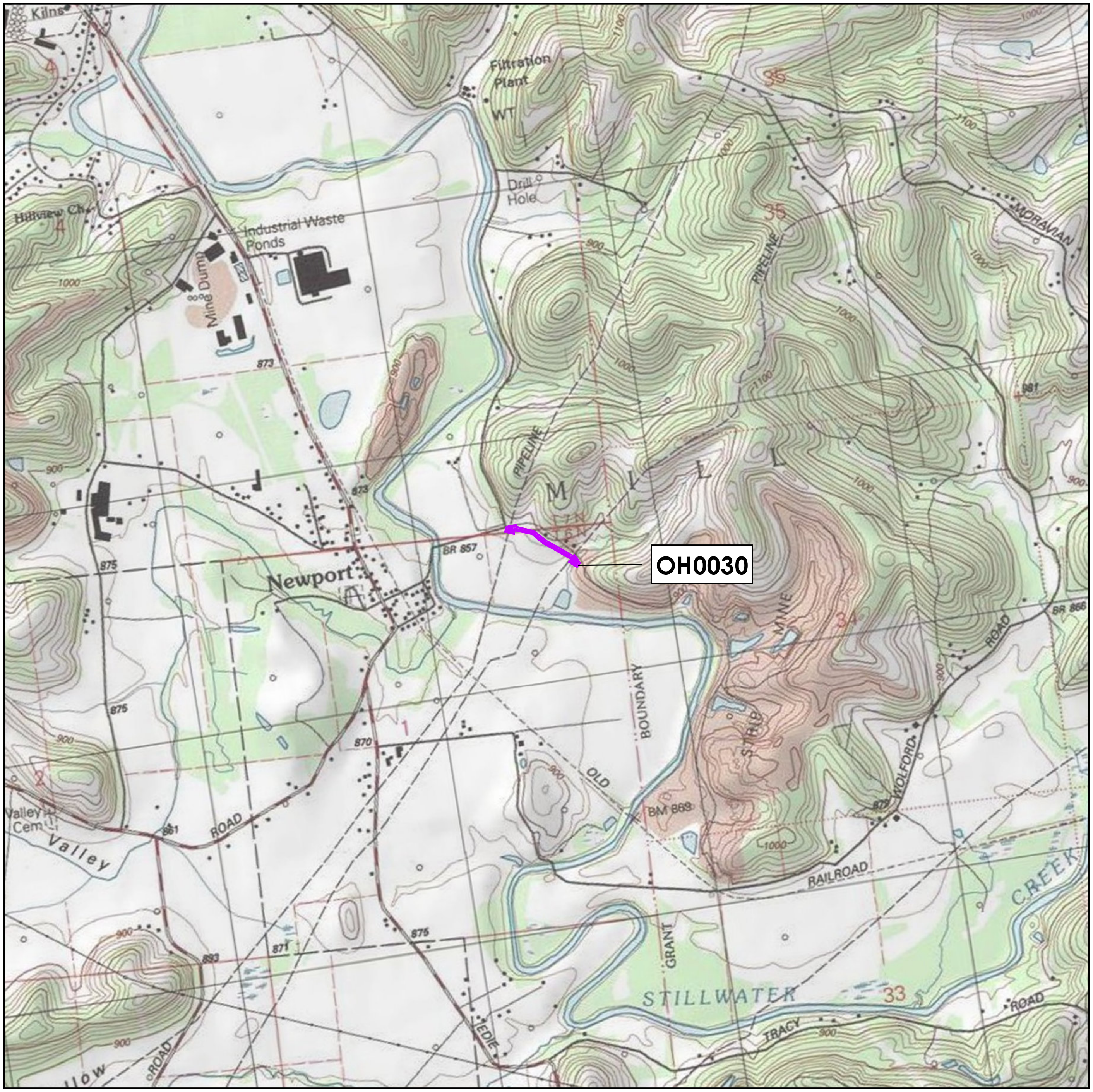
- Mileposts
- Proposed Centerline
- Permanent Easement
- Temporary Workspace
- Additional Temporary Workspace
- Temporary Access Road
- National Wetlands Inventory



Notes

1. Coordinate System: GCS North American 1983 UTM Zone 17S (Calculated)
2. Data Sources Include: Kinder Morgan, Stantec
3. Background: USGS 7.5' Topographic Quadrangle

Off-right-of-way Tap Reconnects



Title

Off-right-of-way Tap Reconnect OH0030

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

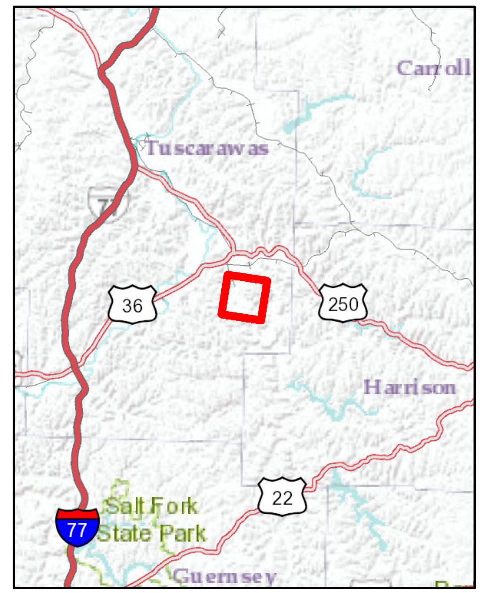
0 1,000 2,000 Feet

1:24,000 (at original document size of 8.5x11)

N

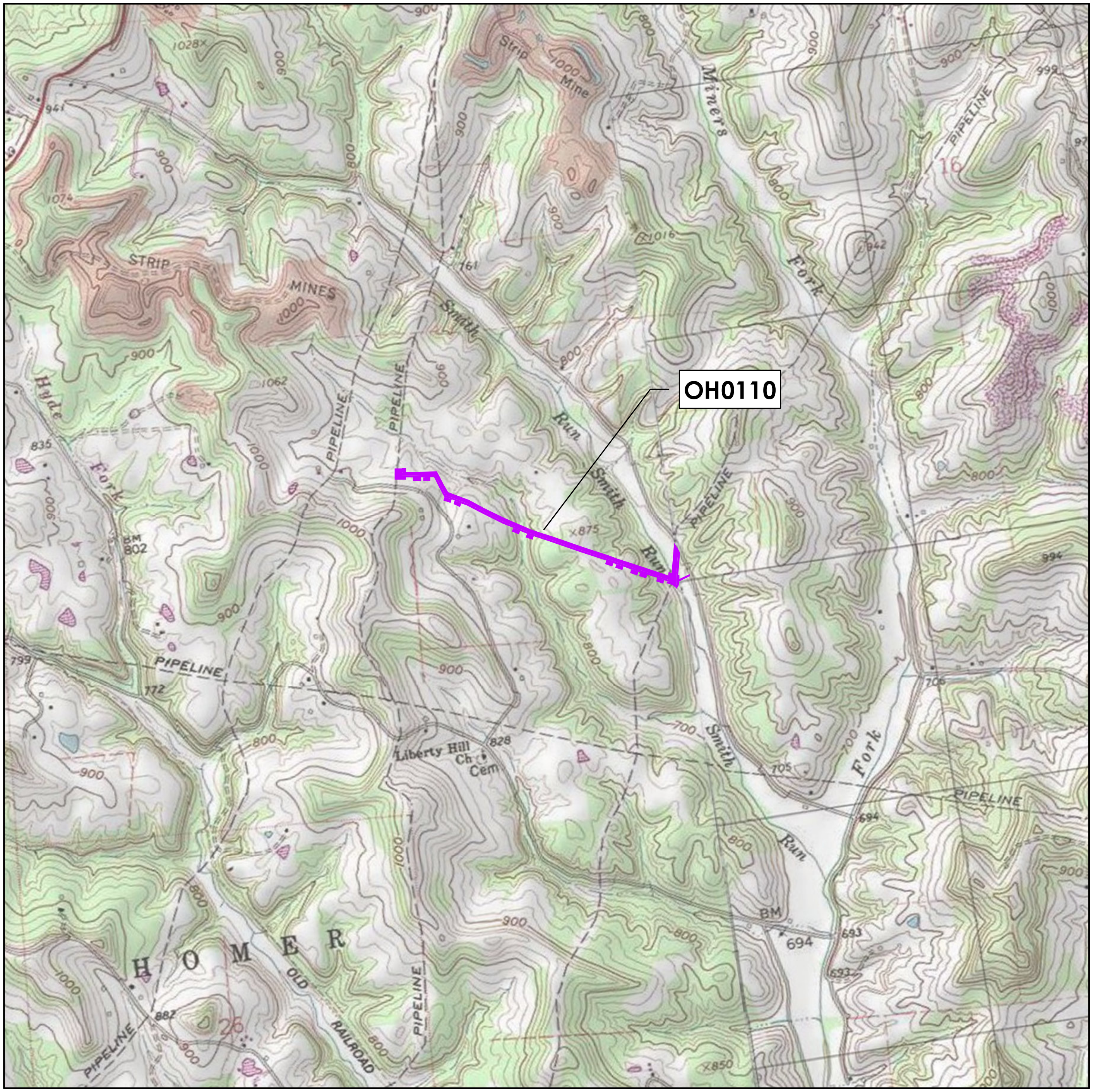
Legend

Construction Workspaces



Notes

1. Projected Coordinate System: USA Contiguous Albers Equal Area Conic FT
2. Data Sources Include: Kinder Morgan, Stantec
3. Background: USGS 7.5" Topographics Quadrangle



Title

Off-right-of-way Tap Reconnect OH0110

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

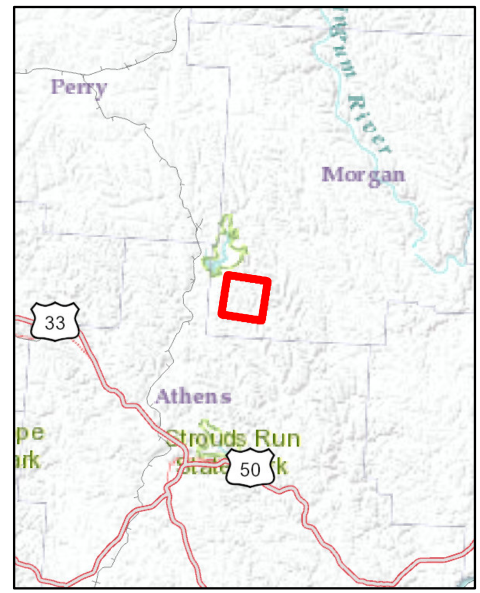
0 1,000 2,000 Feet

1:24,000 (at original document size of 8.5x11)

N

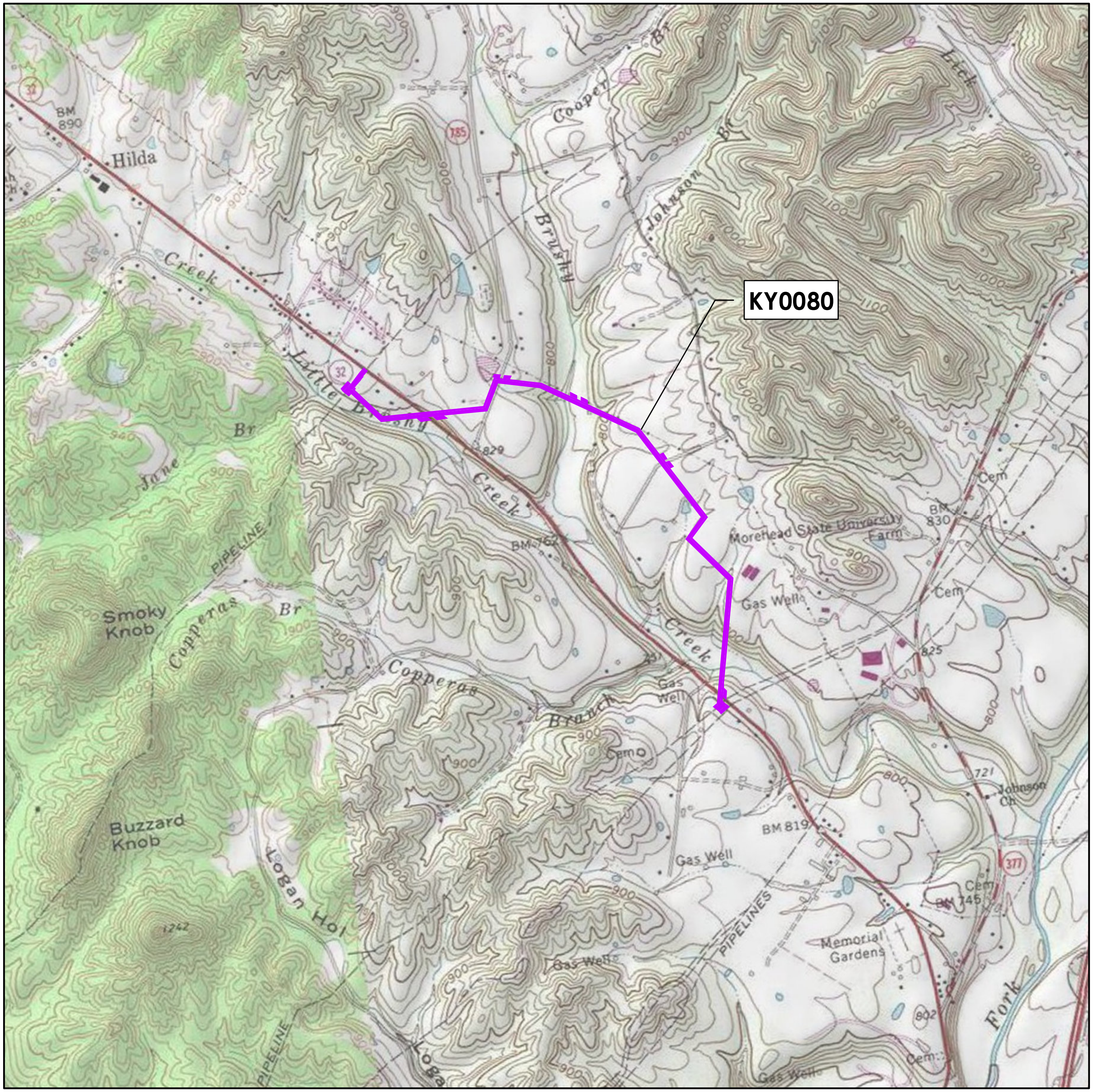
Legend

Construction Workspaces



Notes

1. Projected Coordinate System: USA Contiguous Albers Equal Area Conic FT
2. Data Sources Include: Kinder Morgan, Stantec
3. Background: USGS 7.5" Topographics Quadrangle



Title

Off-right-of-way Tap Reconnect KY0080

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

0 1,000 2,000 Feet

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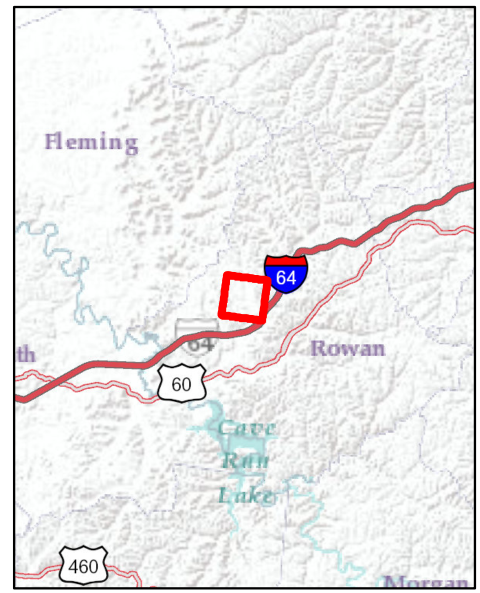
N

Legend

Construction Workspaces



Notes

1. Projected Coordinate System: USA Contiguous Albers Equal Area Conic FT
2. Data Sources Include: Kinder Morgan, Stantec
3. Background: USGS 7.5" Topographics Quadrangle

Title

Off-right-of-way Tap Reconnect KY0170

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

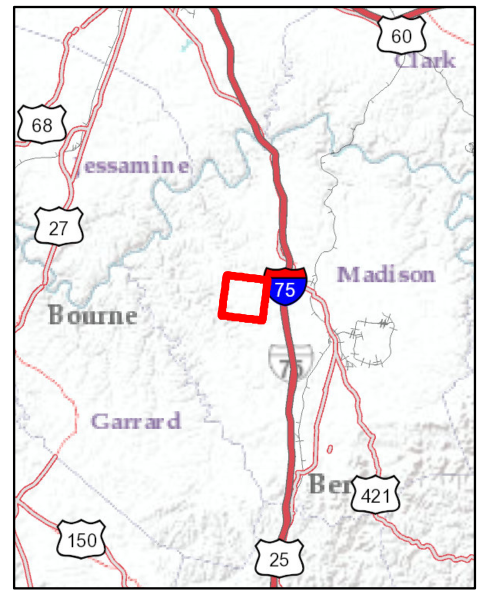
0 1,000 2,000 Feet

1:24,000 (at original document size of 8.5x11)

N

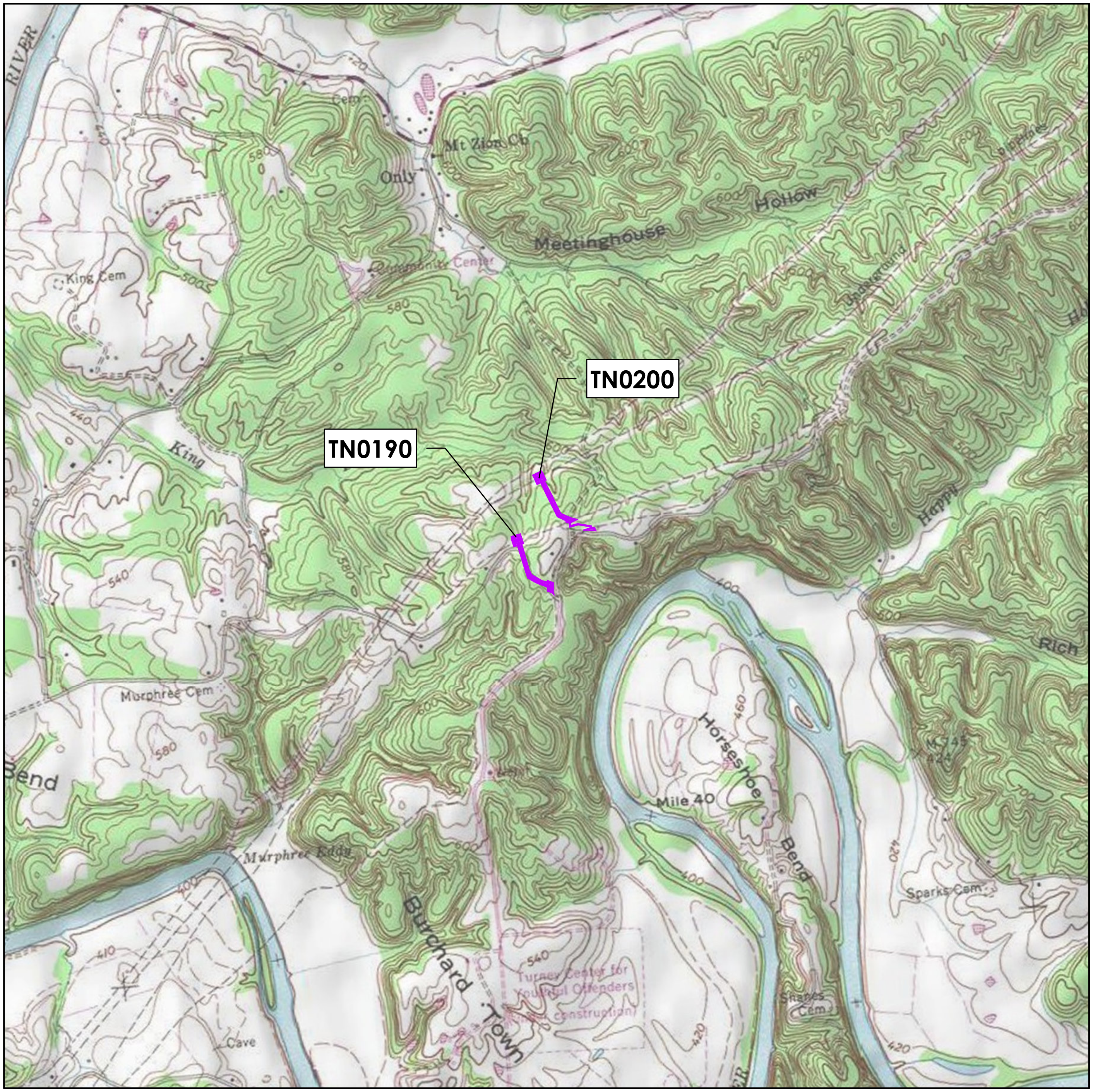
Legend

Construction Workspaces



Notes

1. Projected Coordinate System:
   USA Contiguous Albers Equal Area Conic FT
2. Data Sources Include: Kinder Morgan, Stantec
3. Background: USGS 7.5" Topographics Quadrangle



Title

Off-right-of-way Tap Reconnect TN0190 and TN0200

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

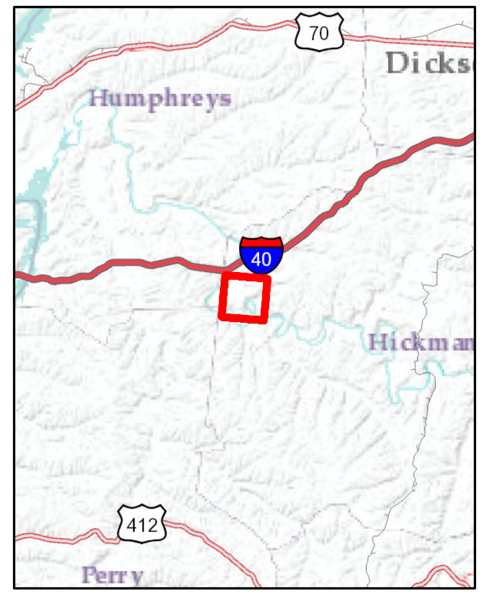
0 1,000 2,000 Feet

1:24,000 (at original document size of 8.5x11)

N

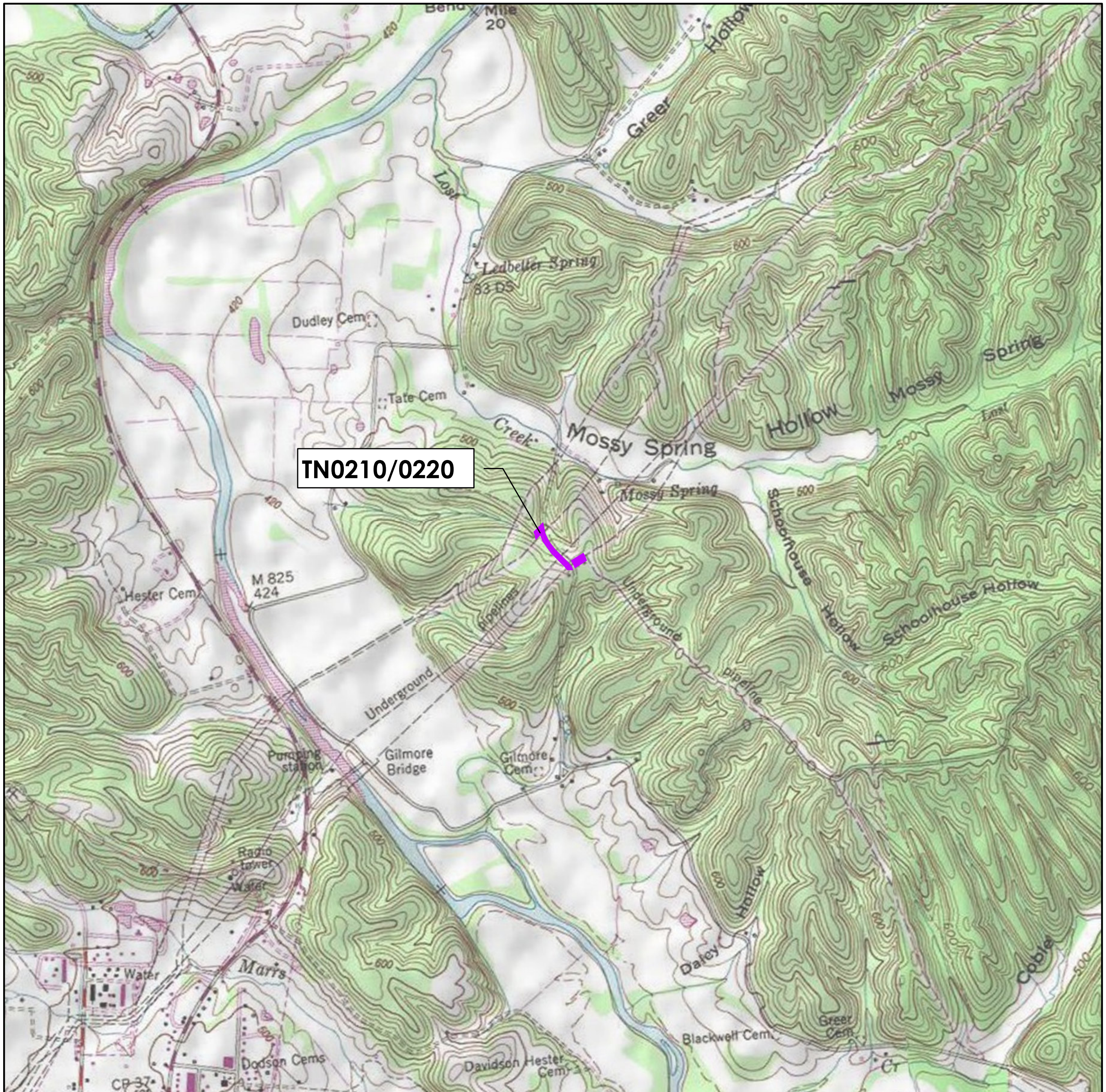
Legend

Construction Workspaces



Notes

1. Projected Coordinate System: USA Contiguous Albers Equal Area Conic FT
2. Data Sources Include: Kinder Morgan, Stantec
3. Background: USGS 7.5" Topographics Quadrangle



Title

Off-right-of-way Tap Reconnect TN0210/TN0220

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

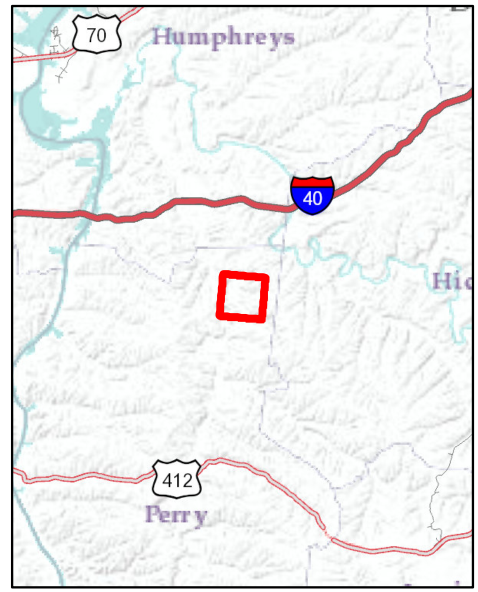
0 1,000 2,000 Feet

1:24,000 (at original document size of 8.5x11)

N

Legend

Construction Workspaces



Notes

1. Projected Coordinate System: USA Contiguous Albers Equal Area Conic FT
2. Data Sources Include: Kinder Morgan, Stantec
3. Background: USGS 7.5" Topographics Quadrangle

Title

Off-right-of-way Tap Reconnect MS0040

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

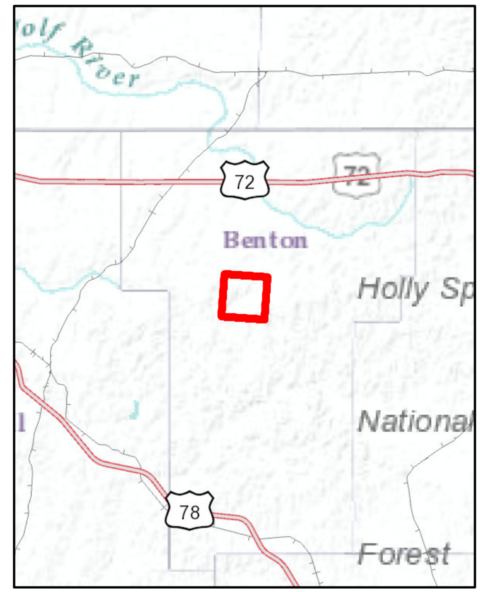
0 1,000 2,000 Feet

1:24,000 (at original document size of 8.5x11)

N

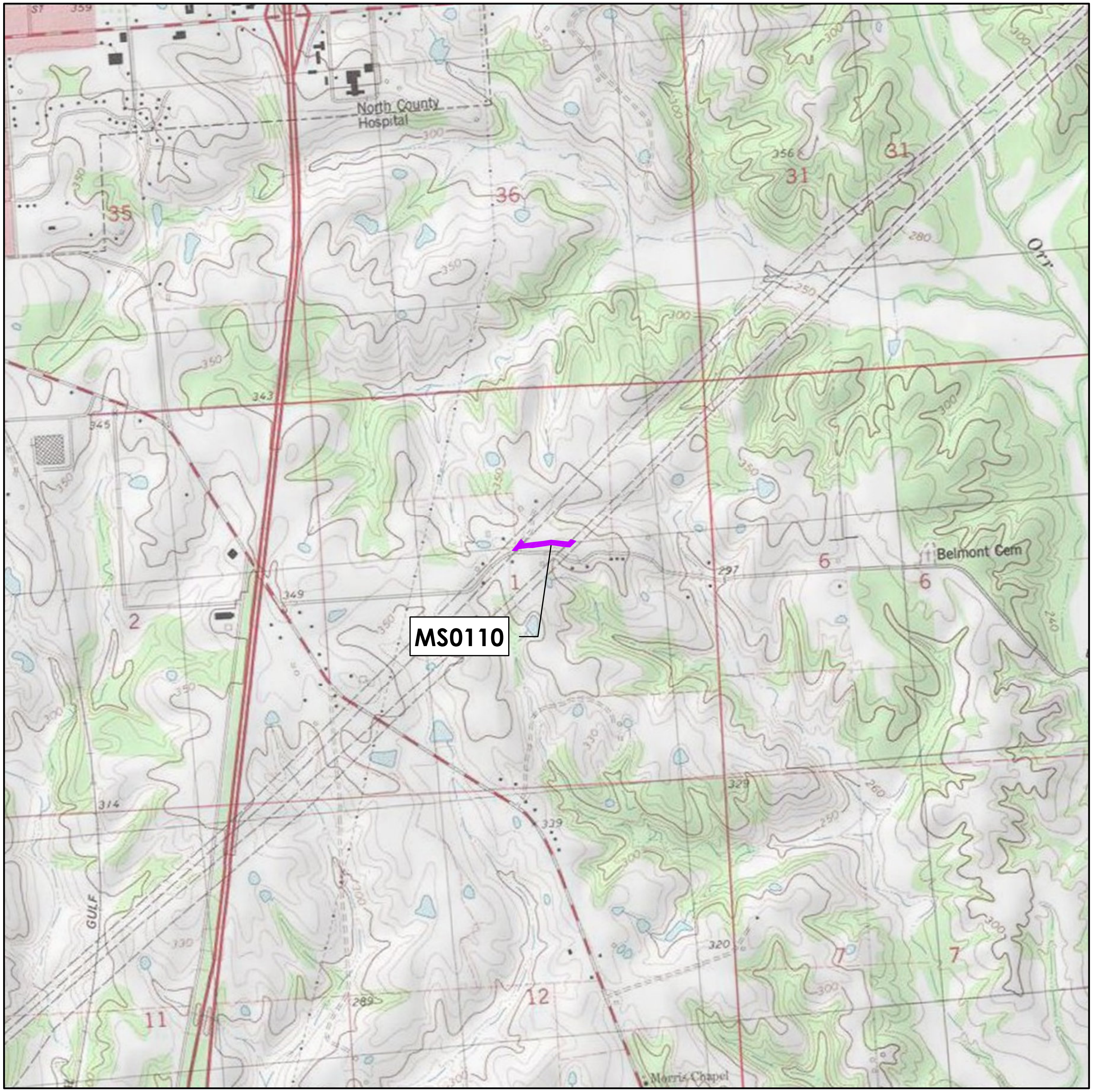
Legend

Construction Workspaces



Notes

1. Projected Coordinate System: USA Contiguous Albers Equal Area Conic FT
2. Data Sources Include: Kinder Morgan, Stantec
3. Background: USGS 7.5" Topographics Quadrangle



Title

Off-right-of-way Tap Reconnect MS0110

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

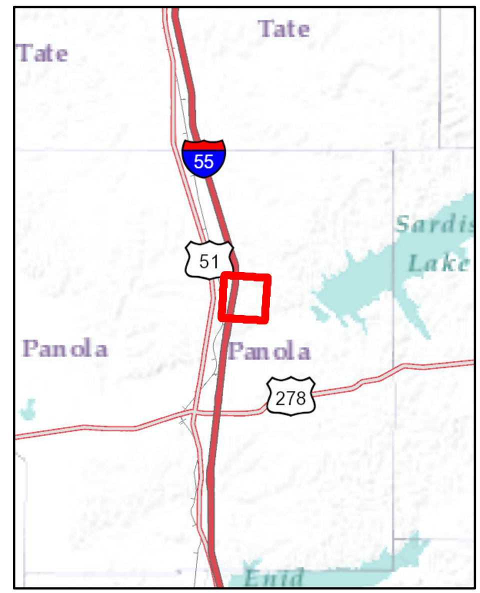
0 1,000 2,000 Feet

1:24,000 (at original document size of 8.5x11)

N

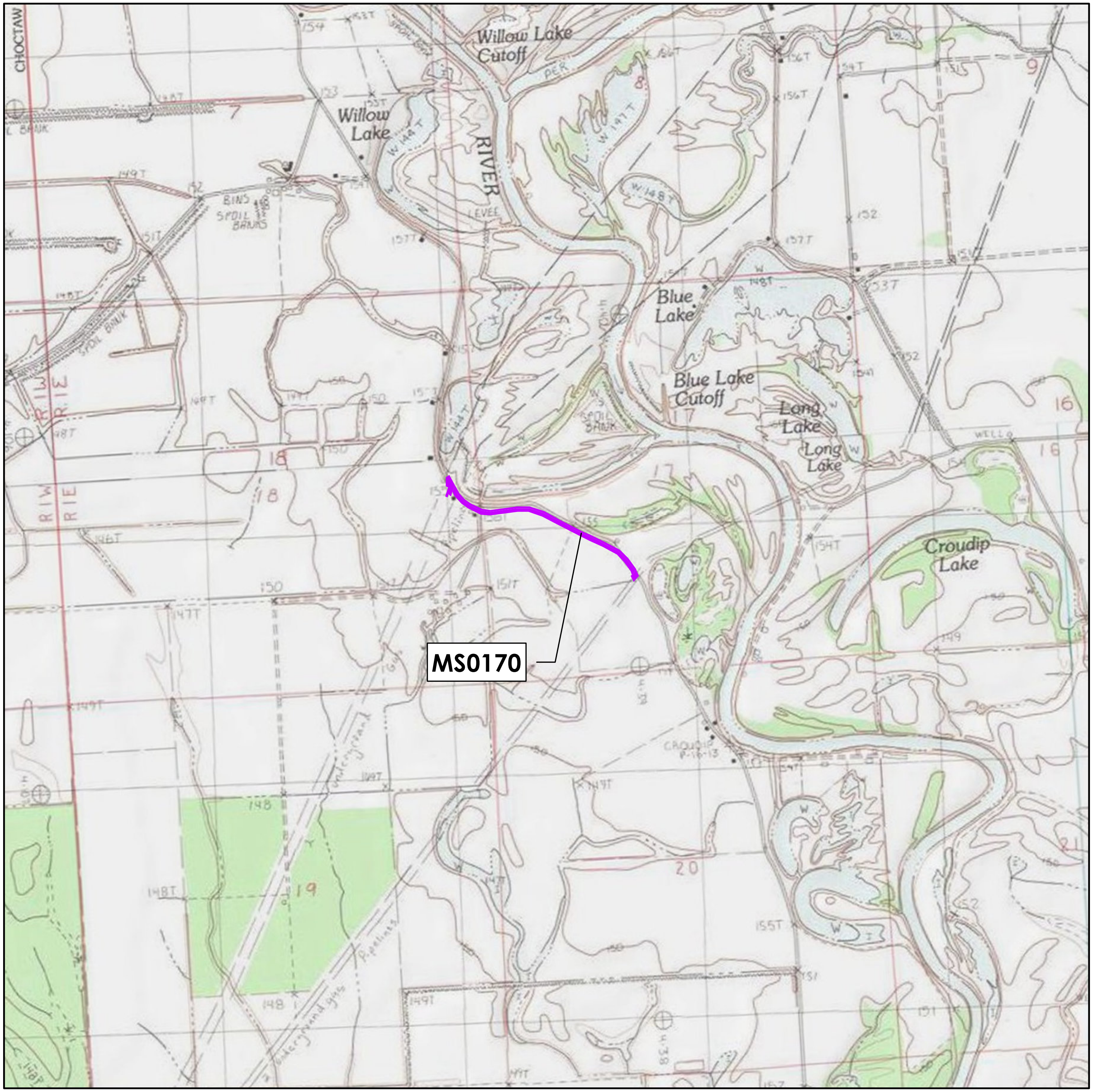
Legend

Construction Workspaces



Notes

1. Projected Coordinate System: USA Contiguous Albers Equal Area Conic FT
2. Data Sources Include: Kinder Morgan, Stantec
3. Background: USGS 7.5" Topographics Quadrangle



Title

Off-right-of-way Tap Reconnect MS0170

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

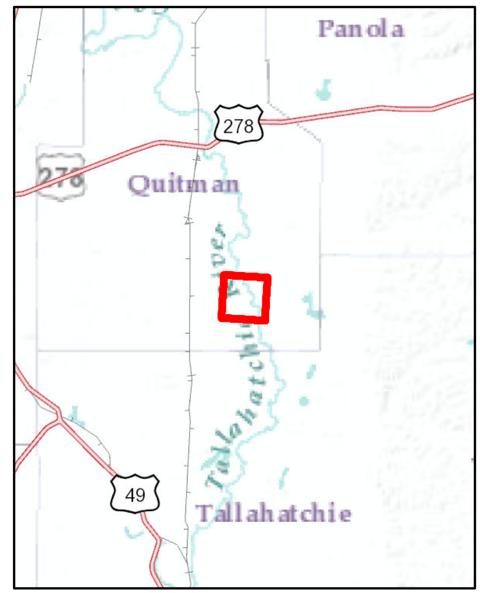
0 1,000 2,000 Feet

1:24,000 (at original document size of 8.5x11)

N

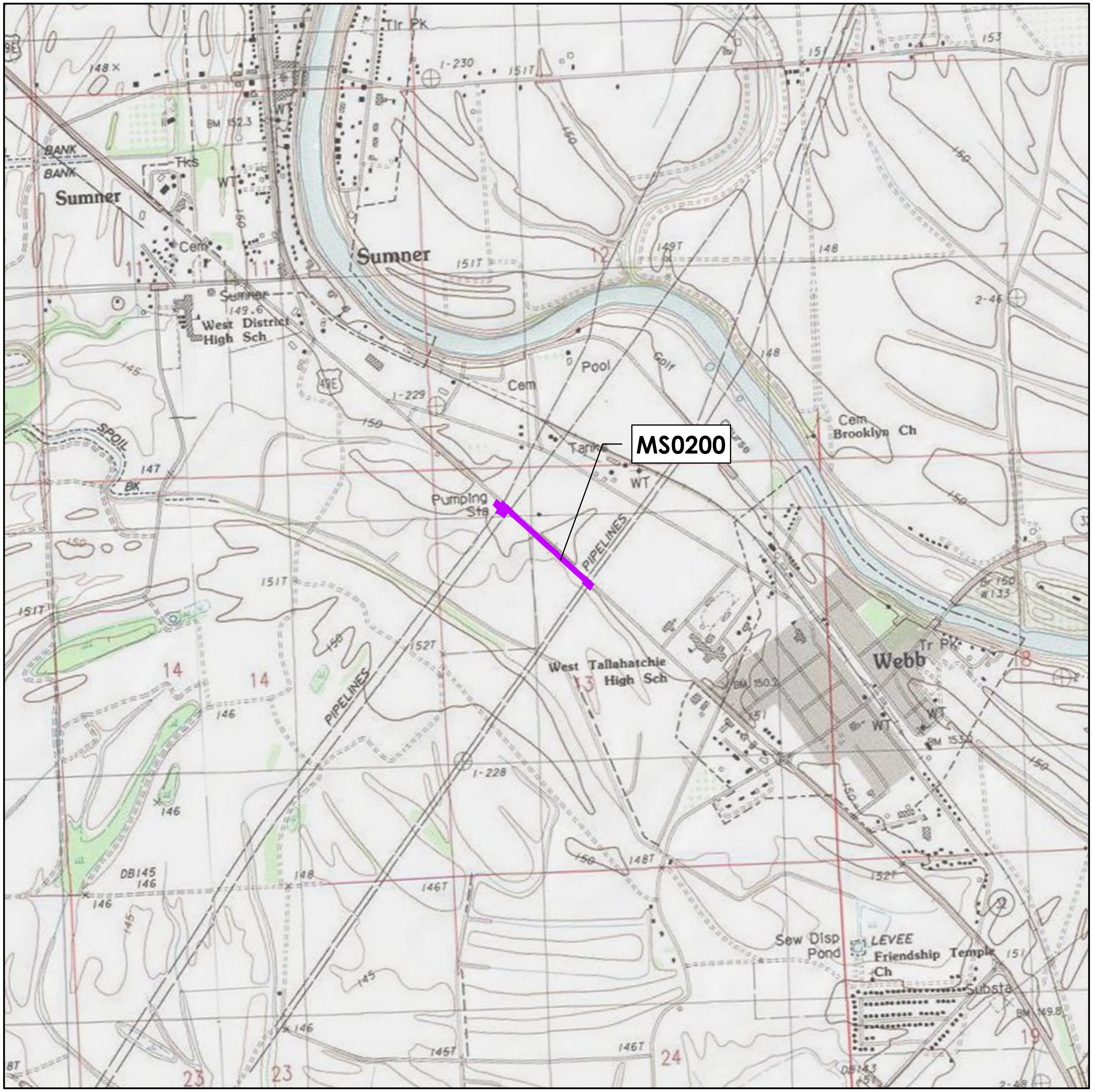
Legend

Construction Workspaces



Notes

1. Projected Coordinate System: USA Contiguous Albers Equal Area Conic FT
2. Data Sources Include: Kinder Morgan, Stantec
3. Background: USGS 7.5" Topographics Quadrangle



Title

Off-right-of-way Tap Reconnect MS0200

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

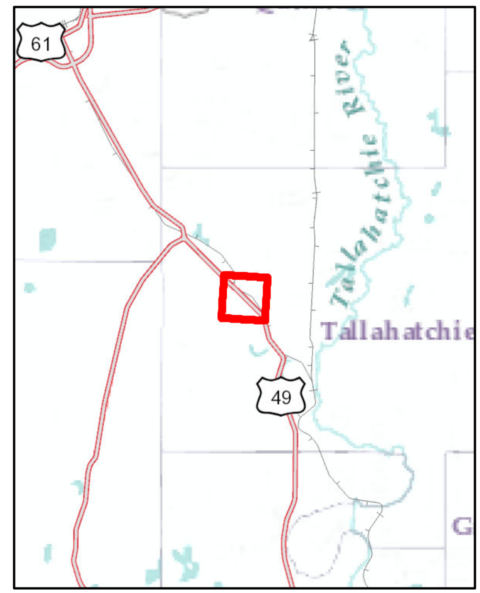
0 1,000 2,000 Feet

1:24,000 (at original document size of 8.5x11)

N

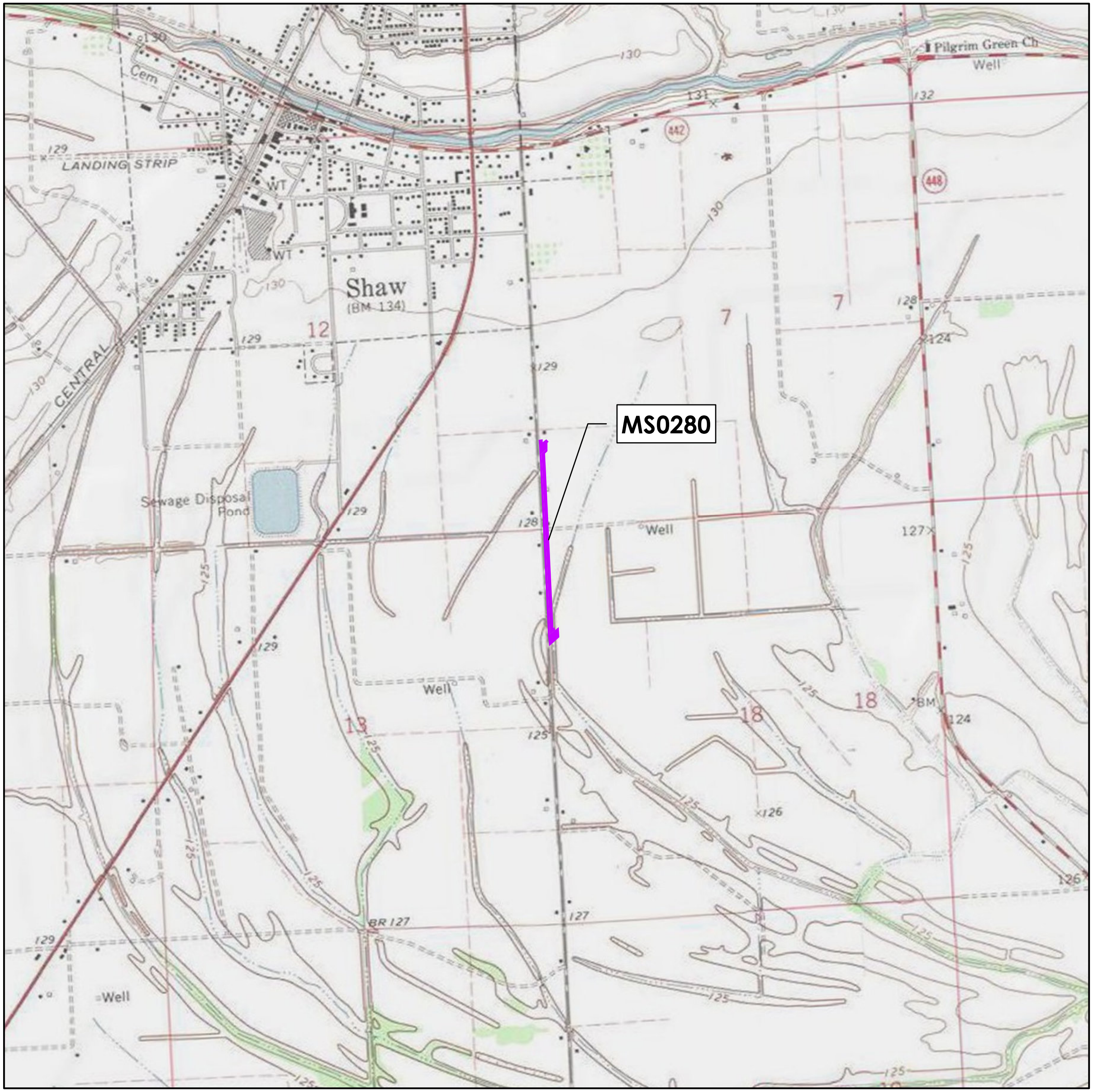
Legend

Construction Workspaces



Notes

1. Projected Coordinate System: USA Contiguous Albers Equal Area Conic FT
2. Data Sources Include: Kinder Morgan, Stantec
3. Background: USGS 7.5" Topographics Quadrangle



Title

Off-right-of-way Tap Reconnect MS0280

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

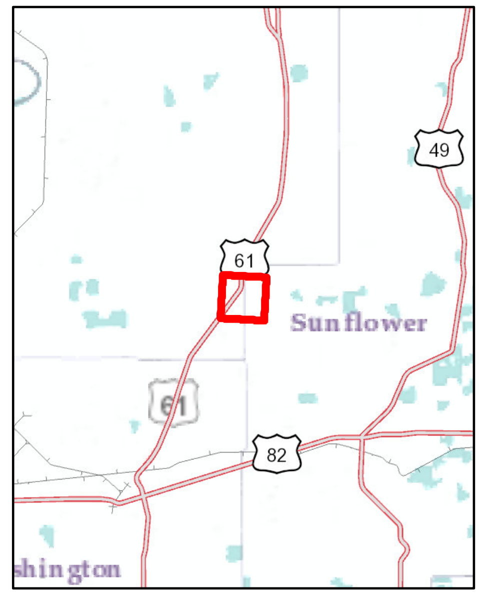
0 1,000 2,000 Feet

1:24,000 (at original document size of 8.5x11)

N

Legend

Construction Workspaces



Notes

1. Projected Coordinate System: USA Contiguous Albers Equal Area Conic FT
2. Data Sources Include: Kinder Morgan, Stantec
3. Background: USGS 7.5" Topographics Quadrangle

Replacement Pipelines

Figure No.

Title

Replacement Pipeline MLV-874

Client/Project

Tennessee Gas Pipeline Company, L.L.C.

Project Location

Madison County, Kentucky

0 0.5 1 Miles

N

Legend

- Proposed Restoration Activities near MLVs
- Tennessee Gas Pipelines
- County Boundary
- State Boundary

Notes

1. Coordinate System: GCS North American 1983 UTM Zone 16S (Calculated)
2. Data Sources Include: Kinder Morgan, HMM, Stantec
3. Background: USGS 7.5' Topographic Quadrangles

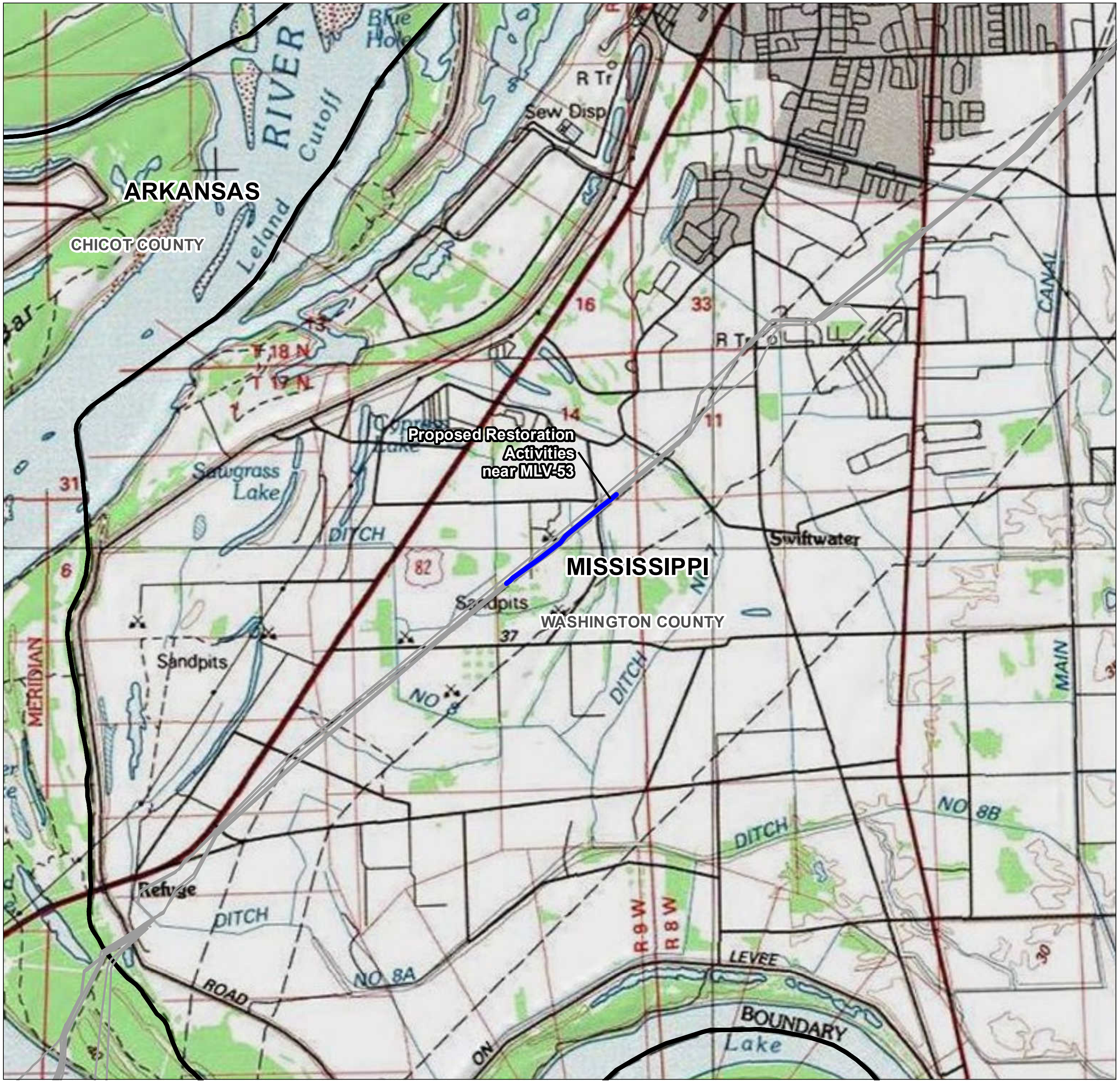


Figure No.

Title

Replacement Pipeline MLV-53

Client/Project

Tennessee Gas Pipeline Company, L.L.C.

Project Location

Washington County, Mississippi

0 0.5 1 Miles

N

Legend

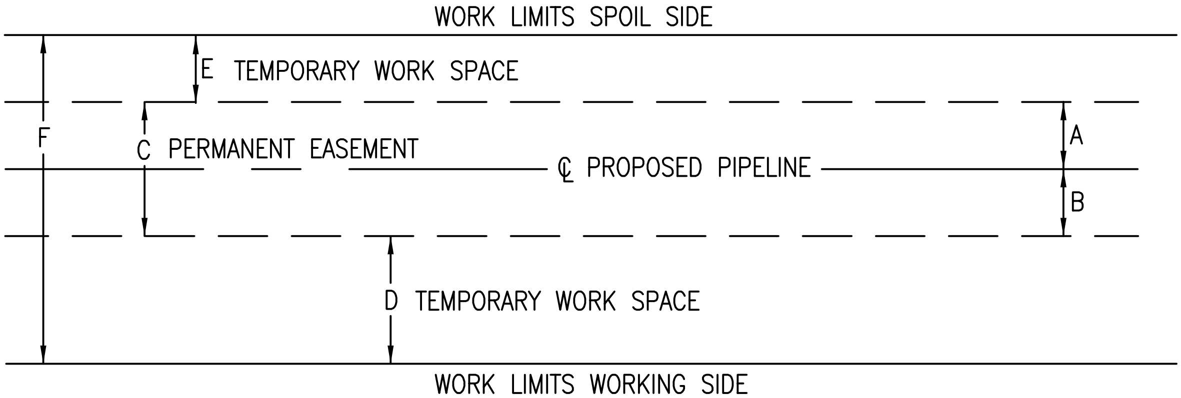
- Proposed Restoration Activities near MLVs
- Tennessee Gas Pipelines
- County Boundary
- State Boundary

Notes

1. Coordinate System: GCS North American 1983 UTM Zone 15S (Calculated)
2. Data Sources Include: Kinder Morgan, HMM, Stantec
3. Background: USGS 7.5' Topographic Quadrangles

Appendix B

Typical Right-of-way Configurations and Construction Techniques



DIMENSIONS TABLE

PIPE SIZES	A	B	C	D	E	F
3" – 6"	15'	15'	30'	20'		50'
8" – 16"	25'	25'	50'	25'		75'
18" – 24"	25'	25'	50'	25'	15'	90'
26" – 30"	25'	25'	50'	35'	15'	100'
36" – 42"	25'	25'	50'	55'	20'	125'

NOTES:

1. IN AREAS WHERE SIDE HILL CUTS ARE DEEPER THAN 5' ADDITIONAL ROOM MAY BE NEEDED FOR SLOPING OF HIGHWALL.
2. SIDE HILL CUTS WILL NEED EXTRA WORK SPACE FOR SPOIL STORAGE.
3. TOPSOIL SEPARATION MAY REQUIRE ADDITIONAL TEMPORARY WORK SPACE.

DRAWING DEPICTED IS SUPERSEDED BY WRITTEN STANDARD, SCOPE OF WORK OR LINE LIST.

REVISIONS

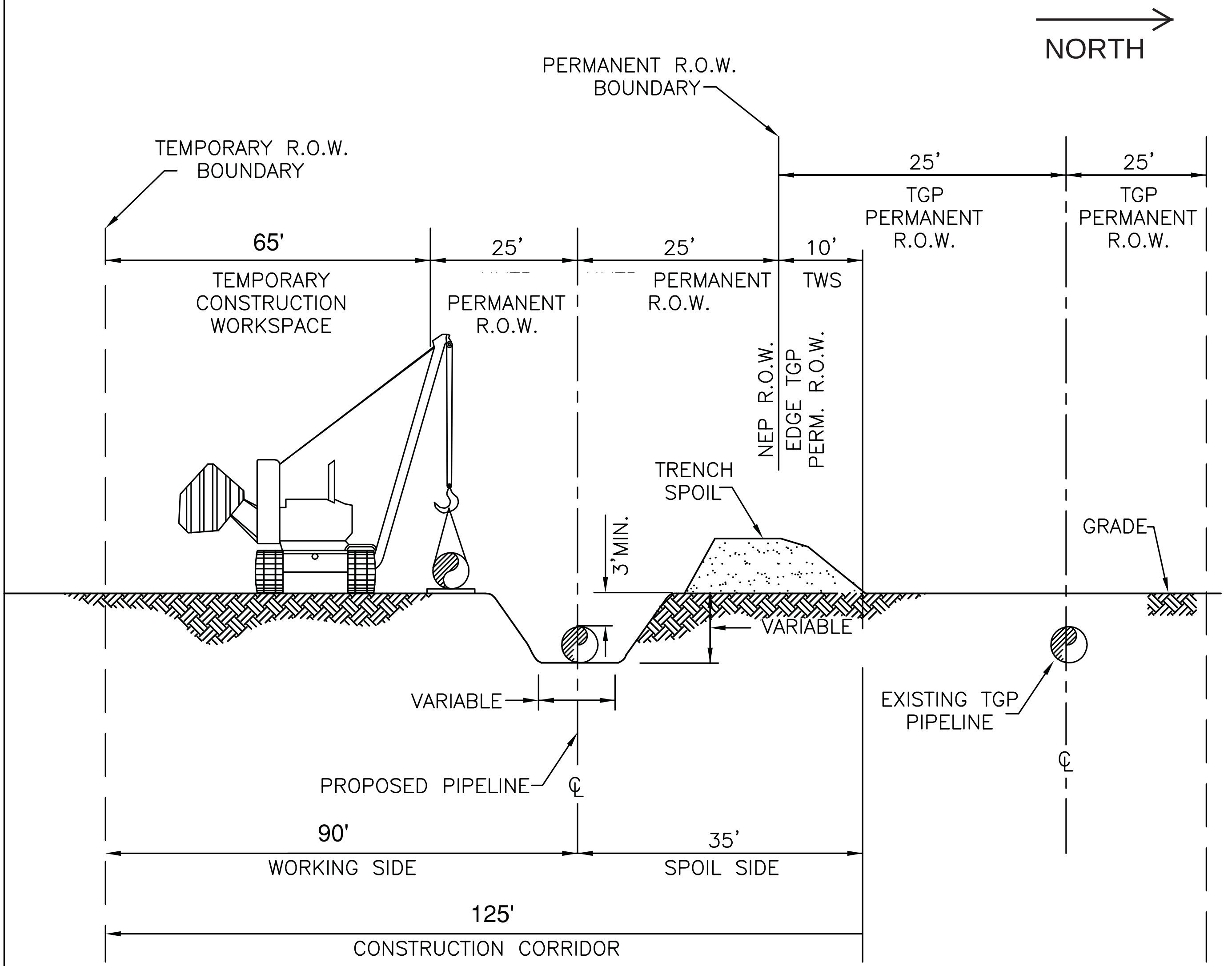
NO.	DATE	DESCRIPTION	BY	CHKD.	APPR.
1	03/10/04	ISSUED FOR REVIEW	RB	CM	
2	07/13/04	REVISED PER CLIENT COMMENT	RB	CM	
3	07/01/05	ENG REWRITE RELEASE	WS		

KINDER MORGAN INC

TYPICAL TEMPORARY WORKSPACE FOR PIPELINE ROW 3" THRU 42"

DATE: 07/01/05		APPROVED BY:	
SCALE: N.T.S.	CST–P–1000–A055	SH. 1 OF 1	

TYPICAL CO-LOCATE CONFIGURATION WITH TGP/OVERLAPPING EASEMENT



CROSSOVER VIEW

NOTES:

1. USE FOR 10-INCH OR GREATER DIAMETER PIPELINE.
2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE-SPECIFIC TERRAIN FEAUTURES; HOWEVER, UNLESS OTHERWISE INDICATED IN KINDER MORGAN ENVIRONMENTAL MANAGEMENT & CONSTRUCTION PLANS, THE MAXIMUM WIDTH OF CONSTRUCTION ROW WILL BE 125 FEET.

KINDER MORGAN

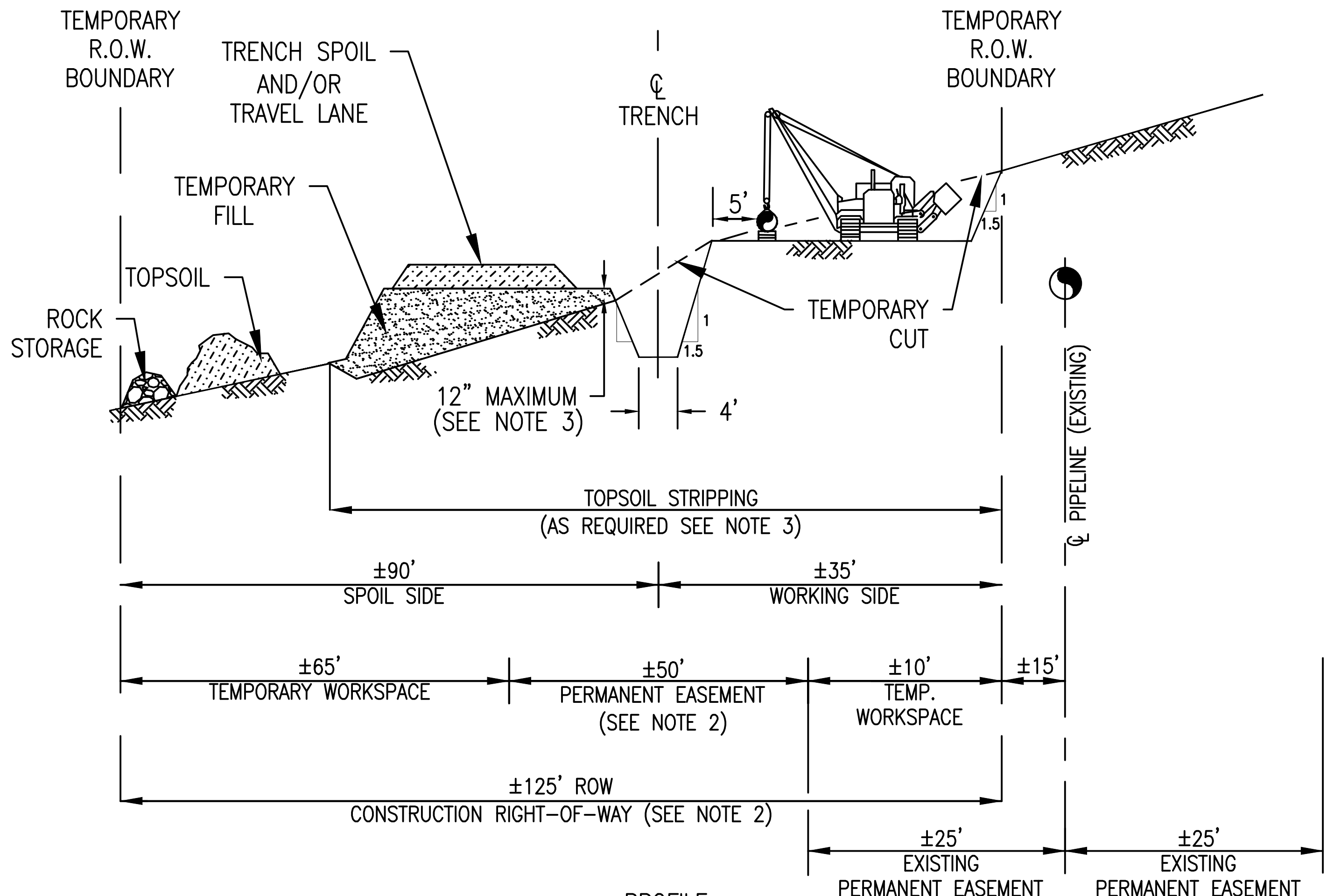
Hatch Mott MacDonald

TYPICAL CO-LOCATE CONFIGURATION WITH TGP/OVERLAPPING EASEMENT

ABANDONMENT & CAPACITY RESTORATION PROJECT

File No.:

DRAWN BY	HMM	DATE	05-28-14	DWG. NO.
CHECKED BY	HMM	SCALE	N.T.S.	TYPICAL 1
APPROVED BY	HMM	SHEET	1 of 1	



PROFILE
(NOT TO SCALE)

NOTES:

1. SIDE HILL CONSTRUCTION CUT AND FILL SHALL BE ALLOWED WHENEVER, IN THE OPINION OF THE CONTRACTOR, STEEP SIDE HILL CONSTRUCTION IS WARRANTED FOR PERSONNEL AND/OR EQUIPMENT SAFETY CONSIDERATIONS.
2. CONSTRUCTION RIGHT-OF-WAY WILL TYPICALLY BE 125 FEET WIDE CONSISTING OF 50 FEET OF PERMANENT EASEMENT AND 75 FEET OF TEMPORARY WORKSPACE. EXTRA TEMPORARY WORK SPACE WILL BE NECESSARY AT MAJOR ROAD, RAIL AND RIVER CROSSING AND OTHER SPECIAL CIRCUMSTANCES, AS REQUIRED. CERTAIN SITUATIONS MAY REQUIRE A NARROWER WIDTH.
3. THIS DRAWING REFLECTS "TRENCH, SPOIL, AND WORKING SIDE" TOPSOIL STRIPPING PROCEDURE AS NEEDED FOR HILL SIDE LEVELING. SALVAGE TOPSOIL OVER TRENCH UNDER THE SPOIL PIPE AND FROM TEMPORARY CUT AND FILL AREAS AT LOCATIONS IDENTIFIED ON THE CONSTRUCTION ALIGNMENT SHEETS OR AS DIRECTED BY THE COMPANY'S INSPECTOR.
4. STOCKPILE TOPSOIL AND/OR ROCK AS SHOWN OR IN ANY CONFIGURATION APPROVED BY THE COMPANY'S REPRESENTATIVE. KEEP TOPSOIL CLEAN OF ALL CONSTRUCTION DEBRIS.
5. LEAVE GAPS IN TOPSOIL AND SPOIL PILES AT OBVIOUS DRAINAGES. DO NOT PUSH TOPSOIL INTO CREEKS OR WETLANDS. DO NOT USE TOPSOIL FOR PADDING. AVOID SCALPING VEGETATED GROUND SURFACE WHEN BACKFILLING TOPSOIL PILE.
6. TEMPORARILY SUSPEND TOPSOIL HANDLING OPERATIONS DURING INORDINATELY WINDY CONDITIONS UNTIL MITIGATIVE MEASURES TO MINIMIZE WIND EROSION CAN BE IMPLEMENTED.
7. SEE DETAILS CST-P-1260-A180.1& .2, CST-P-1260-A190.1& .2 FOR SEDIMENT BARRIER DETAIL DURING CONSTRUCTION.
8. FOR STORM WATER RUNOFF CONTROL ON HILL/SLOPE CONSTRUCTION, SEE TEMPORARY EROSION AND SEDIMENTATION CONTROL PROCEDURES IN SECTION C1260 OF THE CONSTRUCTION STANDARDS.
9. ALL DIMENSIONS INDICATED SHALL BE DETERMINED BY ACTUAL CONSTRUCTION DRAWINGS.
10. ALL EXCAVATION SHALL MEET THE REQUIREMENTS OF OSHA 29 CFR 1926.
11. SIDES OF ALL EXCAVATIONS OVER 4-FEET DEEP SHALL BE DUG, STAIR STEPPED, SLOPED OR SHORED AT ALL TIMES TO PROVIDE SAFE WORK AREAS FOR PERSONNEL IN CONFORMANCE WITH OSHA REQUIREMENTS.

DRAWING DEPICTED IS SUPERSEDED BY WRITTEN STANDARD, SCOPE OF WORK OR LINE LIST.

REVISIONS

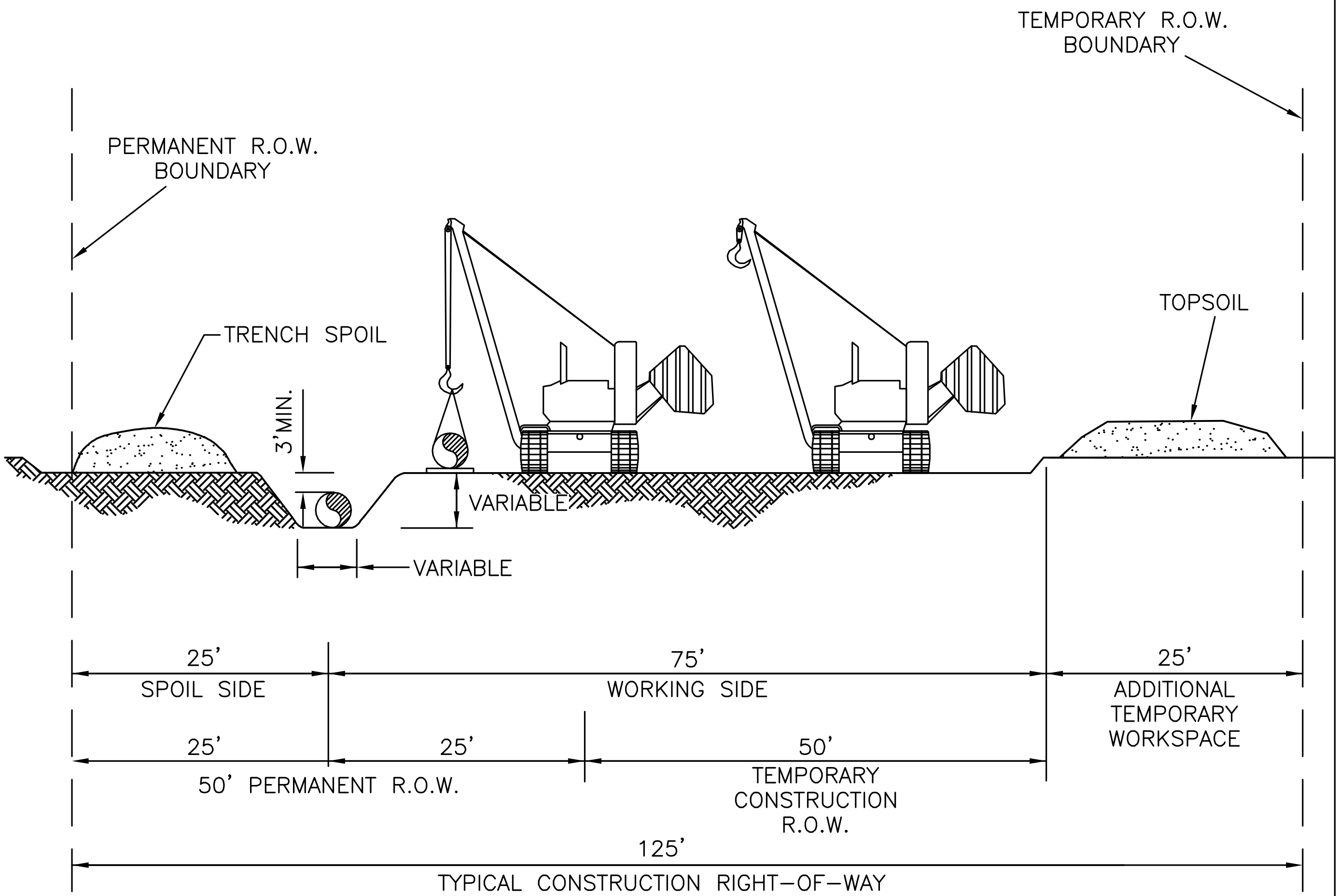
NO.	DATE	DESCRIPTION	BY	CHKD.	APPR.

KINDER MORGAN INC

TYPICAL FULL TOPSOIL AND/OR ROCK SEPARATION SIDE HILL CONSTRUCTION SPOILSIDE TRAVEL LANE W/ PARALLEL PIPELINE

DATE: 03/04/16		APPROVED BY: KM/DC
SCALE: N.T.S.		SH. 1 OF 1

TYPICAL AGRICULTURAL WORKSPACE



CROSSOVER VIEW

NOTES:

1. USE FOR 10-INCH OR GREATER DIAMETER PIPELINE.
2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
3. OTHER CONFIGURATIONS OF TOPSOIL AND SUBSOIL ARE ACCEPTABLE PROVIDED THEY ARE KEPT SEPARATE.
4. UP TO 12 INCHES OF TOPSOIL REMOVED.
5. TOPSOIL AND SUBSOIL PILES WILL BE ADEQUATELY PROTECTED FROM EROSION AND SEDIMENTATION.

KINDER MORGAN

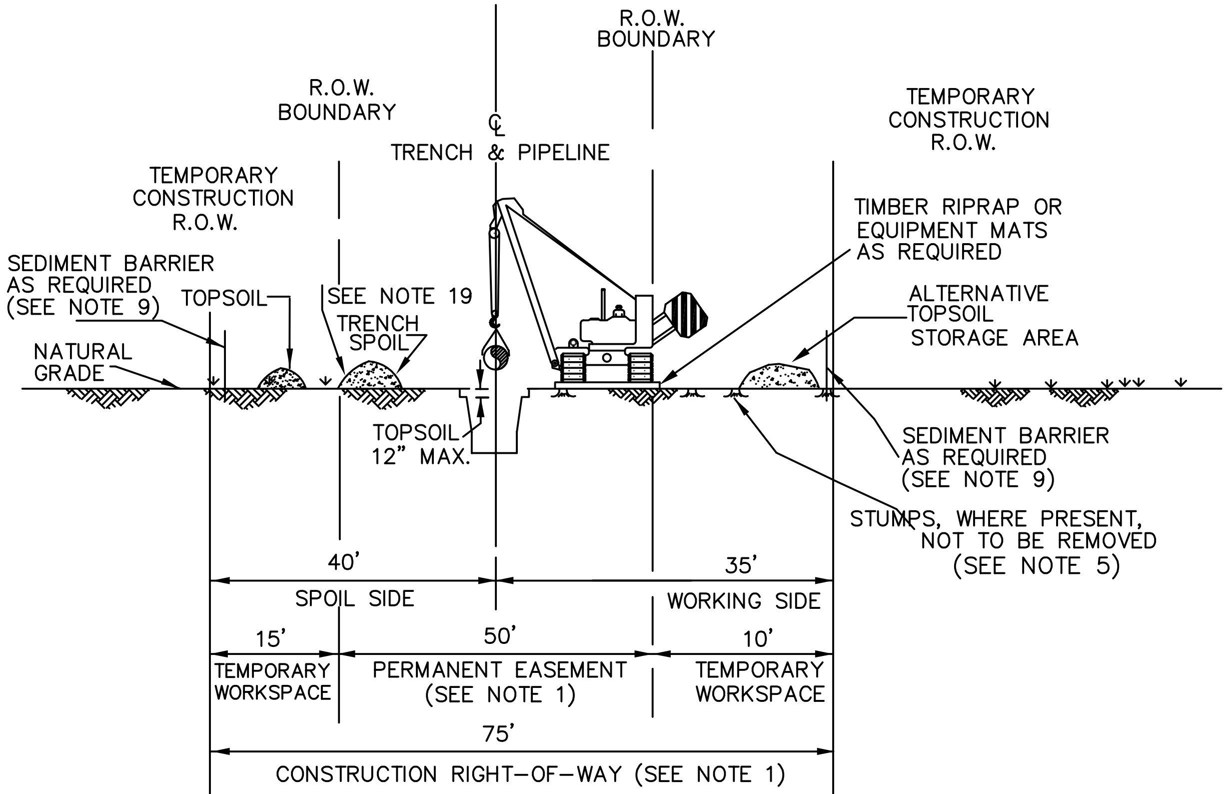
Hatch Mott MacDonald

TYPICAL AGRICULTURAL WORKSPACE

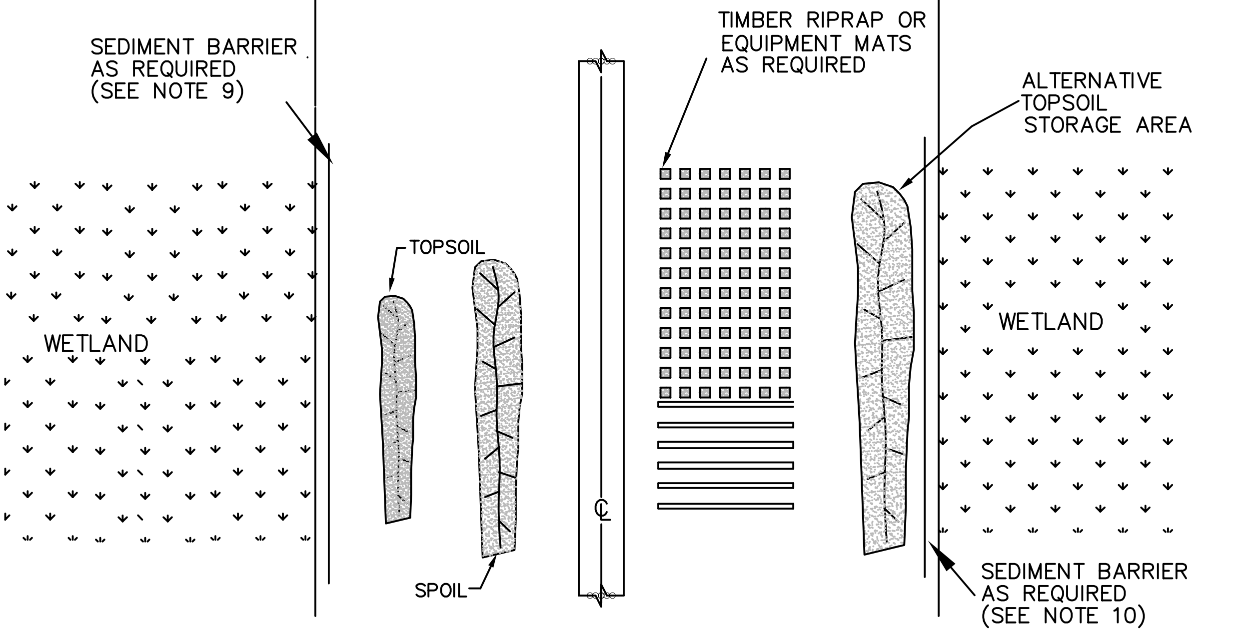
File No.:

ABANDONMENT & CAPACITY RESTORATION PROJECT

DRAWN BY	HMM	DATE	05-28-14	DWG. NO.
CHECKED BY	HMM	SCALE	N.T.S.	TYPICAL 2
APPROVED BY	HMM	SHEET	1 of 1	



PROFILE



PLAN VIEW

DRAWING DEPICTED IS SUPERSEDED BY WRITTEN STANDARD, SCOPE OF WORK OR LINE LIST.

REVISIONS

NO.	DATE	DESCRIPTION	BY	CHKD.	APPR.
1	07/08/04	ISSUED FOR REVIEW	RB	CM	
2	07/13/04	REVISED PER CLIENT COMMENT	RB	CM	
3	07/01/05	ENG REWRITE RELEASE	WS		

KINDER MORGAN INC

TYPICAL
WETLAND CROSSING

DATE: 07/01/05 | APPROVED BY:

SCALE: N.T.S. | CST-P-1260-A380.1 | SH. 1 OF 2

NOTES:

1. CONSTRUCTION RIGHT-OF-WAY WILL TYPICALLY BE 75 FEET WIDE CONSISTING OF 50 FEET OF PERMANENT EASEMENT AND UP TO 25 FEET OF TEMPORARY WORKSPACE.
2. THE SAME LAYOUT APPLIES WHETHER CONSTRUCTION R.O.W. DOES OR DOES NOT ABUT A FOREIGN R.O.W.
3. LOCATE ANY EXTRA TEMPORARY WORK SPACE AREAS AT LEAST 25 FEET FROM EDGE OF WETLAND AND WITHIN THE APPLICABLE FULL WIDTH CONSTRUCTION R.O.W.
4. CLEARING OF VEGETATION AND TREES IS PROHIBITED BETWEEN TEMPORARY EXTRA WORK SPACE AND THE EDGE OF THE WETLAND.
5. CUT VEGETATION AND TREES OFF AT GROUND LEVEL, LEAVING EXISTING ROOT SYSTEMS IN PLACE WHEREVER PRACTICABLE, AND REMOVE CUTTINGS FROM THE WETLAND FOR DISPOSAL.
6. LIMIT CONSTRUCTION EQUIPMENT TO ONE PASS THROUGH WETLANDS TO THE EXTENT PRACTICABLE.
7. NO REFUELING OF EQUIPMENT WITHIN 100 FEET OF WETLAND EXCEPT IN ACCORDANCE WITH THE SPCC PLAN.
8. IF SATURATED AT TIME OF CONSTRUCTION, REDUCE SOIL COMPACTION BY UTILIZING WIDE-TRACK OR BALLOON TIRE CONSTRUCTION EQUIPMENT OR NORMAL EQUIPMENT OPERATED ON TIMBER RIPRAP OR EQUIPMENT MATS.
9. AVOID ADJACENT WETLANDS. INSTALL SEDIMENT BARRIERS IMMEDIATELY AFTER INITIAL GROUND DISTURBANCE AND AT THE EDGE OF THE CONSTRUCTION R.O.W. ALONG THE WETLAND AS DIRECTED BY THE COMPANY'S INSPECTOR.
10. THIS DRAWING REFLECTS "TRENCH ONLY" TOPSOIL STRIPPING PROCEDURE FOR AREAS WHERE STANDING WATER OR SATURATED SOIL ARE NOT PRESENT.
11. SALVAGE UP TO 12" OF TOPSOIL OVER TRENCH AT LOCATIONS IDENTIFIED ON THE CONSTRUCTION DRAWINGS OR AS DIRECTED BY THE COMPANY'S INSPECTOR. MAINTAIN SEPARATION BETWEEN TOPSOIL AND TRENCH SPOIL.
12. LEAVE GAPS IN TOPSOIL AND SPOIL PILES AT OBVIOUS DRAINAGES. DO NOT USE TOPSOIL FOR PADDING. AVOID SCALPING VEGETATED GROUND SURFACE WHEN BACKFILLING SPOIL PILE.
13. IN UNSATURATED CONDITIONS, SPOIL MAY BE USED TO STABILIZE THE WORKING SIDE.
14. IF SATURATED AT TIME OF CONSTRUCTION, LEAVE HARD PLUGS AT THE EDGE OF WETLAND UNTIL JUST PRIOR TO TRENCHING.
15. TRENCH THROUGH WETLANDS.
16. LOWER-IN PIPE, INSTALL TRENCH BREAKERS AT WETLAND EDGES AS DIRECTED BY THE COMPANY'S INSPECTOR TO PREVENT DRAINAGE. BACKFILL UPON COMPLETION OF CONSTRUCTION.
17. REMOVE ALL TIMBER, RIPRAP OR EQUIPMENT MATS FROM WETLANDS UPON COMPLETION OF CONSTRUCTION.
18. RESTORE GRADE TO NEAR PRE-CONSTRUCTION TOPOGRAPHY AND REPLACE TOPSOIL, WHERE SALVAGED, WITHOUT A CROWN OVER THE TRENCH.
19. IF STANDING WATER IS NOT PRESENT, SEED AS SPECIFIED.
20. TOPSOIL AND TRENCH SPOIL RELATIVE POSITIONS CAN, AS DIRECTED BY THE COMPANY'S INSPECTOR, BE REVERSED.

DRAWING DEPICTED IS SUPERSEDED BY WRITTEN STANDARD, SCOPE OF WORK OR LINE LIST.

REVISIONS

NO.	DATE	DESCRIPTION	BY	CHKD.	APPR.
1	07/08/04	ISSUED FOR REVIEW	RB	CM	
2	07/13/04	REVISED PER CLIENT COMMENT	RB	CM	
3	07/01/05	ENG REWRITE RELEAS	WS		

KINDER MORGAN INC

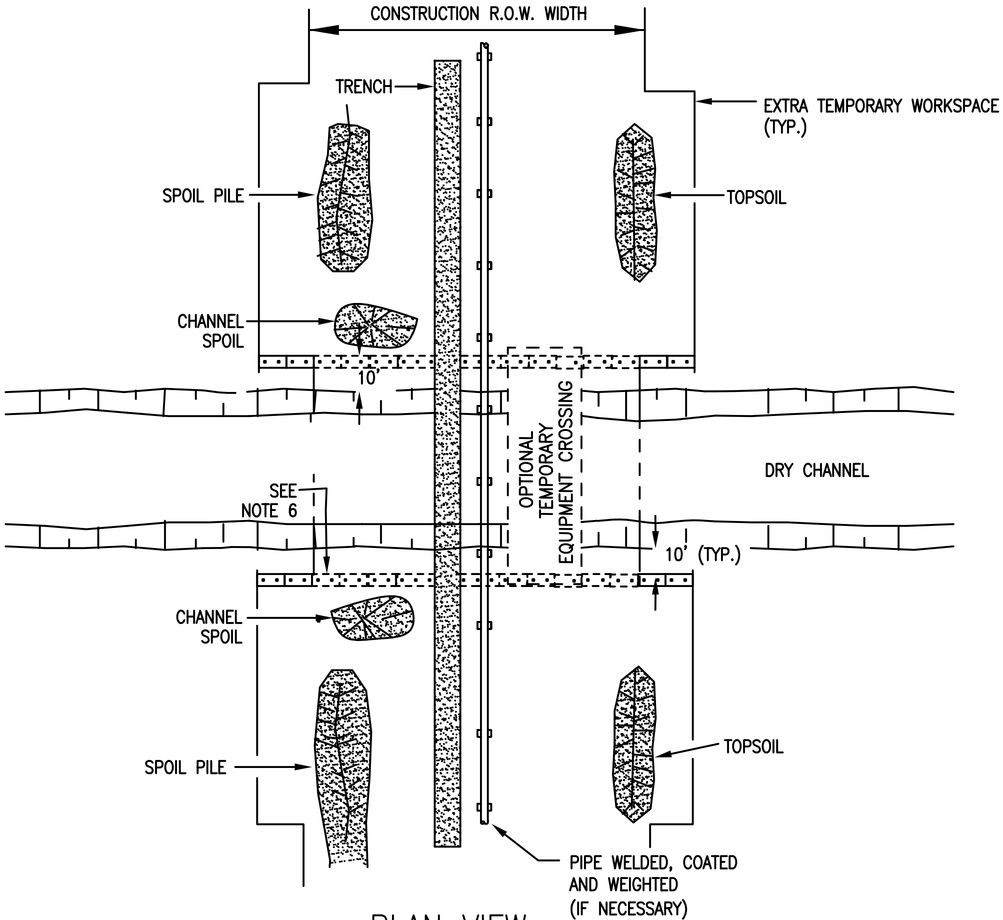
TYPICAL
WETLAND CROSSING

DATE: 07/01/05

APPROVED BY:

SCALE: N.T.S.

CST-P-1260-A380.2



PLAN VIEW

NOTES:

1. METHOD APPLIES TO CROSSINGS WHERE NO FLOWING WATER IS PRESENT AT THE TIME OF CROSSING.
2. CONTRACTOR MAY "MAINLINE THROUGH" THE CROSSING OR UP TO BOTH SIDES OF THE CROSSING; STRING, WELD, COAT, AND WEIGHT (IF NECESSARY), USING THE MAINLINE CREW WITH THE PIPE SKIDDED OVER THE CROSSING.
3. NO REFUELING OF MOBILE EQUIPMENT WITHIN 100 FEET OF DRY CHANNEL. REFUEL STATIONARY EQUIPMENT AS PER THE SPCC PLAN.
4. INSTALLATION OF TEMPORARY EQUIPMENT CROSSING IS OPTIONAL AT THE DISCRETION OF THE COMPANY'S REPRESENTATIVE. IF A TEMPORARY EQUIPMENT CROSSING IS INSTALLED, IT MUST BE BUILT IN ACCORDANCE WITH DETAIL CST-P-1000-A335, A340, A345, A350, A355.
5. IN AGRICULTURAL LAND, STRIP TOPSOIL FROM SPOIL STORAGE AREA. STOCKPILE TOPSOIL AND SPOIL SEPARATELY. TOPSOIL AND SPOIL WILL NOT BE STOCKPILED IN THE CROSSING CHANNEL AND WILL BE PLACED A MINIMUM OF 10 FEET FROM CROSSING BANKS WITHIN THE CONSTRUCTION R.O.W.
6. CONSTRUCT SEDIMENT BARRIERS ACROSS THE ENTIRE CONSTRUCTION R.O.W. FOLLOWING CLEARING AND GRADING AND MAINTAIN UNTIL CONSTRUCTION OF THE CROSSING. EROSION CONTROL MEASURES SHALL BE REINSTALLED IMMEDIATELY FOLLOWING BACKFILLING OF TRENCH AND STABILIZATION OF BANKS. BARRIERS MAY BE TEMPORARILY REMOVED TO ALLOW CONSTRUCTION ACTIVITIES BUT MUST BE REPLACED BY THE END OF EACH WORK DAY.
7. IN-STREAM SPOIL TO BE STORED OUT OF THE STREAM CHANNEL A MINIMUM OF 10 FEET FROM HIGH BANK AND WITHIN THE CONSTRUCTION R.O.W. UNLESS DEPICTED OTHERWISE IN SITE SPECIFIC CROSSING PLANS.
8. BACKFILL WITH NATIVE MATERIAL.
9. RESTORE CROSSING CHANNEL TO APPROXIMATE PRE-CONSTRUCTION PROFILE AND SUBSTRATE.
10. RESTORE CROSSING BANKS TO APPROXIMATE ORIGINAL CONDITION AND STABILIZE, AS REQUIRED.
11. ALL DIMENSIONS INDICATED SHALL BE DETERMINED BY ACTUAL CONSTRUCTION CONDITIONS.

DRAWING DEPICTED IS SUPERSEDED BY WRITTEN STANDARD, SCOPE OF WORK OR LINE LIST.

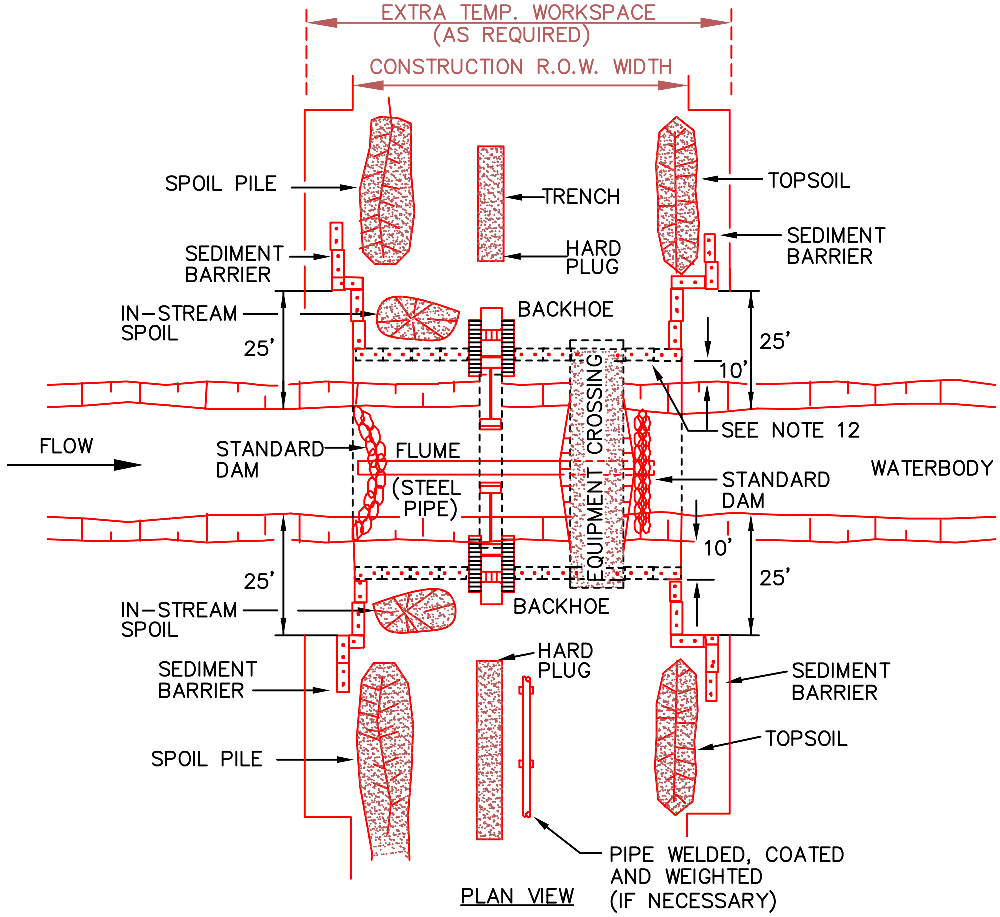
REVISIONS

NO.	DATE	DESCRIPTION	BY	CHKD.	APPR.
1	03/12/04	ISSUED FOR REVIEW	RB	CM	
2	07/13/04	REVISED PER CLIENT COMMENT	RB	CM	
3	07/01/05	ENG REWRITE RELEASE	WS		

KINDER MORGAN INC

TYPICAL NON-FLOWING WATERBODY CROSSING OPEN CUT TRENCH

DATE: 07/01/05		APPROVED BY:
SCALE: N.T.S.	CST-P-1150-A280	SH. 1 OF 1



NOTES:

1. METHOD APPLIES TO WATERBODIES WHERE DOWNSTREAM SILTATION MUST BE AVOIDED. FLUMES ARE GENERALLY NOT RECOMMENDED FOR USE ON WATERBODIES WITH A BROAD UNCONFINED CHANNEL, PERMEABLE SUBSTRATE, EXCESSIVE DISCHARGE, OR WHERE A SIGNIFICANT AMOUNT OF BED OR BANK ALTERATION IS REQUIRED TO INSTALL FLUMES OR DAMS.
2. SCHEDULE CROSSING DURING LOW FLOW PERIOD IF POSSIBLE.
3. COMPLETE ALL WATERCOURSE ACTIVITIES AS EXPEDIENTLY AS POSSIBLE.
4. NO REFUELING OF MOBILE EQUIPMENT WITHIN 100 FEET OF WATERBODY. REFUEL STATIONARY EQUIPMENT AS PER THE SPCC PLAN.
5. INSTALL TEMPORARY EQUIPMENT CROSSING.
6. IN AGRICULTURAL LAND, STRIP TOPSOIL FROM SPOIL STORAGE AREA.
7. IN–STREAM SPOIL TO BE STORED ON BANKS A MINIMUM OF 10 FEET FROM THE TOP OF THE BANK.
8. LEAVE HARD PLUGS AT THE STREAM BANK EDGE UNTIL JUST PRIOR TO PIPE INSTALLATION.
9. SIZE FLUME TO HANDLE 150 % ANTICIPATED FLOWS. INSTALL FLUME IN WATERCOURSE AND MAINTAIN CORRECT ALIGNMENT UNTIL REMOVED.
10. CONSTRUCT UPSTREAM DAM FOLLOWED BY DOWNSTREAM DAM. INSTALL A FLANGE ON UPSTREAM END OF FLUME AND SEAL TO SUBSTRATE WITH SANDBAGS AND POLYETHYLENE LINER WHERE NECESSARY TO ENSURE A WATERTIGHT BARRIER. "KEY" DAMS INTO BANKS OR CONSTRUCT SECONDARY DAM, IF NECESSARY.
11. PUMP STREAM CHANNEL BETWEEN DAMS, IF NECESSARY. DISCHARGE WATER THROUGH A DEWATERING STRUCTURE AND ONTO A STABLE WELL VEGETATED AREA TO PREVENT EROSION AND SEDIMENTATION. NO HEAVILY SILT–LADEN WATER MAY BE DISCHARGED IN THE STREAM.
12. CONSTRUCT SEDIMENT BARRIERS (STRAW BALES AND/OR SILT FENCE) TO PREVENT SILT LADEN WATER AND SPOIL FROM FLOWING BACK INTO WATERCOURSE. CONSTRUCTED SEDIMENT BARRIERS SHALL EXTEND ALONG THE SIDES OF THE STOCKPILES AND THE ENDS OF DAMS. BARRIERS MAY BE TEMPORARILY REMOVED TO ALLOW CONSTRUCTION ACTIVITIES BUT MUST BE REPLACED BY THE END OF EACH WORK DAY.
13. COMPLETE PREFABRICATION OF IN–STREAM PIPE SECTION AND WEIGHT PIPE AS NECESSARY PRIOR TO COMMENCEMENT OF IN–STREAM ACTIVITY.
14. TRENCH THROUGH WATERCOURSE. INSTALL TEMPORARY (SOFT) PLUGS, IF NECESSARY, TO CONTROL WATER FLOW AND TRENCH SLOUGHING.
15. MAINTAIN STREAM FLOW, IF PRESENT, THROUGH FLUME THROUGHOUT CROSSING CONSTRUCTION.
16. LOWER–IN PIPE, INSTALL TRENCH PLUG AND BACKFILL IMMEDIATELY.
17. BACKFILL WITH NATIVE MATERIAL.
18. RESTORE WATERCOURSE CHANNEL TO APPROXIMATE PRE–CONSTRUCTION PROFILE AND SUBSTRATE.
19. RESTORE STREAM BANKS TO APPROXIMATE ORIGINAL CONDITION AND STABILIZE, AS REQUIRED.

DRAWING DEPICTED IS SUPERSEDED BY WRITTEN STANDARD, SCOPE OF WORK OR LINE LIST.

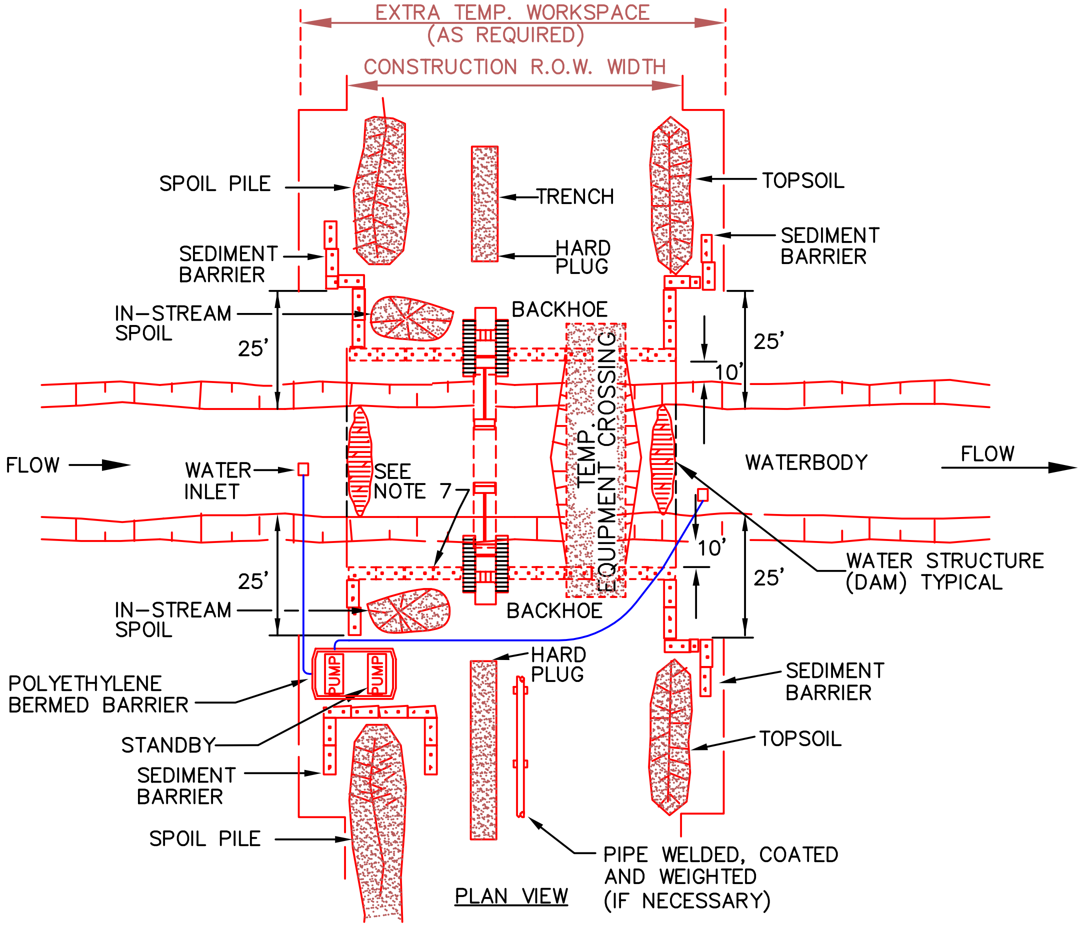
REVISIONS

NO.	DATE	DESCRIPTION	BY	CHKD.	APPR.
1	07/08/04	ISSUED FOR REVIEW	RB	CM	
2	07/13/04	REVISED PER CLIENT COMMENT	RB	CM	
3	07/01/05	ENG REWRITE RELEASE	WS		

KINDER MORGAN INC

WATERBODY CROSSING
OPEN CUT DRY FLUME

DATE: 07/01/05		APPROVED BY:	
SCALE: N.T.S.	CST–P–1150–A375	SH. 1 OF 1	



PLAN VIEW

NOTES:

1. THIS METHOD APPLIES TO WATERBODIES WITH LIMITED FLOW AT TIME OF CONSTRUCTION WHERE DOWNSTREAM SILTATION MUST BE AVOIDED AND THE CROSSING WIDTH IS NOT PROHIBITIVE.
2. SCHEDULE CROSSING DURING LOW FLOW PERIOD IF POSSIBLE.
3. COMPLETE ALL IN-STREAM ACTIVITIES AS EXPEDIENTLY AS POSSIBLE.
4. NO REFUELING OF MOBILE EQUIPMENT WITHIN 100 FEET OF WATERBODY. REFUEL STATIONARY EQUIPMENT AS PER THE SPCC PLAN.
5. INSTALL TEMPORARY EQUIPMENT CROSSING, IF REQUIRED.
6. IN AGRICULTURAL LAND, STRIP TOPSOIL FROM SPOIL STORAGE AREA.
7. CONSTRUCT SEDIMENT BARRIERS TO PREVENT SILT LADEN WATER AND SPOIL FROM FLOWING INTO WATERBODY. CONSTRUCTED SEDIMENT BARRIERS SHALL EXTEND ALONG THE SIDES OF THE SPOIL AND TOPSOIL STOCKPILES AND ACROSS THE ENTIRE CONSTRUCTION R.O.W. BARRIERS MAY BE TEMPORARILY REMOVED TO ALLOW CONSTRUCTION ACTIVITIES BUT MUST BE REPLACED BY THE END OF EACH WORK DAY.
8. CONSTRUCT UPSTREAM STRUCTURE (DAM) FOLLOWED BY DOWNSTREAM STRUCTURE (DAM). WATER STRUCTURES' (AQUA DAM, JERSEY BARRIERS, SAND BAGS, STEEL PLATE, POLYETHYLENE LINER, ETC.) FINAL LOCATION WILL BE APPROVED BY THE ENVIRONMENTAL INSPECTOR.
9. SIZE PUMPS FOR DIVERSION OF ENTIRE STREAM FLOW. CONTRACTOR SHALL MAINTAIN 100% SPARE PUMPING CAPACITY ON SITE. PUMPS SHALL BE INSTALLED ON POLYETHYLENE BARRIERS FOR FUEL/OIL SPILL CONTAINMENT. PUMP INTAKES WILL BE SCREENED TO PREVENT ENTRAPMENT OF FISH. CONTRACTOR SHALL MONITOR PUMPS AND WATER STRUCTURES ON A 24 HOUR BASIS UNTIL THE CROSSING INSTALLATION IS COMPLETE. SHOULD LEAKAGE AT THE DAM STRUCTURES OCCUR, CONTRACTOR SHALL DEWATER BETWEEN THE STRUCTURES THROUGH AN APPROPRIATE FILTER AND ONTO A WELL VEGETATED UPLAND AREA. NO HEAVILY SILT-LADEN WATER SHALL BE DISCHARGED INTO THE STREAM.
10. LEAVE HARD PLUGS AT STREAM BANK EDGE UNTIL JUST PRIOR TO PIPE INSTALLATION.
11. COMPLETE CONSTRUCTION OF IN-STREAM PIPE SECTION. WEIGHT PIPE AS NECESSARY PRIOR TO COMMENCEMENT OF IN-STREAM ACTIVITY.
12. TRENCH THROUGH WATERBODY AS EXPEDIENTLY AS PRACTICAL. INSTALL TEMPORARY (SOFT) PLUGS, IF NECESSARY, TO CONTROL WATER FLOW AND TRENCH SLOUGHING.
13. MAINTAIN STREAM FLOW THROUGHOUT CROSSING CONSTRUCTION.
14. LOWER-IN PIPE, INSTALL TRENCH PLUG AND BACKFILL IMMEDIATELY.
15. BACKFILL WITH NATIVE MATERIAL.
16. RESTORE WATERBODY CHANNEL TO APPROXIMATE PRE-CONSTRUCTION PROFILE AND SUBSTRATE.
17. DISMANTLE DOWNSTREAM WATER STRUCTURE (DAM) AND UPSTREAM WATER STRUCTURE (DAM) AFTER TRENCH BACKFILL.
18. RESTORE STREAM BANKS TO APPROXIMATE ORIGINAL CONDITION AND STABILIZE, AS REQUIRED.

DRAWING DEPICTED IS SUPERSEDED BY WRITTEN STANDARD, SCOPE OF WORK OR LINE LIST.

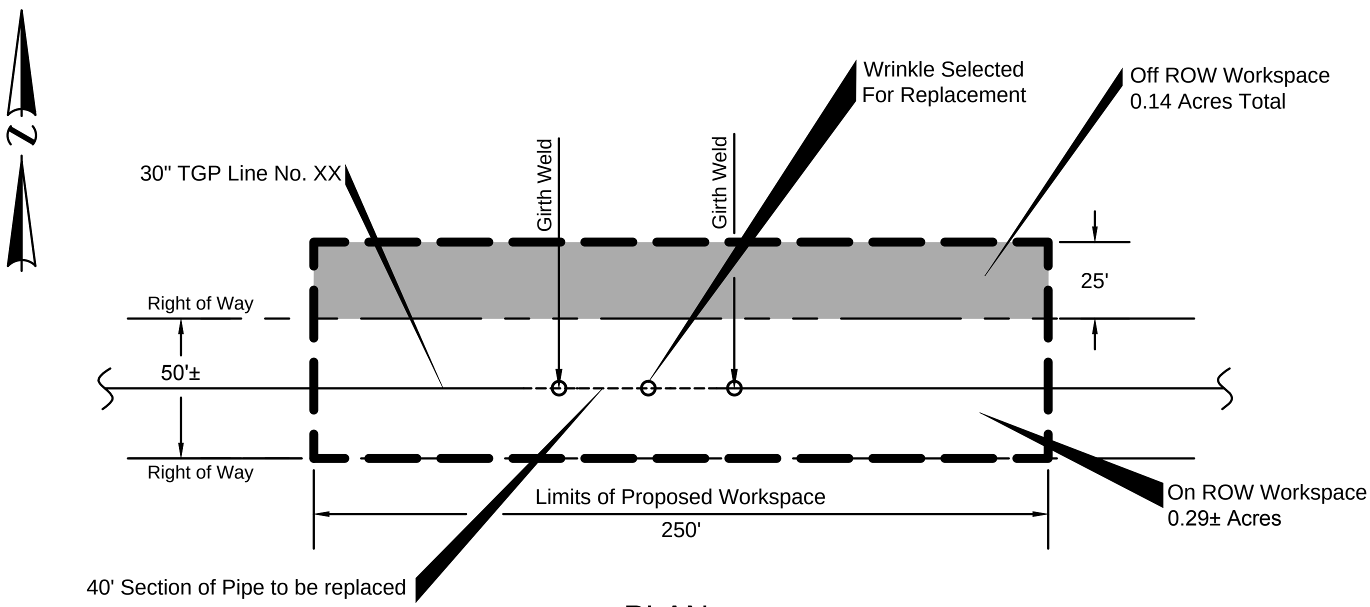
REVISIONS

NO.	DATE	DESCRIPTION	BY	CHKD.	APPR.
1	07/08/04	ISSUED FOR REVIEW	RB	CM	
2	07/13/04	REVISED PER CLIENT COMMENT	RB	CM	
3	07/01/05	ENG REWRITE RELEASE	WS		

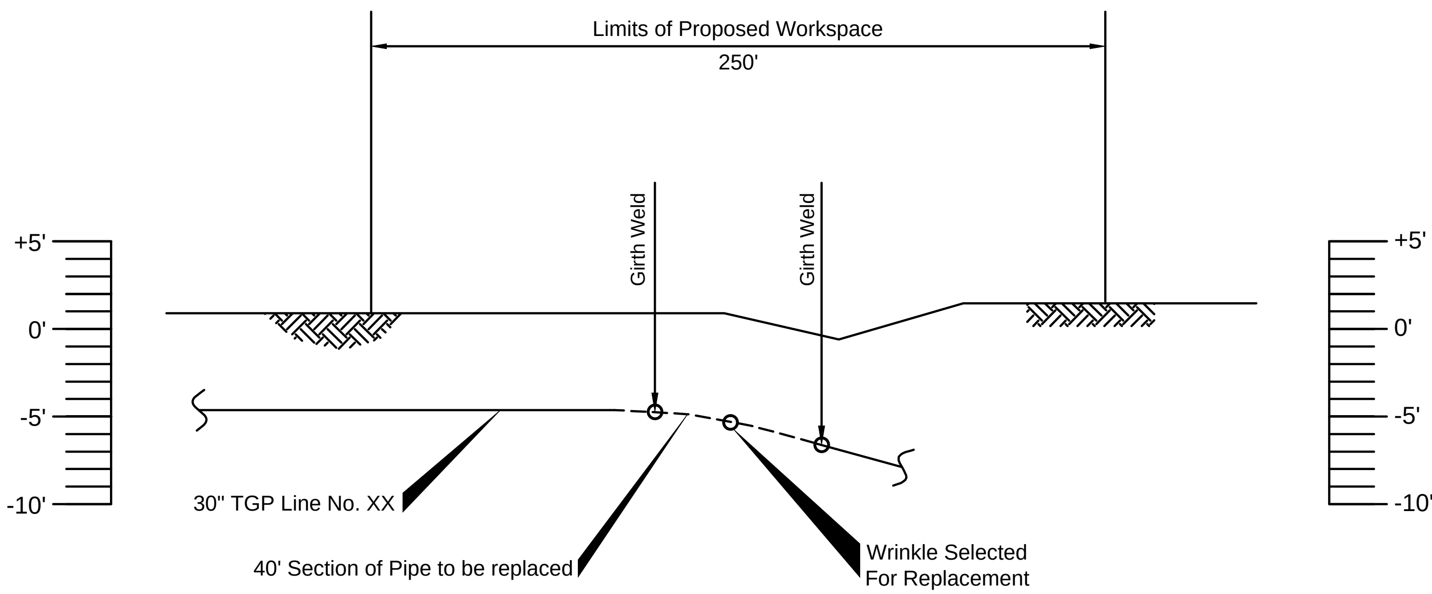
KINDER MORGAN INC

WATERBODY CROSSING
OPEN CUT DAM & PUMP

DATE: 07/01/05		APPROVED BY:	
SCALE: N.T.S.	CST-P-1150-A370	SH. 1 OF 1	



PLAN



PROFILE

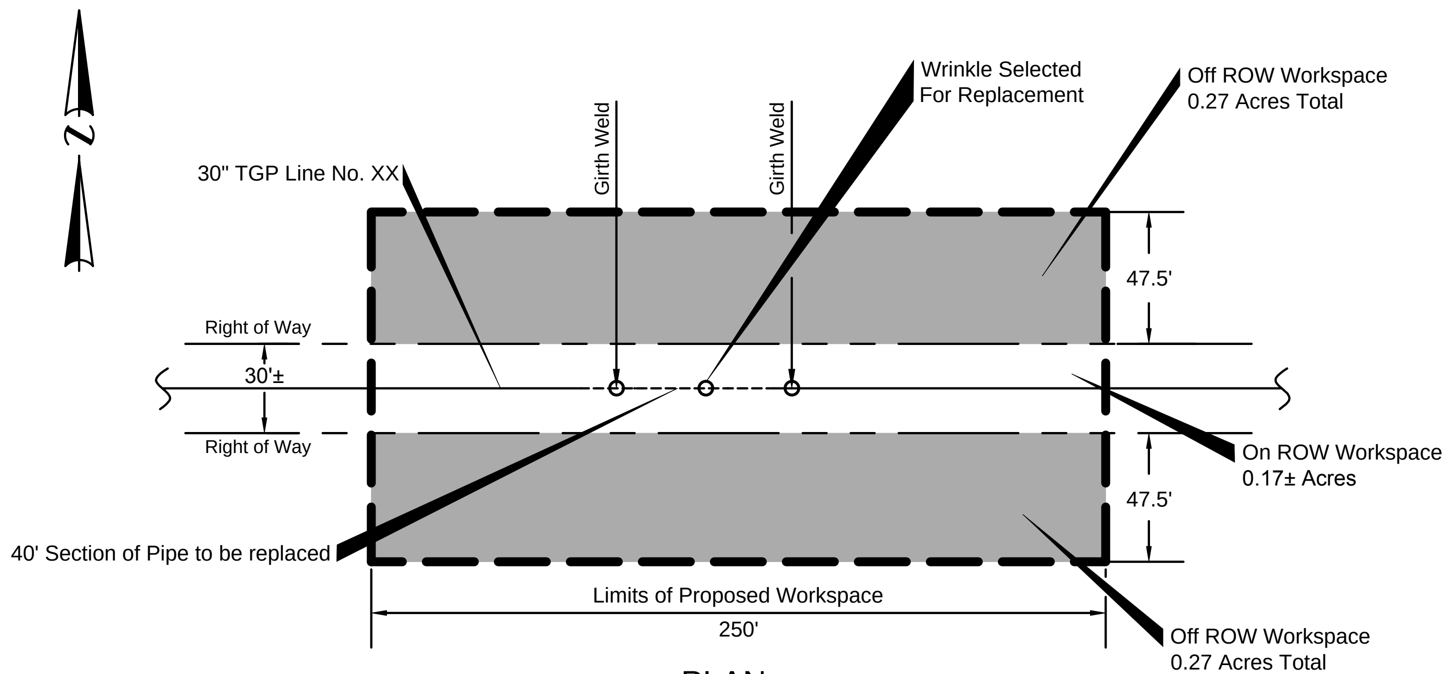
REVISIONS

NO.	DATE	DESCRIPTION	BY	CHKD.	APPR.
A	01/08/14	PRELIMINARY DRAWING	TTN	TJD	

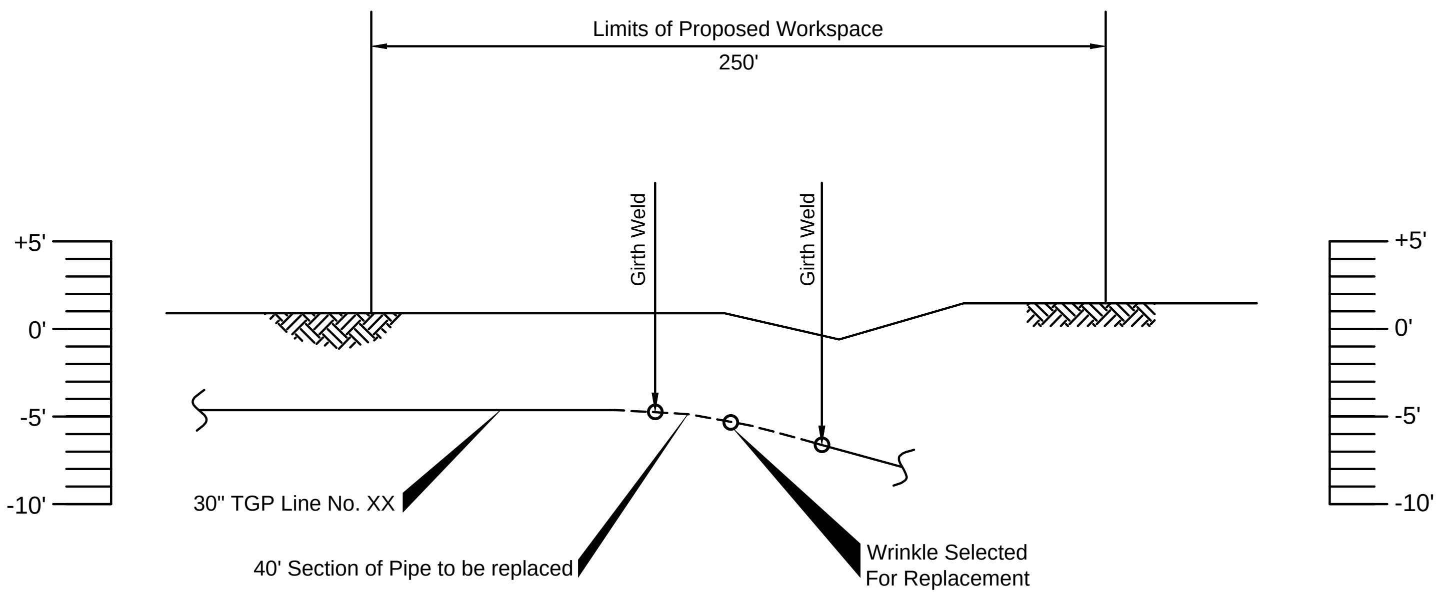
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

TYPICAL WORKSPACE LAYOUT FOR SINGLE WRINKLE BEND REPLACEMENT DIG PURSUANT TO SECTION 2.55(b) CERTIFICATE EXCLUSION

DATE: 01/08/15		APPROVED BY:	
SCALE: N.T.S.	WR-TYP-2.55B	SH. 1 OF 1	



PLAN



PROFILE

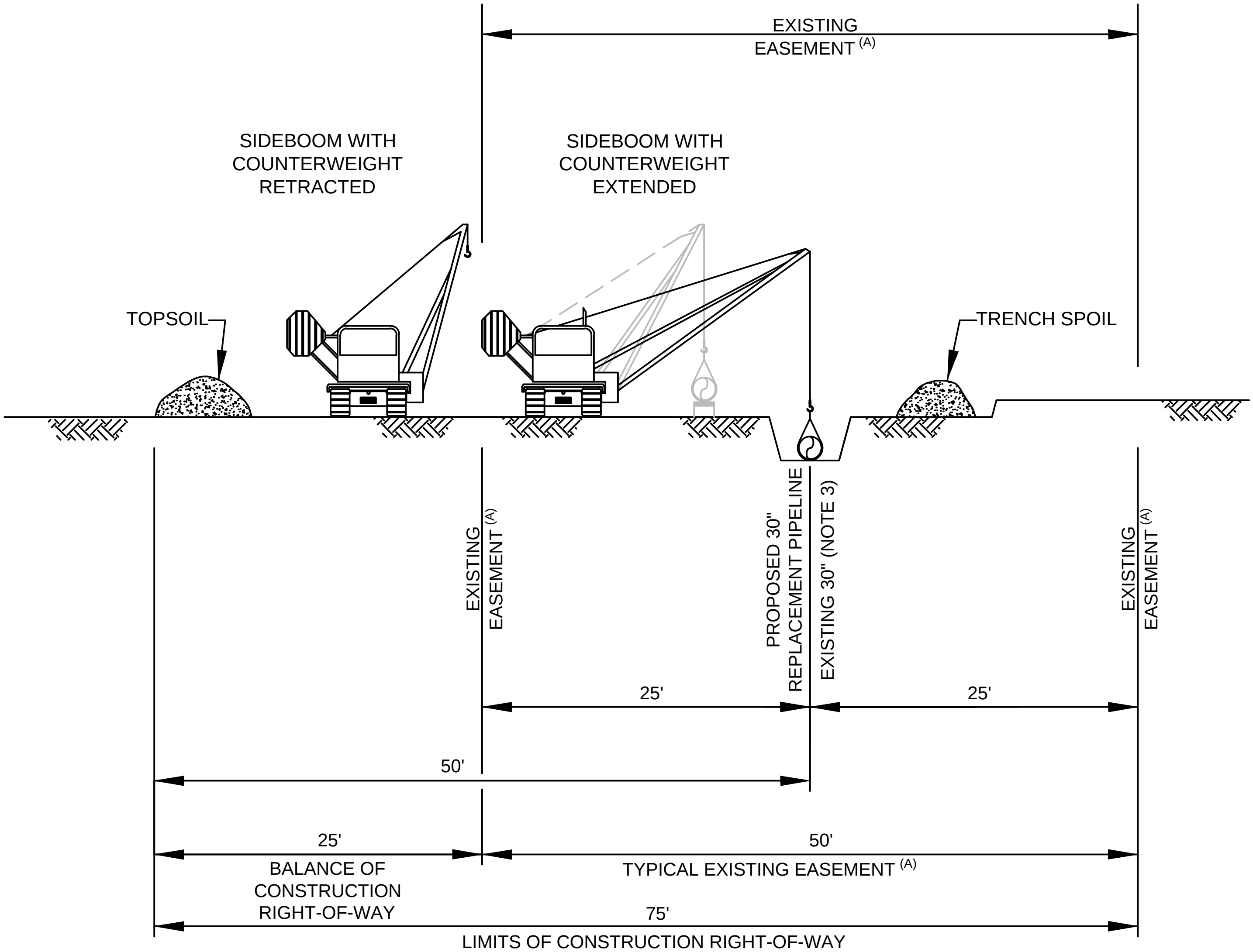
REVISIONS

NO.	DATE	DESCRIPTION	BY	CHKD.	APPR.
A	01/08/14	PRELIMINARY DRAWING	TTN	TJD	

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

TYPICAL WORKSPACE LAYOUT FOR SINGLE WRINKLE BEND REPLACEMENT DIG PURSUANT TO THE BLANKET CERTIFICATE

DATE: 01/08/15		APPROVED BY:
SCALE: N.T.S.	WR-TYP-BLANKET	SH. 1 OF 1



PROFILE
(NOT TO SCALE)

NOTES:

1. CONSTRUCTION RIGHT-OF-WAY WILL BE 75 FEET WIDE OR LESS IN ACCORDANCE WITH FERC 2.55(b) REGULATIONS. NO ADDITIONAL TEMPORARY WORKSPACE (ATWS) IS REQUIRED.
2. LEAVE GAPS IN SPOIL PILES AT OBVIOUS DRAINAGES. DO NOT PUSH UPLAND SOILS INTO CREEKS OR WETLANDS. DO NOT USE TOPSOIL FOR PADDING. AVOID SCALPING VEGETATED GROUND SURFACE WHEN BACKFILING TOPSOIL AND SPOIL PILES.
3. A PORTION OF THE EXISTING 30" TGP LINES 100-3 AND 800-1 WILL BE REMOVED AND REPLACED WITH PROPOSED 30" PIPELINES.

(A) EXISTING EASEMENT WIDTHS MAY VARY BY TRACT BASED ON EXISTING PROPERTY RIGHTS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.
A	09–15–16	TTP	ISSUED FOR FERC	PENDING	JL

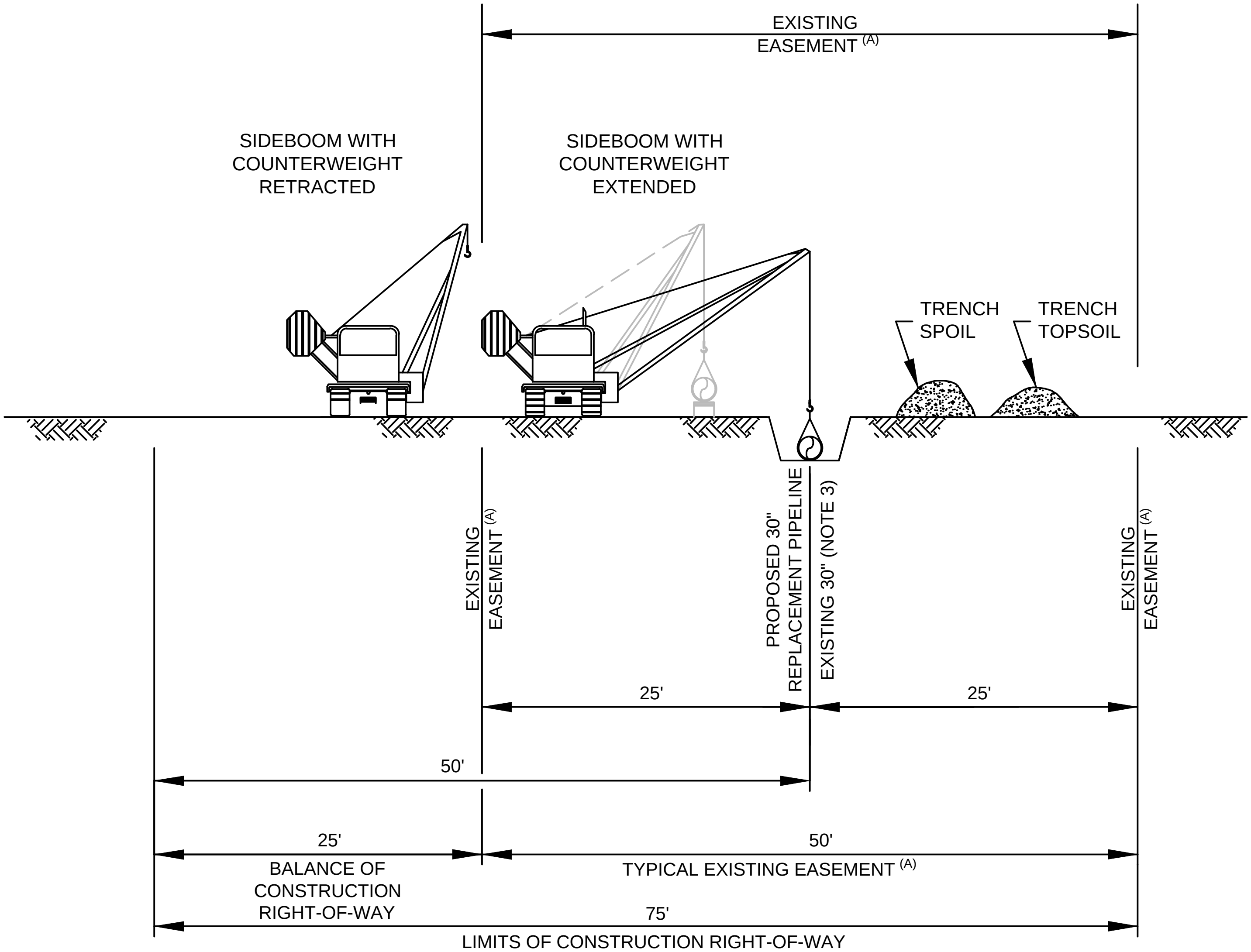
REVISIONS

Dft: TTP	Date: 09–09–2016	Scale: N.T.S	
Chk: JL	Date: 09–09–2016	Filename: TA–T4–100–3–114A2.DWG	
Appr: JL	Date: 09–09–2016		

TYPICAL TOPSOILED ROW DETAIL
ACR PROJECT
30" TGP LINES 100–3 AND 800–1
MLV 53–3B AND MLV 847–1
PIPE REPLACEMENTS

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

Drawing No.	Sheet	Rev.
TA–T4–100–3–114A2	Sheet: 1 of 1 / Type: CAD	A



PROFILE
(NOT TO SCALE)

NOTES:

1. CONSTRUCTION RIGHT-OF-WAY WILL BE 75 FEET WIDE OR LESS IN ACCORDANCE WITH FERC 2.55(b) REGULATIONS. NO ADDITIONAL TEMPORARY WORKSPACE (ATWS) IS REQUIRED.
2. LEAVE GAPS IN SPOIL PILES AT OBVIOUS DRAINAGES. DO NOT PUSH UPLAND SOILS INTO CREEKS OR WETLANDS. DO NOT USE TOPSOIL FOR PADDING. AVOID SCALPING VEGETATED GROUND SURFACE WHEN BACKFILING TOPSOIL AND SPOIL PILES.
3. A PORTION OF THE EXISTING 30" TGP LINES 100-3 AND 800-1 WILL BE REMOVED AND REPLACED WITH PROPOSED 30" PIPELINES.

(A) EXISTING EASEMENT WIDTHS MAY VARY BY TRACT BASED ON EXISTING PROPERTY RIGHTS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.
A	09–15–16	TTP	ISSUED FOR FERC	PENDING	JL

REVISIONS

Dft: TTP	Date: 09–09–2016	Scale: N.T.S	
Chk: JL	Date: 09–09–2016	Filename: TA–T4–100–3–114A1.DWG	
Appr: JL	Date: 09–09–2016		

TYPICAL ROW DETAIL
ACR PROJECT
30" TGP LINES 100–3 AND 800–1
MLV 53–3B AND MLV 874–1
PIPE REPLACEMENTS

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

Drawing No.	Sheet	Rev.
TA–T4–100–3–114A1	Sheet: 1 of 1 / Type: CAD	A

Appendix C

Table of Abandonment and Construction Activities

Appendix C

Table of Abandonment and Construction Activities

Facility Name or Workspace ID	Map ID	Typical Workspace Configuration	Activity	Miles of Activity	Access Road Number (Total Miles) [Improved]	Disturbance acres (total for site including access roads) — Construction: TWS	ATWS	New Permanent Right-of-Way	Existing Permanent Right-of-Way	County or Parish	Nearest Milepost on the Abandoned Line
Ohio											
CS216.5	CS-216-5		New Mid-Point Compressor Station	0	1 (0.3)	8.6	0	15.5 [a]	0.0	Mahoning	
OH0005	OH-216-001	FERC-005-I	Crossover Removal	0	NA	0	0	0	1.0	Columbiana	MP12.4-215-3
OH0006	OH-215-001	FERC-005-I	Crossover Removal	0	NA	0	0	0	1.3	Columbiana	MP0.0-214-3
OH0007	OH-213-003	FERC-001	Gas Disconnect (CS214)	<0.1	NA	0.2	0	0	0	Carroll	MP0.0-214-3
OH0012	OH-213-002	FERC-002	Tap Removal	0	NA	0.3	0	0	0.2	Carroll	MP0.2-213-3
OH0015	OH-213-001	FERC-005-I	Crossover Removal	0	NA	0	0	0	1.7	Carroll	MP0.0-212-3
OH0030	OH-211-002 & 002A	FERC-004	Off-ROW Tap Reconnect	0.2	NA	0.7	0	1.0	0.6	Tuscarawas	MP12.7-211-3
CS211.5	CS 211-5		New Mid-Point Compressor Station	0	2 (0.7)	8.5	0	16.8 [a]	0	Tuscarawas	MP11.2-211-3
OH0040	OH-211-001	FERC-005-I	Crossover Removal	0	NA	0	0	0	1.7	Tuscarawas	MP0.0-211-3
OH0050	OH-210-002	FERC-002	Tap Removal	0	NA	0.3	0	0	0.6	Guernsey	MP7.4-210-3
OH0070	OH-208-002	FERC-001	Gas Disconnect (CS209)	<0.1	NA	0.1	0	0	0	Guernsey	MP0.0-209-3
OH0090	OH-207-001	FERC-006-I	Crossover Removal/Reconnect	0	NA	0.4	0	0	2.1	Morgan	MP0.0-207-3
CS206.5	CS 206-5		New Mid-Point Compressor Station	0	1 (0.1)	20.1	0	10.8 [a]	0	Morgan	MP0.2-207-3
OH0100	OH-206-001	FERC-005-I	Crossover Removal	0	NA	0.2	0	0	1.2	Morgan	MP0.0-206-3
OH0110	OH-205-003 & 003A	FERC-004	Off-ROW Tap Reconnect	0.8	NA	3.0	1.3	4.6	1.1	Morgan	MP13.8-205-3
OH0115	OH-205-002	FERC-002	Tap Removal	0	NA	0.2	0	0	0.5	Athens	MP6.7-205-3
OH0120	OH-205-001	FERC-005-I	Crossover Removal	0	NA	0	0	0	0.6	Athens	MP0.0-205-3
OH0140	OH-203-002	FERC-001	Gas Disconnect (CS204)	0	NA	0.2	0	0	0	Athens	MP0.0-204-3
OH0150	OH-203-001	FERC-005-III	Crossover Removal	0	NA	<0.1	0	0	0.4	Vinton	MP0.0-203-3
OH0160	OH-202-001	FERC-005-I	Crossover Removal	0	NA	<0.1	0	0	0.9	Jackson	MP0.0-202-3
CS202.5	CS 202-5		New Mid-Point Compressor Station	0	2 (0.6)	9.3	0	17.4 [a]	0	Jackson	MP11.8-201-3
OH0170	OH-201-002	FERC-003	Tap Removal/Reconnect	< 0.1	NA	0	0	0	1.4	Scioto	MP2.5-201-3
OH0180	OH-201-001	FERC-006-I	Crossover Removal/Reconnect	0	NA	0	0	0	0.5	Scioto	MP0.0-201-3
OH0200	OH-201-003	FERC-001	Gas Disconnect	0	NA	0	0	0	<0.1	Scioto	MP10.3-200-3
			Ohio Totals	1.0	1.7	52.1	1.3	66.1	15.6	NA	NA
Kentucky											
KY0002	KY-200-002	FERC-001	Gas Disconnect	0	NA	0	0	0	0.1	Greenup	MP8.5-200-3
KY0010	KY-200-002	FERC-005-II	Crossover Removal	0	NA	0	0	0	0.9	Greenup	MP8.4-200-3
KY0020	KY-200-001	FERC-003	Tap Removal/Reconnect	<0.1	NA	<0.1	0	0	1.2	Greenup	MP8.2-200-3
KY0030	KY-111-003	FERC-001	Gas Disconnect (CS200)	0	NA	0.1	0	0	0	Greenup	MP0.0-200-3
KY0040/KY0050	KY-111-002	FERC-005-II	Crossover Removal	0	NA	<0.1	0	0	0.4	Carter	MP10.9-111-3
New-build Pipeline (KY0055)		Typical pipeline construction	New-build Pipeline, Relocated Launcher/Receiver, and Laydown Yard [b]	7.7	6 (3.9) [3.8]	75.3	18.9	46.4	0.2	Carter/Lewis	NA
KY0060	KY-111-001	FERC-006-I	Crossover Removal/Reconnect	0	NA	0	0	0	0.6	Lewis	MP0.0-111-3
CS110 (KY0070)	KY-109-003	FERC-001	Gas Disconnect (CS110)	0	NA	0.1	0	0	0	Rowan	MP0.0-110-3
	CS110		Modified Compressor Station	0	2 [0.2]	1.4	0	0	2.7	Rowan	MP0.0-110-3
KY0080	KY-109-002	FERC-004	Off-ROW Tap Reconnect	1.7	NA	5.5	1.2	10.0	0.8	Rowan	MP5.5-109-3
KY0100	KY-109-001	FERC-006-I	Crossover Removal/Reconnect	0	NA	0.1	0	0	1.2	Rowan	MP0.0-109-3
KY0110	KY-108-001	FERC-005-I	Crossover Removal	0	NA	0.3	0	0	0.8	Bath	MP0.0-108-3
KY0120	KY-107-001	FERC-006-I	Crossover Removal/Reconnect	0	NA	0	0	0	1.8	Montgomery	MP0.0-107-3
KY0130	KY-105-002	FERC-001	Gas Disconnect (CS106)	0	NA	0.1	0	0	0	Powell	MP0.0-106-1D

Table of Abandonment and Construction Activities

Facility Name or Workspace ID	Map ID	Typical Workspace Configuration	Activity	Miles of Activity	Access Road Number (Total Miles) [Improved]	Disturbance acres (total for site including access roads)				County or Parish	Nearest Milepost on the Abandoned Line
						Construction					
						TWS	ATWS	New Permanent Right-of-Way	Existing Permanent Right-of-Way		
KY0150	KY-104-001	FERC-005-III	Crossover Removal	0	NA	0.2	0	0	1.2	Madison	MP0.0-104-1
CS875 (KY0155)	CS875		Modified Compressor Station	0	NA	23.6	0	0	0	Madison	MP8.0-103-1
KY0160 [c]	KY-103-001	FERC-005-I	Crossover Removal	0	NA	included with KY0170		included with KY0170	included with KY0170	Madison	MP0.0-103-1
KY0170 [c]	KY-103-001 & 001A	FERC-004	Off-ROW Tap Reconnect	0.5	NA	1.7	0	2.9	1.3	Madison	MP0.0-103-1
KY0180	KY-102-002	FERC-005-IV	Crossover Removal	0	NA	1.0	0	0	0.2	Madison	MP11.2-102-1
KY0190	KY-102-001	FERC-005-IV	Disconnect Crossover(s)	0	NA	0.4	0	0	0.5	Garrard	MP0.0-102-1
KY0220	KY-101-001	FERC-005-I	Crossover Removal	0	NA	0.3	0	0	2.6	Boyle	MP0.0-101-1
KY0230	KY-100-001	FERC-002	Tap Removal	0	NA	0.1	0	0	1.4	Boyle	MP3.1-100-1
KY0240 [c]	KY-99-003	FERC-005-V	Crossover Removal	<0.1	NA	included with KY0250		included with KY0250	included with KY0250	Boyle	MP0.0-100-1
KY0250 [c]	KY-99-003	FERC-003	Tap Removal/Reconnect	0	NA	0	0	0	1.2	Boyle	MP0.0-100-1
KY0260	KY-99-002	FERC-003	Tap Removal/Reconnect	0.1	NA	0.5	0	0.2	0.8	Boyle	MP1.2-99-1
KY0280	KY-98-001	FERC-006-II	Crossover Removal/Reconnect	0	NA	0	0	0	0.9	Marion	MP0.0-98-1
KY0290 [c]	KY-97-001	FERC-003	Tap Removal/Reconnect	< 0.1	NA	included with KY0300		included with KY0300	included with KY0300	Marion	MP0.0-97-1
KY0300 [c]	KY-300-001	FERC-006-II	Crossover Removal/Reconnect	0	NA	0.4	0	0	1.0	Marion	MP0.0-97-1
KY0310	KY-96-001	FERC-003	Tap Removal/Reconnect	<0.1	NA	0.4	0	0.2	1.1	Marion	MP8.5-96-1D
KY0320	KY-95-003	FERC-001	Gas Disconnect (CS96)	0.2	NA	0.1	0	0	0	Taylor	MP0.0-96-1D
KY0330	KY-95-002	FERC-003	Tap Removal/Reconnect	<0.1	NA	0.6	0	0.1	1.2	Green	MP2.2-95-1
KY0340	KY-95-001	FERC-005-VI	Crossover Removal, River Crossing and Launcher/ Receiver Disconnect	0	NA	0	0	0	0.9	Green	MP0.0-95-1
KY0350	KY-94-001	FERC-005-V	Crossover Removal	0	NA	0	0	0	1.2	Green	MP0.0-94-1
KY0360	KY-93-001	FERC-005-V	Crossover Removal	0	NA	0.4	0	0	0.4	Hart	MP0.0-93-1
KY0370	KY-92-002	FERC-003	Tap Removal/Reconnect	< 0.1	NA	0.6	0	0.1	0.7	Barren	MP2.1-92-1
KY0380	KY-380-001	FERC-006-II	Crossover Removal/Reconnect	0	NA	<0.1	0	0	0.6	Barren	MP0.0-92-1
KY0400	KY-90-001	FERC-005-V	Crossover Removal	0	NA	0	0	0	0.6	Allen	MP0.0-90-1
KY0410	KY-89-002	FERC-003	Tap Removal/Reconnect	< 0.1	NA	0	0	0	0.4	Allen	MP3.6-89-1
KY0420	KY-89-001	FERC-005-V	Crossover Removal	0	NA	0.1	0	0	0.6	Allen	MP0.0-89-1
KY0430	KY-88-001	FERC-005-V	Crossover Removal	0	NA	0.3	0	0	1.0	Simpson	MP0.0-88-1
			Kentucky Totals	10.1	4.1	113.6	20.1	60.2	30.5	NA	NA
Tennessee											
TN0010	TN-86-003	FERC-001	Gas Disconnect (CS87)	0.2	NA	0.1	0	0	0	Sumner	MP0.1-87-1D
TN0020 [c]	TN-86-001	FERC-003	Tap Removal/Reconnect	< 0.1	NA	included with TN0030		included with TN0030	included with TN0030	Robertson	MP0.0-86-1
TN0030 [c]	TN-86-001	FERC-006-II	Crossover Removal/Reconnect	0	NA	0.2	0	<0.1	1.0	Robertson	MP0.0-86-1
TN0040 [c]	TN-85-001	FERC-005-V	Crossover Removal	0	NA	0	0	0	1.6	Robertson	MP0.0-85-1
TN0050 [c]	TN-85-001	FERC-002	Tap Removal	0	NA	included with TN0040		included with TN0040	included with TN0040	Robertson	MP0.0-85-1
TN0060	TN-84-002	FERC-003	Tap Removal/Reconnect	< 0.1	NA	0	0	0	1.0	Robertson	MP8.8-84-1
TN0070	TN-84-001	FERC-005-V	Crossover Removal	0	NA	0	0	0	0.8	Cheatham	MP0.0-84-1
TN0080	TN-83-004	FERC-003	Tap Removal/Reconnect	< 0.1	NA	0	0	0	0.3	Cheatham	MP19.6-83-1
TN0100	TN-83-002	FERC-003	Tap Removal/Reconnect	< 0.1	NA	0.8	0	0.1	0.5	Cheatham	MP6.9-83-1
TN0125	TN-82-002	FERC-005-VI	Crossover Removal, River Crossing and Launcher/Receiver Disconnect	0	NA	0	0	0	1.8	Dickson	MP5.9-82-1C
TN0140/TN0150 [c]	TN-82-001	FERC-005-VI	Crossover Removal, River Crossing and Launcher/ Receiver Disconnect	0	NA	0	0	0	1.3	Dickson	MP8.6-81-1
TN0160	TN-81-002	FERC-003	Tap Removal/Reconnect	0.1	NA	1.4	0	0.2	0.9	Dickson	MP7.0-81-1

Table of Abandonment and Construction Activities

Facility Name or Workspace ID	Map ID	Typical Workspace Configuration	Activity	Miles of Activity	Access Road Number (Total Miles) [Improved]	Disturbance acres (total for site including access roads) Construction: TWS	ATWS	New Permanent Right-of-Way	Existing Permanent Right-of-Way	County or Parish	Nearest Milepost on the Abandoned Line
TN0170	TN-81-001	FERC-005-V	Crossover Removal	0	NA	0.2	0	0	0.9	Hickman	MP0.0-81-1
TN0190	TN-79-003	FERC-004	Off-ROW Tap Reconnect	0.2	NA	0.9	0	0.9	0.3	Hickman	MP7.9-79-1D
TN0200	TN-79-004 and 004A	FERC-004	Off-ROW Tap Reconnect	0.1	NA	0.6	0	0.8	0.8	Hickman	MP8.1-79-1D
TN0210 [c]	TN-79-002	FERC-004	Off-ROW Tap Reconnect	0	NA	included with TN0220		included with TN0220	included with TN0220	Perry	MP1.9-79-1D
TN0220 [c]	TN-79-002	FERC-004	Off-ROW Tap Reconnect	0.2	NA	0.5	0	0.6	0.9	Perry	MP1.9-79-1D
TN0230	TN-78-002	FERC-001	Gas Disconnect (CS79)	0	NA	0.1	0	0	0	Perry	MP0.1-79-1D
TN0250 [c]	TN-77-004	FERC-005-I	Crossover Removal	<0.1	NA	included with TN0260		included with TN0260	included with TN0260	Perry	MP0.0-78-1
TN0260 [c]	TN-77-004	FERC-003	Tap Removal/Reconnect	< 0.1	NA	0	0	0	3.3	Perry	MP0.0-78-1
TN0280	TN-77-001	FERC-005-III	Crossover Removal	0	NA	0	0	0	0.6	Decatur	77-1-MP0.0
TN0290	TN-76-001	FERC-005-III	Crossover Removal	0	NA	0.2	0	0	0.5	Henderson	MP0.0-76-1
TN0300	TN-75-002	FERC-003	Tap Removal/Reconnect	0.1	NA	0.5	0	0.2	0.8	Chester	MP2.4-75-1
TN0310	TN-75-001	FERC-005-III	Crossover Removal	0	NA	0.1	0	0	0.3	McNairy	MP0.0-75-1
TN0320	TN-74-002	FERC-003	Tap Removal/Reconnect	< 0.1	NA	<0.1	0	0.1	0.6	McNairy	MP7.5-74-1
TN0330	TN-74-001	FERC-005-III	Crossover Removal	0	NA	0.1	0	0	0.6	McNairy	MP0.0-74-1
TN0340 [c]	TN-73-002	FERC-003	Tap Removal/Reconnect	0.1	NA	2.2	0	0.6	1.6	McNairy	MP2.4-73-1
TN0350 [c]	TN-73-002	FERC-003	Tap Removal/Reconnect	0	NA	included with TN0340		included with TN0340	included with TN0340	McNairy	MP2.4-73-1
TN0360	TN-73-001	FERC-005-III	Crossover Removal	0	NA	0.6	0	0	0.5	McNairy	MP0.0-73-1
TN0370	TN-72-002	FERC-003	Tap Removal/Reconnect	< 0.1	NA	0.6	0	<0.1	0.9	McNairy	MP7.5-72-1
TN0380	TN-72-001	FERC-005-III	Crossover Removal	0	NA	0	0	0	1.0	McNairy	MP0.0-72-1
TN0400	TN-71-000	FERC-001	Gas Disconnect (CS71)	0	NA	0.1	0	0	0	Hardeman	MP0.1-71-1D
			Tennessee Total	0.9	NA	9.2	0	3.5	22.8	NA	NA
Mississippi											
MS0010	MS-70-001	FERC-005-V	Crossover Removal	0	NA	0	0	0	0.7	Benton	MP0.0-70-1
MS0030	MS-69-003 and 003A	FERC-003	Tap Removal/Reconnect	0	NA	0.1	0	0	0.4	Benton	MP4.9-69-1
MS0040	MS-69-002 and 002A	FERC-004	Off-ROW Tap Reconnect	1.1	NA	3.7	0.7	6.5	0.8	Benton	MP3.5-69-1
MS0045	MS-69-001.1	FERC-001	Gas Disconnect	0	NA	0.2	0	0.0	0.3	Benton	MP2.1-69-1
MS0050 [c]	MS-69-001	FERC-005-VI	Crossover Removal, River Crossing and Launcher/ Receiver Disconnect	0	NA	0.2	0	0	0.9	Benton	MP0.0-69-1
MS0060 [c]	MS-69-001	FERC-005-VI	Crossover Removal, River Crossing and Launcher/ Receiver Disconnect	0	NA	included with MS0050		included with MS0050	included with MS0050	Benton	MP0.0-69-1
MS0070	MS-68-001	FERC-006-II	Crossover Removal/Reconnect	0	NA	0.1	0	0	0.8	Marshall	MP0.0-68-1
MS0075	MS-75-001	FERC-006-II	Crossover Removal/Reconnect	0	NA	0.5	0	0	0.5	Marshall	MP0.0-67-1
MS0080 [c]	MS-66-002	FERC-006-II	Crossover Removal/Reconnect	0	NA	0.1	0	0	3.4	Lafayette	MP0.0-66-1
MS0090 [c]	MS-65-001	FERC-003	Tap Removal/Reconnect	< 0.1	NA	included with MS0080		included with MS0080	included with MS0080	Lafayette	MP0.0-66-1
MS0100	MS-65-002	FERC-006-II	Crossover Removal/Reconnect	0	NA	0	0	0	1.1	Panola	MP0.0-65-1
MS0110	MS-64-002 and 002A	FERC-004	Off-ROW Tap Reconnect	0.1	NA	0.3	0	0.6	0.6	Panola	MP4.4-64-1
MS0120	MS-64-001	FERC-005-V	Crossover Removal	0	NA	0	0	0	1.3	Panola	MP0.0-64-1
MS0130	MS-63-001	FERC-002	Tap Removal	0	NA	0	0	0	0.2	Panola	MP7.8-63-1D
MS0140	MS-62-002	FERC-001	Gas Disconnect (CS63)	0	NA	0.1	0	0	0	Panola	MP0.1-63-1D
MS0150	MS-62-001	FERC-005-III	Crossover Removal	0	NA	0.5	0	0	0.6	Quitman	MP0.0-62-1
MS0160	MS-61-002	FERC-003	Tap Removal/Reconnect	0.1	NA	0.4	0	0.4	0.8	Quitman	MP4.4-61-1
MS0170 [c]	MS-61-001 and 001A	FERC-004	Off-ROW Tap Reconnect	0.5	NA	1.6	0	0.7	3.3	Quitman	MP0.0-61-1

Appendix C

Table of Abandonment and Construction Activities

Facility Name or Workspace ID	Map ID	Typical Workspace Configuration	Activity	Miles of Activity	Access Road Number (Total Miles) [Improved]	Disturbance acres (total for site including access roads) Construction TWS	ATWS	New Permanent Right-of-Way	Existing Permanent Right-of-Way	County or Parish	Nearest Milepost on the Abandoned Line
MS0180[c]	MS-61-001	FERC-005-I	Crossover Removal	0	NA	included with MS0170		included with MS0170	included with MS0170	Quitman	MP0.0-61-1
MS0190	MS-60-001	FERC-005-III	Crossover Removal	0	NA	0.2	0	0	0.5	Tallahatchie	MP0.0-60-1
MS0200	MS-59-002 and 002A	FERC-004	Off-ROW Tap Reconnect	0.3	NA	1.0	0	1.6	0.8	Tallahatchie	MP4.9-59-1
MS0210	MS-59-001	FERC-005-III	Crossover Removal	0	NA	0.1	0	0	1.0	Tallahatchie	MP0.0-59-1
MS0220	MS-58-002	FERC-003	Tap Removal/Reconnect	< 0.1	NA	0.4	0	<0.1	0.7	Sunflower	MP1.4-58-1
MS0230	MS-58-001	FERC-005-III	Crossover Removal	0	NA	0.7	0	0	0.9	Sunflower	MP0.0-58-1
MS0260	MS-57-002	FERC-003	Tap Removal/Reconnect	< 0.1	NA	0.2	0	0	1.0	Sunflower	MP6.4-57-1
MS0270	MS-57-001	FERC-005-III	Crossover Removal	0	NA	0.2	0	0	0.8	Sunflower	MP0.0-57-1
MS0280	MS-56-002 and 002A	FERC-004	Off-ROW Tap Reconnect	0.5	NA	1.4	0	2.8	0.9	Sunflower	MP3.3-56-1
MS0290	MS-56-001	FERC-005-III	Crossover Removal	0	NA	0.2	0	0	0.7	Bolivar	MP0.0-56-1
MS0300	MS-55-001	FERC-005-III	Crossover Removal	0	NA	0.1	0	0	0.9	Washington	MP0.0-55-1
MS0310	MS-54-001	FERC-003	Tap Removal/Reconnect	< 0.1	NA	0	0	0	0.8	Washington	MP2.6-54-1D
MS0320	MS-53-002	FERC-001	Gas Disconnect (CS54)	0	NA	0.1	0	0	0	Washington	MP0.1-54-1D
MS0340	KY-95-001	FERC-005-VI	Crossover Removal, River Crossing and Launcher/ Receiver Disconnect	0	NA	0	0	0	1.3	Washington	MP14.4-53-1
			Mississippi Totals	2.6	NA	12.4	0.7	12.6	26.0	NA	NA
Arkansas											
AR0010	AR-53-002	FERC-005-VI	Crossover Removal, River Crossing and Launcher/ Receiver Disconnect	0	NA	0	0	0	1.0	Chicot	MP11.6-53-1
AR0020	AR-53-001	FERC-005-V	Crossover Removal	0	NA	0.5	0	0	0.5	Chicot	MP0.0-53-1
AR0030	AR-52-001	FERC-005-V	Crossover Removal	0	NA	0.1	0	0	0.7	Ashley	MP0.0-52-1
			Arkansas Totals	0	NA	0.6	0	0	2.2	NA	NA
Louisiana											
LA0010	LA-51-001	FERC-005-III	Crossover Removal	0	NA	0.4	0	0	1.2	Morehouse	MP0.0-51-1
LA0020	LA-50-001	FERC-005-V	Crossover Removal	0	NA	0.6	0	0	0.8	Morehouse	MP0.0-50-1
LA0030	LA-49-001	FERC-006-II	Crossover Removal/Reconnect	0	NA	0.2	0	0	1.4	Morehouse	MP0.0-49-1
LA0040	LA-48-001	FERC-005-V	Crossover Removal	0	NA	0.4	0	0	1.2	Ouachita	MP0.0-48-1
LA0050	LA-47-001	FERC-005-V	Crossover Removal	0	NA	0.1	0	0	0.4	Ouachita	MP7.1-47-1D
LA0060	LA-46-004	FERC-001	Gas Disconnect (CS47)	0	NA	0.1	0	0	0	Ouachita	MP0.1-47-1D
LA0075	LA-46-002	FERC-002	Tap Removal	0	NA	0	0	0	0.8	Ouachita	MP6.4-46-1
LA0080	LA-46-002	FERC-002	Tap Removal	0	NA	0	0	0	0.2	Ouachita	MP1.0-46-1
LA0090	LA-46-001	FERC-005-I	Crossover Removal	0	NA	0	0	0	1.2	Ouachita	MP0.0-46-1
LA0100	LA-45-003	FERC-002	Tap Removal	0	NA	0.1	0	0	0.5	Ouachita	MP9.5-45-1
LA0110[c]	LA-45-112	FERC-002	Tap Removal	0	NA	0	0	0	1.0	Jackson	MP5.7-45-1
LA0120[c]	LA-45-112	FERC-002	Tap Removal	0	NA	included with LA0110		included with LA0110	included with LA0110	Jackson	MP5.7-45-1
LA0130	LA-45-001	FERC-005-V	Crossover Removal	0	NA	0	0	0	0.2	Jackson	MP0.0-45-1
LA0140	LA-44-002	FERC-003	Tap Removal/Reconnect	< 0.1	NA	0	0	0	0.9	Jackson	MP9.7-44-1
LA0150	LA-44-001	FERC-005-I	Crossover Removal	0	NA	0	0	0	0.5	Jackson	MP0.0-44-1
LA0170	LA-43-002	FERC-005-VI	Crossover Removal, River Crossing and Launcher/ Receiver Disconnect	0	NA	0	0	0	0.3	Winn	MP5.3-43-1
LA0180	LA-43-001	FERC-005-V	Crossover Removal	0	NA	<0.1	0	0	0.6	Winn	MP0.0-43-1
LA0190	LA-42-004	FERC-002	Tap Removal	0	NA	0	0	0	0.1	Winn	MP8.1-42-1
LA0200	LA-42-003	FERC-002	Tap Removal	0	NA	0	0	01.1	1.1	Winn	MP5.1-42-1

Appendix C

Table of Abandonment and Construction Activities

Facility Name or Workspace ID	Map ID	Typical Workspace Configuration	Activity	Miles of Activity	Access Road Number (Total Miles) [Improved]	Disturbance acres (total for site including access roads)				County or Parish	Nearest Milepost on the Abandoned Line
						Construction					
						TWS	ATWS	New Permanent Right-of-Way	Existing Permanent Right-of-Way		
LA0210	LA-42-002	FERC-002	Tap Removal	0	NA	0.1	0	0	0.9	Winn	MP2.9-42-1
LA0220	LA-42-001	FERC-005-V	Crossover Removal	0	NA	0	0	0	0.6	Winn	MP0.0-42-1
LA0230	LA-41-001	FERC-005-V	Crossover Removal	0	NA	0	0	0	0.5	Natchitoches	MP11.7-41-1
LA0240	LA-41-003	FERC-003	Tap Removal/Reconnect	< 0.1	NA	0.2	0	0	1.8	Natchitoches	MP9.1-41-1
LA0250	LA-41-002	FERC-002	Tap Removal	0	NA	0	0	0	0.6	Natchitoches	MP4.7-41-1
LA0260 [c]	LA-40-001	FERC-005-V	Crossover Removal	0	NA	0.3	0	0	0.8	Natchitoches	MP0.0-41-1
LA0270 [c]	LA-40-001	FERC-002	Tap Removal	0	NA	included with LA0260		included with LA0260	included with LA0260	Natchitoches	MP0.0-41-1
LA0280	LA-40-000	FERC-001	Gas Disconnect (CS40)	0	NA	0.1	0	0	0	Natchitoches	MP0.2-40-1D
			Louisiana Totals	< 0.1	NA	2.6	0	0	17.5	NA	NA
			Project Totals	14.6	5.8	190.5	22.1	143.2	114.7	NA	NA

a Indicates new permanent easement that is new property purchased by Tennessee. New property purchased is limited to the four new mid-point compressor stations in Ohio.
b Acreage associated with the laydown yard is included with ATWS acreage.
c More than one activity would occur in this workspace and the acreages have been combined.

Appendix D

Waterbodies Crossed by the ACRP or within ACRP Construction Workspaces

Appendix D

Waterbodies Crossed by the ACRP or within ACRP Construction Workspaces

Waterbody ID	Waterbody Name	Location/ Approximate Milepost	Flow Type [a]	FERC Classification [b]	Water Quality Designation/ Fishery Classification	Bank Width (feet)	Impaired	Proposed Crossing Method [c]	Length of Pipeline Crossing (feet)
Compressor Stations									
KY-RO-CS110_ST01	Unnamed tributary to Estep Branch	CS 110	I [d]	Minor	No Designation / Warmwater	3.0	No	Open cut	--
CS202.5_ST02	Unnamed	CS 202.5	E	Minor	No Designation / Warmwater	2.3	No	Permanent fill	--
CS202.5_ST03	Unnamed	CS 202.5	E	Minor	No Designation / Warmwater	4.3	No	Not crossed	--
CS202.5_ST05	Unnamed	CS 202.5	I	Minor	No Designation / Warmwater	4.3	No	Permanent fill	--
OH0095_ST02	Unnamed	CS 206.5	I	Minor	No Designation / Warmwater	3.0	No	Permanent fill	--
New-build Pipeline									
KY-LE-00.00_ST01	Unnamed tributary to Grassy Fork	MP 0.1	I	Minor	No Designation / Warmwater	8.0	No	Open cut	8.0
KY-LE-00.00_ST02	Staggs Branch	MP 1.1	P	Intermediate	No Designation / Warmwater	12.0	No	Dry crossing	12.0
KY-LE-00.00_ST03	Unnamed tributary to Grassy Fork	MP 0.8	I	Minor	No Designation / Warmwater	5.0	No	Open cut	5.0
KY-LE-00.00_ST04	Unnamed	MP 0.8	E	Minor	No Designation / Warmwater	6.0	No	Open cut	6.0
KY-CA-00.00_ST06	Unnamed tributary to McGlone Fork	MP 2.6	I	Minor	No Designation / Warmwater	3.0	No	Open cut	3.0
KY-CA-00.00_ST07	Unnamed tributary to McGlone Fork	MP 3.1	I	Minor	No Designation /Warmwater	5.0	No	Open cut	5.0
KY-CA-00.00_ST08	Unnamed tributary to McGlone Fork	MP 2.9	I	Minor	No Designation / Warmwater	8.0	No	Open cut	8.0
KY-CA-00.00_ST09	Perry Fork	MP 3.6	P	Minor	No Designation / Warmwater	8.0	No	Dry crossing	8.0
KY-CA-00.00_ST10	Davis Fork	MP 3.8	I	Minor	No Designation / Warmwater	10.0	No	Open cut	10.0
KY-CA-00.00_ST11	Unnamed tributary to McGlone Creek	MP 3.8	I	Minor	No Designation / Warmwater	4.0	No	Not crossed	0.0
KY-CA-00.00_ST13	Unnamed	MP 4.4	E	Minor	No Designation / Warmwater	4.0	No	Open cut	4.0
KY-CA-17.011_ST01	Long Fork	MP 4.9	P	Intermediate	No Designation / Warmwater	12.0	No	Not crossed	0.0
KY-CA-00.00_ST14	Cedar Run	MP 6.1	I	Minor	No Designation / Warmwater	0.0	No	Not crossed	0.0
KY-CA-.001_ST02	Unnamed	MP 6.7	E	Minor	No Designation / Warmwater	3.0	No	Open cut	3.0
KY-CA-.001_ST01	Brushy Creek	MP 6.8	P	Intermediate	No Designation / Warmwater	15.0	No	Dry crossing	32.0
KY-CA-.001_ST01	Brushy Creek	MP 7.0	P	Minor	No Designation / Warmwater	9	No	Dry crossing	11.0
KY-CA-.001_ST01	Brushy Creek	MP 7.5	P	Minor	No Designation / Warmwater	9.0	No	Dry crossing	32.0
KY-CA-17.00002_ST01	Cedar Creek	MP 7.5	I	Minor	No Designation / Warmwater	2.0	No	Not crossed	0.0

Appendix D

Waterbodies Crossed by the ACRP or within ACRP Construction Workspaces

Waterbody ID	Waterbody Name	Location/ Approximate Milepost	Flow Type [a]	FERC Classification [b]	Water Quality Designation/ Fishery Classification	Bank Width (feet)	Impaired	Proposed Crossing Method [c]	Length of Pipeline Crossing (feet)
KY-CA-.001_ST01	Brushy Creek	Access Road ACRD.006	P	Intermediate	No Designation / Warmwater	18.4	No	Temporary bridge	21.0
Pipeline Replacements									
	Canal 1 - unnamed tributary	MP 18.4	I	Minor	No Designation / None	15.0	No	Dry crossing	5.0
	Canal 2 - unnamed tributary	MP 18.6	I	Minor	No Designation / None	4.0	No	Dry crossing	2.0
	Canal 3 - unnamed tributary	MP 17.8	E	Minor	No Designation / None	5.0	No	Dry crossing	5.0
	Irvine Lick	MP 11.3	P	Intermediate	No Designation / None	32.0	No	Dry crossing	25.0
	Tates Creek	MP 11.5	P	Intermediate	No Designation / None	40.0	No	Conventional Bore	19.0
	Canal 1 - unnamed tributary	MP 11.8	I	Minor	No Designation / None	5.0	No	Dry crossing	3.0
	Canal 2 - unnamed tributary	MP 12.1	P	Minor	No Designation / None	6.0	No	Dry crossing	3.0
Off-right-of-way Tap Reconnects									
MS0040_ST04	Big Snow Creek	MS0040	I	Minor	Fish & Wildlife / Warmwater	3.0	No	Open cut	NA
MS0040_ST01	Unnamed	MS0040	P	Minor	Fish & Wildlife / Warmwater	4.0	No	Dry crossing	NA
MS0040_ST02	Big Snow Creek	MS0040	P	Minor	Fish & Wildlife / Warmwater	10.0	No	Dry crossing	NA
MS0040_ST03	Unnamed	MS0040	I	Minor	Fish & Wildlife / Warmwater	3.0	No	Open cut	NA
TN0370N_ST01N	Unnamed	TN0370N	P	Minor	Undetermined / Warmwater	2.0	No	Dry crossing	NA
KY0080_ST01	Unnamed	KY0080	I [d]	Minor	Not Listed / Warmwater	2.5	No	Open cut	NA
KY0080_ST02	Big Brushy Creek	KY0080	P [d]	Intermediate	5 PS / Warmwater	38.0	No	Dry crossing	NA
KY0080_ST03	Unnamed	KY0080	I [d]	Minor	Not Listed / Warmwater	2.5	No	Open cut	NA
KY0080_ST04	Unnamed	KY0080	I [d]	Minor	Not Listed / Warmwater	2.0	No	Open cut	NA
KY0080_ST05	Big Brushy Creek	KY0080	P [d]	Intermediate	5 PS / Warmwater	42.0	No	Dry crossing	NA
KY0010_WB1	Unnamed	KY0010	E	Minor	Not Listed / Warmwater	4.0	No	Open cut	NA
OH0110E_0110W_ST01	Unnamed	OH0110E	I	Minor	No Designation / Warmwater	2.5	No	Open cut	NA
OH0110E_0110W_ST02	Unnamed	OH0110E	P	Minor	No Designation / Warmwater	10.0	Yes	Dry crossing	NA
OH0110E_0110W_ST03	Unnamed	OH0110E	E	Minor	No Designation / Warmwater	1.0	No	Not crossed	--
OH0110E_0110W_ST04	Unnamed	OH0110E	E	Minor	No Designation / Warmwater	1.0	No	Open cut	NA

Appendix D

Waterbodies Crossed by the ACRP or within ACRP Construction Workspaces

Waterbody ID	Waterbody Name	Location/ Approximate Milepost	Flow Type [a]	FERC Classification [b]	Water Quality Designation/ Fishery Classification	Bank Width (feet)	Impaired	Proposed Crossing Method [c]	Length of Pipeline Crossing (feet)
OH0110E_0110W_ST05	Smith Run	OH0110E	P	Intermediate	Ag/Industrial; Water Supply; Primary Contact Recreation/ Warmwater	16.0	Yes	Dry crossing	NA
OH0110E_0110W_ST06	Smith Run	OH0110E	E	Minor	Ag/Industrial; Water Supply; Primary Contact Recreation / Warmwater	1.0	No	Open cut	NA
OH0110E_0110W_ST07	Unnamed	OH0110E	E	Minor	No Designation / Warmwater	2.5	No	Open cut	NA
OH0110E_0110W_ST08	Unnamed	OH0110E	E	Minor	No Designation / Warmwater	1.5	No	Not crossed	--
OH0110E_0110W_ST09	Unnamed	OH0110E	E	Minor	No Designation / Warmwater	1.5	No	Open cut	NA
OH0110E_0110W_ST010	Unnamed	OH0110E	E	Minor	No Designation / Warmwater	3.0	No	Open cut	NA
OH0115_ST01	Unnamed	OH0115	I	Minor	No Designation / Warmwater	8.0	Yes	Not crossed	--

NA indicates data not available.

PS indicates partial support by the State of Kentucky for the water use designation (conditions are suitable at some times of the year but not others).

See appendix C for a description of activities corresponding to each Facility ID.

a Flow Type definitions:

E = Ephemeral – An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round.

I = Intermittent – An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water.

P = Perennial – A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year.

b Intermediate = between 10 and 100 feet wide; Minor = less than 10 feet wide.

c Methods would be based on FERC's Procedures. Typically, ephemeral and intermittent waterbodies would be crossed via open cut method when there is no perceptible water flow; however, if flow is perceived at the time of crossing, a dry crossing method would be used (i.e., dam and pump or flume). "Not crossed" indicates that a waterbody would be within the construction right-of-way but would not be crossed by the pipeline. If the waterbody is less than 15 feet wide, it would be bridged to facilitate equipment and vehicle movement.

d As determined by the National Hydrography Dataset.

Appendix E

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

Table E-1

Federally Listed Species Potentially Occurring in the Project Area

Species	Federal Status [a]	State Status [b]	Habitat Description	Effect Determination [c] OH	KY	TN	MS	AR	LA
Mammals									
Gray bat *Myotis grisescens*	E	SE (TN) ST (KY)	Roost in caves and feed along rivers and lakes (Decher and Choate, 1995).	-	TBD	NLAA[d]	-	-	-
Indiana bat *Myotis sodalis*	E	SE (OH, KY, TN)	Caves or abandoned mines in winter, forests in summer (Thomson, 1982).	NLAA[d]	LAA[e]	LAA[e]	NLAA[d]	-	-
Northern long-eared bat *Myotis septentrionalis*	T	SE (KY)	Caves or abandoned mines in winter, forests in summer (Caceres and Barclay, 2000).	NLAA[d]	LAA[e]	LAA[e]	NLAA[d]	NE[f]	NLAA
Virginia big-eared bat *Corynorhinus townsendii virginianus*	E	SE (KY)	Roost in caves and forage in forests (Kunz and Martin, 1982).	-	NLAA	-	-	-	-
Birds									
Interior least tern *Sterna antillarum ssp. athalassos*	E	SE (KY, TN, MS, AR, LA)	Elevated portions of level, unvegetated beaches, sandpits, sandbars, gravel bars, and salt flats (NatureServe 2015; USFWS, 2015d).	-	-	-	NE[f]	NLAA	NLAA
Piping plover *Charadrius melodus*	T	-	Breeds in sandy beaches of shallow lakes. Non-breeding habitat includes ocean beaches and sand or algal flats in protected bays (USFWS, 2015d; NatureServe, 2015).	-	-	-	-	NLAA	-
Red-cockaded woodpecker *Picoides borealis*	E	SE (MS)	Open, mature pine woodlands (NatureServe, 2015).	-	-	-	-	NE[f]	NE[f]
Wood stork *Mycteria americana*	E	-	Marshes, swamps, lagoons, ponds, flooded fields, and brackish wetlands (NatureServe, 2015).	-	-	-	NLAA[d]	-	-
Fish									
Diamond darter *Crystallaria cincotta*	E	-	Riffles and pools in clean sand, gravel, and cobble runs of small to medium-sized rivers (NatureServe, 2015).	-	NE[f]	-	-	-	-
Pallid sturgeon *Scaphirhynchus albus*	E	SE (AR)	Large, turbid, free flowing rivers and their tributaries with strong current over firm gravel or sandy substrates (USFWS, 2015d).	-	-	-	NE[f]	NE[f]	NE[f]
Pygmy madtom *Noturus stanauli*	E	SE (TN)	Clear, moderate to large rivers in shallow gravel or fine-sand shoals with moderate to strong current (NatureServe, 2015).	-	-	NE[f]	-	-	-
Reptiles									
Louisiana pine snake *Pituophis ruthveni*	P	-	Inhabits sandy, well-drained soils in open pine forests (such as longleaf pine) savannah dominated by grasses. Uses pocket gopher burrow systems for below-ground refuges (NatureServe, 2016).	-	-	-	-	-	NLAA[g]

Table E-1

Federally Listed Species Potentially Occurring in the Project Area

Species	Federal Status [a]	State Status [b]	Habitat Description	Effect Determination [c]					
				OH	KY	TN	MS	AR	LA
Timber rattlesnake *Crotalus horridus*	SOC	SE (OH)	Mountainous or hilly coniferous, deciduous, and mixed forests often with rock outcrops, talus, and scree; river bottoms and floodplains, including scrub-shrub and forested wetlands; and agricultural fields (USFWS, 2015a).	NLAA[g]	-	-	-	-	-
Amphibians									
Eastern hellbender *Cryptobranchus alleganiensis alleganiensis*	SOC	SE (OH, KY)	Confined to running waters of fairly large streams and rivers, especially in stretches with large flat stones (KSNPC, 2014).	NE[f, g]	-	-	-	-	-
Mussels									
Clubshell *Pleurobema decisum*	E	SE (OH, KY, TN)	Clean, loose sand and gravel in small to medium rivers. Requires stable, undisturbed habitat (USFWS, 1997b).	NE[f]	NLAA[d]	NE[f]	-	-	-
Cracking pearlymussel *Hemistena lata*	E	SE (TN)	Sand, gravel, and cobble substrates in swift currents or in mud and sand in slower currents (NatureServe, 2015).	-	-	NE[f]	-	-	-
Fanshell *Cyprogenia stegaria*	E	SE (KY, TN)	Sand or gravel in deep water of moderate current. Requires stable, undisturbed habitat (USFWS, 1997c).	NE[f]	NLAA[d]	NE[f]	-	-	-
Fat pocketbook *Potamilus capax*	E	SE (MS)	In slow-flowing water in large rivers in mud, sand, and fine gravel substrates (NatureServe, 2015).	-	-	-	NE[f]	-	-
Fluted kidney shell *Ptychobranchus subtentum*	E	-	Swift currents or riffles in small to medium rivers in sand, gravel, and cobble substrates (NatureServe, 2015).	-	NE[f]	NE[f]	-	-	-
Littlewing pearlymussel *Pegias fabula*	E	-	Small cool streams in riffles on sand, gravel, or underneath rocks (NatureServe, 2015).	-	NE[f]	-	-	-	-
Northern riffleshell *Epioblasma torulosa rangiana*	E	SE (KY)	Firmly packed sand or gravel. Requires stable, undisturbed habitat (USFWS, 1997d).	NE[f]	NLAA[d]	-	-	-	-
Orangefoot pimpleback *Plethobasus cooperianus*	E	SE (TN)	Sand, gravel, and cobbles in riffles in shoals in medium to large rivers (NatureServe, 2015).	-	NLAA[d]	NE[f]	-	-	-
Pink mucket *Lampsilis abrupta*	E	SE (OH, KY, TN, AR)	Mud and sand in shallow stream riffles. Requires stable, undisturbed habitat (USFWS, 1997e).	NE[f]	NLAA[d]	NE[f]	-	NE[f]	NE[f]
Rabbitsfoot *Quadrula cylindrica cylindrica*	T	SE (TN, MS) ST (KY)	Sand, gravel, and cobbles in swift currents of small to large rivers (NatureServe, 2015).	NE[f]	NLAA[d]	NE[f]	NE[f]	NE[f]	NE[f]
Rayed bean *Villosa fabalis*	E	SE (OH)	Small to large streams, but may be found in small or medium rivers and natural lakes. Occur in shoal or riffle areas among roots of vegetation (NatureServe, 2015).	NE[f]	-	-	-	-	-
Ring pink *Obovaria retusa*	E	SE (TN)	Gravel and sandbars in medium to large rivers (NatureServe, 2015).	-	NLAA[d]	NE[f]	-	-	-

Table E-1

Federally Listed Species Potentially Occurring in the Project Area

Species	Federal Status [a]	State Status [b]	Habitat Description	Effect Determination [c] OH	KY	TN	MS	AR	LA
Rough pigtoe *Pleurobema plenum*	E	SE (KY, TN)	Sand or gravel in deep waters of medium to large rivers (USFWS, 2015d; NatureServe, 2015).	-	NLAA[d]	NE[f]	-	-	-
Sheepnose *Plethobasus cyphyus*	E	SE (OH, KY, MS)	Gravel and cobbles in riffles in medium to large rivers. Also found in reservoirs (NatureServe, 2015).	NE[f]	NLAA[d]	-	NE[f]	-	-
Slabside pearlymussel *Pleuronaia dolabelloides*	E	-	Creeks to large rivers in high gradient riffle systems with moderate to swift current velocities and coarse sand, fine gravel, and cobble substrates (NatureServe, 2015).	-	NE[f]	NE[f]	-	-	-
Snuffbox *Epioblasma triquetra*	E	SE (OH, KY)	Swift current of small- to medium-sized creeks, large rivers (USFWS, 2014c).	NE[f]	NLAA[d]	-	-	-	-
Spectaclecase *Cumberlandia monodonta*	E	-	Gravel and cobble substrates in medium to large streams in fast-moving currents (USFWS, 2015d; NatureServe, 2105).	-	NE[f]	NE[f]	-	-	-
White wartyback *Plethobasus cicatricosus*	E	SE (TN)	Shoals and riffles in large rivers (NatureServe, 2015).	-	-	NE[f]	-	-	-
Other Invertebrates									
Kentucky cave shrimp *Palaemonias ganteri*	E	SE (KY)	Endemic to Mammoth Cave/Flint Ridge Cave System in silty bottomed pools in subterranean habitat (NatureServe, 2015).	-	NE[f]	-	-	-	-
American burying beetle *Nicrophorus americanus*	E	-	Upland grasslands or near fringe of grassland/forest areas (NatureServe, 2015).	NE[f]	-	-	-	-	-
Tatum Cave beetle *Pseudanophthalmus parvus*	C	-	Endemic to Tatum Cave in Marion County, Kentucky (79 FR 72475).	-	NE[f, g]	-	-	-	-
Plants									
Earth fruit *Geocarpon minimum*	T	-	Sparsely vegetated sandstone glades and saline prairies (NatureServe, 2015).	-	-	-	-	-	NE[f]
Pondberry *Lindera melissifolia*	E	SE (AR)	Seasonal ponds and depressions in pinelands in seasonally flooded wetlands (NatureServe, 2015).	-	-	-	NLAA[d]	NE[f]	-
Price's potato-bean *Apios priceana*	T	SE (TN)	Openings in rich woods (TNHIP, 2014).	-	-	TBD	-	-	-
Running buffalo clover *Trifolium stoloniferum*	E	-	Mesic habitats exposed to partial or filtered light and frequent disturbance (NatureServe, 2015).	NE[h]	TBD	-	-	-	-
Short's bladderpod *Physaria globosa*	E	SE (TN)	Limestone talus slopes and cliffs (TNHIP, 2014).	-	TBD	NE[h]	-	-	-
Small whorled pogonia *Isotria medeoloides*	T	-	Dry to mesic second-growth deciduous forest (NatureServe, 2015).	NE[h]	-	-	-	-	-

Table E-1

Federally Listed Species Potentially Occurring in the Project Area

Species	Federal Status [a]	State Status [b]	Habitat Description	Effect Determination [c] OH	KY	TN	MS	AR	LA
Virginia spiraea *Spiraea virginiana*	T	SE (OH)	Slow-moving streams with scoured sandstone bedrock (NatureServe, 2015).	NE[h]	TBD	-	-	-	-
Whorled sunflower *Helianthus verticillatus*	E	SE (TN)	Openings in woodlands and along creeks in wet prairie and calcareous barrens (NatureServe, 2015).	-	-	TBD	-	-	-

a E = endangered; T = threatened; P = proposed threatened; C = candidate ; SOC = species of concern

b SE= state endangered; ST = state threatened; OH = Ohio; KY = Kentucky; TN = Tennessee; MS = Mississippi; AR = Arkansas; LA = Louisiana

c NE = no effect; NLAA = may affect, not likely to adversely affect; LAA = may affect, likely to adversely affect; TBD = to be determined, awaiting completion of species-specific surveys; - = not applicable or not present in state

d Awaiting USFWS concurrence.

e Mitigation for take through use of a Conservation Memorandum of Agreement (Kentucky) and participation in the Indiana Bat Mitigation In-Lieu Fee program (Tennessee).

f No effect determination based on lack of suitable habitat in the Project area.

g There is no requirement under the ESA for consultation regarding project impacts on candidate species or species of concern.

h No effect determination based on no populations of the species found during species-specific surveys conducted within potential habitat.

Sources: USFWS (2014c, 2015b, 2015c, 2015h, 2015j, 2015k)

Table E-2

State-listed Species Potentially Occurring in the Project Area

Species	Status	Habitat Comments	Impacts and Mitigation
Mammals			
Allegheny woodrat *Neotoma magister*	OH-E TN-D	Outcrops, cliffs, talus slopes, crevices, sinkholes, caves, and karst topography (TDEC, 2015).	Species has not been observed within 4 miles of the Project area. No impacts on habitat in Ohio and Tennessee anticipated.
American pygmy shrew *Sorex hoyi*	TN-R	Found in a variety of habitats, with moist sites preferred over dry areas. Found in middle and east Tennessee (TDEC, 2015).	Impacts on habitat likely to be minor and no impacts on species at population level anticipated.
Black bear *Ursus americanus*	OH-E KY-S MS-E	Largely forested areas (KSNPC, 2014).	Black bears are highly mobile and typically avoid areas that experience a significant amount of human activity unless attracted by a food source.
Florida panther *Puma concolor coryi*	MS-E	Large contiguous blocks of wooded habitat including heavily forested areas in lowlands and swamps and upland forests in some parts of range (NatureServe, 2016).	Florida panther are highly mobile and likely to avoid areas that experience a significant amount of human activity. Impacts to habitat likely to be minor.
Gray bat *Myotis grisescens*	F-E KY-T TN-E	Roosts in caves and feed along rivers and lakes (Decher and Choate, 1995).	See section 2.4.1 for discussion of potential impacts and mitigation.
Indiana Bat *Myotis sodalis*	F-E OH-E KY-E TN-E	Caves or abandoned mines in winter, forests in summer (Thomson, 1982).	See section 2.4.1 for discussion of potential impacts and mitigation.
Least weasel *Mustela nivalis*	KY-S	Prime habitat unknown. Seems to occur in farmland (KSNPC, 2014).	Species has been documented within 1 mile of MLV 874 project workspaces (KNSPC, 2016). Impacts on habitat may occur but no impacts on species at population level anticipated.
Meadow jumping mouse *Zapus hudsonius*	TN-D	Open grassy fields; often abundant in thick vegetation near water bodies (TDEC, 2015).	Minimal impacts on open land habitats in Tennessee would not have significant adverse impacts on the species.
Northern long eared bat *Myotis septentrionalis*	F-T KY-E	Caves or abandoned mines in winter, forests in summer (Caceres and Barclay, 2000).	See section 2.4.1 for discussion of potential impacts and mitigation.
Southeastern shrew *Sorex longirostris*	TN-D	Various habitats including wet meadows, damp woods, and uplands (TDEC, 2015).	Minimal impacts on habitat in Tennessee would not have significant adverse impacts on the species.
Virginia big eared bat *Corynorhinus townsendii virginianus*	F-E KY-E	Roost in caves and forages in forests (Kunz and Martin, 1982).	See section 2.4.1 for discussion of potential impacts and mitigation.

Table E-2

State-listed Species Potentially Occurring in the Project Area

Species	Status	Habitat Comments	Impacts and Mitigation
Birds			
American bittern *Botaurus lentiginosus*	OH-E	Fresh water bogs, swamps, wet fields, cattail and bulrush marshes, brackish and saltwater marshes, and meadows (ODNR, 2015e).	Impacts on state-listed bird species could occur as a result of temporary and permanent impacts on upland forest, wetland forest, open land, open wetland, and vegetated developed habitats associated with construction and operation of Project infrastructure. Impacts could include temporary habitat disturbance and alteration associated with construction activities and permanent habitat loss associated with construction of new facilities.
American black duck *Anas rubripes*	MS-S2N	Breed in a variety of wetland habitats, from salt marshes to beaver ponds, river islands, and boreal bogs. They winter in salt water along the coasts (USFWS, 2015a).	
American coot *Fulica americana*	KY-E	Freshwater lakes, ponds, marshes, and larger rivers, wintering also on brackish estuaries and bays and on land bordering these habitats (KSNPC, 2014).	Impacts on the state-listed bird species would be avoided and minimized through implementation of migratory bird protection measures, as discussed in section 2.3.3, including avoidance of tree-removal or mowing during the bird nesting season and/or conducting pre-clearing migratory bird surveys in coordination with USFWS.
Bachman's sparrow *Aimophila aestivalis*	TN-E	Early successional areas with scattered saplings (often pines), bushes, or understory, brushy or overgrown hillsides, overgrown fields with thickets, and brambles (TDEC, 2015).	
Bald eagle *Haliaeetus leucocephalus*	KY-T MS-S2BS2N AR-S2BS4N LA-S3	Primarily associated with larger rivers and lakes although also occurs along medium sized stream floodplains. In winter, may associate with waterfowl concentrations or congregate in areas with abundant dead fish (KSNPC, 2014).	Based on the characteristics and habitat requirements of migratory birds known to occur in the proposed Project area, the amount of similar habitat adjacent to and near the Project, and with TGP's adherence to USFWS guidelines and implementation of mitigation measures, and our recommendations, we conclude that construction and operation of the Project would not have significant impacts on state-listed bird species.
Barn owl *Tyto alba*	KY-S	Open and partly open country in a wide variety of situations, often around human habitation. In northern winter often roosts in dense conifers (KSNPC, 2014).	
Bewick's wren *Thryomanes bewickii*	KY-S MS-E	Brushy areas, thickets and scrub in open country, open and riparian woodland. Found in rural towns and farmsteads (KSNPC, 2014).	
Brown creeper *Certhia americana*	KY-E	Forest, woodland, swamps; also scrub and parks in winter and migration (KSNPC, 2014).	
Cerulean warbler *Dendroica cerulea*	TN-D	Mature deciduous forest, particularly in floodplains or mesic conditions (TDEC, 2015).	
Cooper's hawk *Accipiter cooperi*	MS-S3?B	Primarily mature forest, either broadleaf or coniferous. Also use open woodland and forest edges (USFWS, 2015a).	

Table E-2

State-listed Species Potentially Occurring in the Project Area

Species	Status	Habitat Comments	Impacts and Mitigation
Dark-eyed junco *Junco hyemalis*	KY-S	Coniferous and deciduous forest, forest edge, clearings, bogs, open woodland, brushy areas adjacent to forest, and burned-over lands; in migration and winter in a variety of open woodland, brushy, and grassy habitats (KSNPC, 2014).	
Double breasted cormorant *Phalacrocorax auritus*	KY-T	Lakes, rivers, swamps, and seacoasts (KSNPC, 2014).	
Henslow's sparrow *Ammodramus henslowii*	KY-S	Open fields and meadows with relatively thick/dense grass interspersed with weeds or shrubby vegetation (KSNPC, 2014).	
Interior least tern *Sterna antillarum athalassos*	F-E AR-S2B	Elevated portions of level, unvegetated beaches, sandpits, sandbars, gravel bars, and salt flats (NatureServe, 2015; USFWS, 2015a).	
Lark sparrow *Chondestes grammacus*	TN-T	Open habitats with scattered bushes and trees, prairie, cultivated areas, fields with bushy borders; ground nester (TDEC, 2015).	
Least bittern *Ixobrychus exilis*	MS-S3B	Wetlands along lakes, rivers, and estuaries on the coastal plain. The species nests among dense, tall growths of emergent vegetation interspersed with some woody vegetation and open, fresh water, and brackish marshes (NatureServe, 2015).	
Little blue heron *Egretta caerulea*	TN-D MS-S2B	Bodies of calm shallow water; colonial nester (TDEC, 2015).	
Northern harrier *Circus cyaneus*	OH-E	Marshes, meadows, grasslands, and cultivated fields. Perches on ground or on stumps or posts. Winter roosts in undisturbed fields or marshes (ODNR, 2015e).	
Pied-billed grebe *Podilymbus podiceps*	KY-E	Lakes, ponds, sluggish streams, and marshes; also in brackish bays and estuaries in migration and when not breeding (KSNPC, 2014).	
Red-cockaded woodpecker *Picoides borealis*	F-E LA-S2	Open, mature pine woodlands (NatureServe, 2015).	
Rose-breasted grosbeak *Pheucticus ludovicianus*	KY-S	Second-growth woods, borders of swamps and streams, dense growths of small trees, and shrubs along edges of woods and old pastures, gardens and parks, old orchards (KSNPC, 2014).	

Table E-2

State-listed Species Potentially Occurring in the Project Area

Species	Status	Habitat Comments	Impacts and Mitigation
Rusty blackbird *Euphagus carolinus*	MS-S2N	Breeding habitat includes moist woodland (primarily coniferous), bushy bogs and fens, and wooded edges of waterbodies. Nests in trees or shrubs, usually in or near water (USFWS, 2015a).	
Sandhill crane *Grus canadensis*	LA-S2S3	Prairies, fields, and marshes (LDWF, 2015).	
Savannah sparrow *Passerculus sandwichensis*	KY-S	Open areas, especially grasslands, tundra, meadows, bogs, farmlands, grassy areas with scattered bushes, and marshes, including salt marshes (KSNPC, 2014).	
Sedge wren *Cistothorus platensis*	KY-S	Grasslands and savanna, especially where wet or boggy, sedge marshes, locally in dry cultivated grainfields. In migration and winter also in brushy grasslands (KSNPC, 2014).	
Sharp-shinned hawk *Accipiter striatus*	KY-S MS-S1?B	Forest and open woodland, coniferous, mixed, or deciduous, primarily in conifers. In more northern and mountainous portion of range (KSNPC, 2014).	
Short-eared owl *Asio flammeus*	KY-E	Open country, including prairie, meadows, tundra, moorlands, marshes, savanna, dunes, fields, open woodland. Roosts by day on ground, on low open perch, under low shrub, or in conifers (KSNPC, 2014).	
Spotted sandpiper *Actitis macularius*	KY-E	Seacoasts and shores of lakes, ponds, and streams, sometimes in marshes; prefers shores with rocks, wood, or debris; also mangrove edges in Caribbean (KSNPC, 2014).	
Upland sandpiper *Bartramia longicauda*	OH-E	Extensive, open tracts of short grassland habitat. Nests in native prairie, dry meadows, pastures, and other open or agricultural land (NatureServe, 2015).	
Yellow rail *Coturnicops noveboracensis*	MS-S2N	Breeds in freshwater emergent wetlands, grass or sedge marshes, and wet meadows (NatureServe, 2015).	
Yellow-crowned night heron *Nyctanassa violacea*	MS-S3B/S1N	Marshes, swamps, lakes, lagoons, and mangroves. Chiefly coastal (NatureServe, 2015).	

Table E-2

State-listed Species Potentially Occurring in the Project Area

Species	Status	Habitat Comments	Impacts and Mitigation
Fish			
Bigeye shiner *Notropis boops*	OH-T LA-S3	Prefers pools with emergent vegetation in moderately clear creeks and small to medium rivers with moderate grades (LDWF, 2015).	Impacts on state-listed fish species could occur as a result of temporary and permanent impacts on perennial, intermittent, and ephemeral streams associated with construction and operation of Project infrastructure.
Black buffalo *Ictiobus niger*	MS-S3	Pools and backwaters of small to large rivers, reservoirs, and lakes (NatureServe, 2015).	A total of 46 waterbodies would be within the construction workspaces. These include 14 perennial streams, 19 intermittent, and 13 ephemeral waterbodies.
Blue sucker *Cycleptus elongatus*	OH-T	A bottom feeder that consumes insects, crustaceans, and plant material in various sized rivers and streams in a range of currents (NatureServe, 2015).	Impacts on state-listed fish with potential to be present within the Project area would be avoided and minimized through minimization of in-water work in perennial streams and through implementation of our Plan and Procedures to reduce the potential that waterbodies would be affected as a result of stormwater runoff, as committed to by TGP. Based on the limited amount of aquatic habitat affected and implementation of our Plan and Procedures, we conclude that the Project would not have significant adverse impacts on state-listed fish species.
Blueheaded shiner *Pteronotropis hubbsi*	LA-S2	Found in small- to medium-sized slow moving streams and oxbow lakes with mud or mud-sand bottoms (LDWF, 2015).	
Chain pickerel *Esox niger*	KY-S	Coastal plain wetlands, streams, and vegetated oxbow lake shorelines. It also tolerates reservoir conditions (KSNPC, 2014).	
Channel darter *Percina copelandi*	OH-T	Occurs in warm, low and moderate gradient rivers, and large creeks in areas of moderate current. Usually is found over sand and gravel substrates and prefers clear water and silt-free bottoms (NatureServe, 2015).	
Chestnut lamprey *Ichthyomyzon castaneus*	KY-S	Moderate-size creeks, large rivers, and reservoirs. Substrate consists of gravel and rubble with areas of sand and silt (KSNPC, 2014).	
Coppercheek darter *Etheostoma aquali*	TN-T	Primarily in deep riffles, runs, and flowing pools. In Tennessee, present in the Duck and Buffalo River watersheds (TDEC, 2015).	
Egg-mimic darter *Etheostoma pseudovulatum*	TN-E	Small- to medium-sized gravelly, cool, spring fed streams. In Tennessee, present in the lower Duck River watershed (TDEC, 2015).	
Flame chub *Hemitremia flammea*	TN-D	Springs and spring-fed streams with lush aquatic vegetation. In Tennessee, present in the Tennessee and Middle Cumberland River watersheds (TDEC, 2015).	
Golden darter *Etheostoma denoncourti*	TN-R	Medium to large rivers in shallow riffle areas of pea gravel. In Tennessee, present in the Tennessee River system (TDEC, 2015).	

Table E-2

State-listed Species Potentially Occurring in the Project Area

Species	Status	Habitat Comments	Impacts and Mitigation
Goldeye *Hiodon alosoides*	OH-E AR-S2?	Occurs in quiet turbid water of medium to large lowland rivers, the small lakes, ponds, and marshes connected to them, and muddy shallows of larger lakes (NatureServe, 2015).	
Greater redhorse *Moxostoma valenciennesi*	OH-E	Moderate to fast-flowing, medium-sized to large rivers with clear water and substrates of clean sand, gravel, or boulders (NatureServe, 2015).	
Loghead darter *Percina macrocephala*	KY-E	Clear, upland streams and rivers with moderate current, over clean substrates, often above and below riffles (KSNPC, 2014).	
Mountain madtom *Noturus eleutherus*	OH-E	Inhabits small to large rivers, in fast-flowing, clear water sections over sand, gravel, and rubble, often near vegetation (NatureServe, 2015).	
Mud darter *Etheostoma asprigene*	MS-S2	Sloughs, bottomland lakes, and low-gradient areas of small to large rivers. Also occurs in areas of sluggish to moderate current with substrates of mud, sand, and detritus (NatureServe, 2015).	
Naked sand darter *Ammocrypta beani*	TN-D	Shifting sand bottoms and sandy runs. In Tennessee, present in the Hatchie and Wolf Rivers and their larger tributaries (TDEC, 2015).	
Northern madtom *Noturus stigmosus*	OH-E KY-S	Large streams and rivers in moderate to swift current over gravel and sand, and sometimes debris or pondweed for cover (KSNPC, 2014).	
Ohio lamprey *Ichthyomyzon bdellium*	OH-E	Inhabits medium to large rivers, larvae burrow near debris in mud bottom of quiet pools of creeks and small rivers. Adults are parasitic on fish such as carp and gar (NatureServe, 2015).	
Pallid sturgeon *Scaphirhynchus albus*	F-E AR-S1	Large rivers and their tributaries typically associated with sandy and fine bottom substrate (USFWS, 2015a).	
Popeye shiner *Notropis ariommus*	OH-E	Occurs in warm, relatively clear flowing waters of large creeks and small to medium rivers and are closely associated with gravel substrate (NatureServe, 2015).	
Pygmy madtom *Noturus stanauli*	TN-E	Medium to large rivers with moderate to strong current over gravel substrates. In Tennessee, present in the Tennessee River watershed (TDEC, 2015).	

Table E-2

State-listed Species Potentially Occurring in the Project Area

Species	Status	Habitat Comments	Impacts and Mitigation
River darter *Percina shumardi*	OH-T	Occurs in large rivers and lower part of tributaries; deep chutes and riffles where current is swift and bottom is coarse gravel or rock (NatureServe, 2015).	
Saddled madtom *Noturus fasciatus*	TN-T	Rocky riffles, runs, and flowing pools of clear creeks and small rivers; Duck River system and nearby tributaries of the Tennessee River (TDEC, 2015).	
Scaly sand darter *Ammocrypta vivax*	TN-D	Small to medium rivers with sandy substrate; Hatchie and Buffalo Rivers (TDEC, 2015).	
Shovelnose sturgeon *Scaphirhynchus platorynchus*	OH-E	Deep channels and embayments of large, turbid rivers. Often occurs over sand mixed with gravel or mud in areas with strong current (NatureServe, 2015).	
Southern cavefish *Typhlichthys subterraneus*	TN-D	Aquatic cave obligate; cave streams, karst waters, and water supply wells (TDEC, 2015).	
Southern rainbow *Villosa vibex*	TN-R	Mud or soft sand in small rivers and creeks in areas with moderate current. In Tennessee, present in the Conasauga, Hatchie, and Wolf River systems (TDEC, 2015).	
Splendid darter *Etheostoma barrenense*	TN-D	Locally abundant in rocky pools and adjacent riffles of small to moderate streams. In Tennessee, present in the Barren River watershed (TDEC, 2015).	
Spottail shiner *Notropis hudsonius*	KY-S	Occurs over firm sand along the shoreline of big rivers where rapid current is avoided (KSNPC, 2014).	
Spotted darter *Etheostoma maculatum*	KY-T	Inhabits medium to large streams where it occurs among coarse gravel, cobble, and boulders in swift riffles and shoals (KSNPC, 2014).	
Stargazing minnow *Phenacobius uranops*	KY-S	Inhabits medium-size streams to small rivers with high gradient, permanent flow, clear water, and pebble and gravel substrates (KSNPC, 2014).	
Steelcolor shiner *Cyprinella whipplei*	MS-S2 LA-S2/S3	Prefers pools and backwaters of moderately clear creeks and medium to large rivers with moderate grades. The main threat to this species is water quality degradation caused by increased siltation, turbidity, and impoundment. Proper erosion control methods should be used during any construction to minimize potential effects on their habitat (LDWF, 2015).	

Table E-2

State-listed Species Potentially Occurring in the Project Area

Species	Status	Habitat Comments	Impacts and Mitigation
Trout perch *Percopsis omiscomaycus*	KY-S	Lives in clear, small- to moderate-size streams in pools or raceways over clean sand or mixed sand and gravel bottoms (KSNPC, 2014).	
Yazoo darter *Etheostoma raneyi*	MS-S2	Occurs in sandy pools of headwaters and creeks, often in areas with multiple channels flowing through wetlands (NatureServe, 2015).	
Reptiles			
Eastern massasauga *Sistrurus catenatus*	OH-E	Uses a range of habitats including wet prairies, fens, and other wetlands, as well as drier upland habitat (ODNR, 2015e).	Impacts on state-listed reptile species could occur as a result of temporary and permanent impacts on forested, open, and wetlands habitats associated with construction and operation of Project infrastructure. Impacts could include temporary habitat disturbance and alteration associated with construction activities and permanent habitat loss associated with construction of new facilities.
Eastern slender glass lizard *Ophisaurus attenuatus longicaudus*	TN-D	Dry upland areas including brushy, cut-over woodlands and grassy fields; nearly statewide but obscure; fossorial (TDEC, 2015).	
Northern pinesnake *Pituophis melanoleucus melanoleucus*	TN-T	Well-drained sandy soils in pine/pine-oak woods; dry mountain ridges. In Tennessee, occurs in eastern portions of west Tennessee and eastern Tennessee to lower elevations of the Appalachian Mountains (TDEC, 2015).	Based on minimal potential loss of habitat and with consideration for measures committed to by TGP, we conclude that the Project would not have significant adverse impacts on state-listed reptile species.
Timber rattlesnake *Crotalus horridus*	F-SOC OH-E	Mountainous or hilly coniferous, deciduous, and mixed forests often with rock outcrops, talus, and scree; river bottoms and floodplains, including scrub-shrub and forested wetlands; and agricultural fields (USFWS, 2015a).	
Amphibians			
Eastern hellbender *Cryptobranchus alleganiensis alleganiensis*	F-SOC OH-E KY-E	Confined to running waters of fairly large streams and rivers, especially in stretches with large flat stones (KSNPC, 2014).	Impacts on state-listed amphibian species could occur as a result of temporary and permanent impacts on wetland and waterbody habitats associated with construction and operation of Project infrastructure. Impacts could include temporary habitat disturbance and alteration associated with construction activities and permanent habitat loss associated with construction of new facilities.
Eastern spadefoot *Scaphiopus holbrookii*	OH-E	This species is found in areas of sandy soils that are associated with river valleys. Breeding habitats may include flooded agricultural fields or other water-holding depressions (ODNR, 2015e).	Impacts on state-listed amphibians with potential to be present in the Project area would be avoided and minimized through minimization of in-water work in perennial streams and through implementation of our Plan and Procedures to reduce the potential that waterbodies would be
Four-toed salamander *Hemidactylium scutatum*	TN-D	Woodland swamps, shallow depressions, and sphagnum mats on acidic soils; middle and east Tennessee (TDEC, 2015).	

Table E-2

State-listed Species Potentially Occurring in the Project Area

Species	Status	Habitat Comments	Impacts and Mitigation
Mole salamander *Ambystoma talpoideum*	AR-S3	Usually occurs near breeding ponds in pine flatwoods, floodplains, and bottomland hardwood forests (NatureServe, 2015).	affected as a result of stormwater runoff, as committed to by TGP. Based on minimal potential loss of habitat and with consideration for measures committed to by TGP, we conclude that the Project would not have significant adverse impacts on state-listed amphibian species.
Northern leopard frog *Rana pipiens*	KY-S	Breeds in natural and human-made ponds. Otherwise uses moist grassland, meadows, and margins (KSNPC, 2014).	
Mussels			
Butterfly mussel *Ellipsaria lineolata*	OH-E	Inhabits freshwater high-gradient large rivers and moderate-gradient medium-sized rivers (NatureServe, 2015).	Impacts on state-listed mussel species could occur as a result of temporary and permanent impacts on perennial, intermittent, and ephemeral streams associated with construction and operation of Project infrastructure. Impacts on state-listed mussels with potential to be present within the Project area would be avoided and minimized through minimization of in-water work in perennial streams and through implementation of our Plan and Procedures to reduce the potential that waterbodies would be affected as a result of stormwater runoff as committed to by TGP. Based on minimal potential loss of habitat and with consideration for measures committed to by TGP, we conclude that the Project would not have significant adverse impacts on state-listed mussel species. See section 2.4.1 for additional discussion of potential impacts and mitigation for impacts on federally listed species.
Clubshell *Pleurobema clava*	F-E OH-E KY-E	Clean, loose sand and gravel in small to medium rivers. Requires stable, undisturbed habitat (KSNPC, 2014).	
Cracking pearlymussel *Hemistena lata*	F-E TN-E	Sand, gravel, and cobble substrates in swift currents or in mud and sand in slower currents (NatureServe, 2015).	
Creek heelsplitter *Lasmigona compressa*	KY-E	Generally occurs in creeks, small streams, and headwaters of larger rivers in sand, fine gravel, or mud bottoms, usually in swift water below riffles (KSNPC, 2014).	
Deertoe *Truncilla truncata*	MS-S3	Habitat generalist but usually occurs in fine gravel mixed with sand and mud in medium-sized rivers. May become numerous in large rivers (NatureServe, 2015).	
Elktoe *Alasmidonta marginata*	KY-T	Occurs in large to medium size streams but more typical of smaller streams (TDEC, 2015).	
Fanshell *Cyprogenia stegaria*	F-E KY-E	Sand or gravel in deep water of moderate current. Requires stable, undisturbed habitat (KSNPC, 2014).	
Fat pocketbook *Potamilus capax*	F-E MS-E	In slow-flowing water in large rivers in mud, sand, and fine gravel substrates (NatureServe, 2015).	
Kentucky creekshell *Villosa ortmanni*	KY-T	Free-flowing, upland rivers that range in size from small (1st order) spring fed streams to the Green River (KSNPC, 2014).	
Little spectaclecase *Villosa lienosa*	KY-S	Inhabits small to medium-sized rivers, usually in shallow water on a sand/mud/detritus bottom (KSNPC, 2014).	

Table E-2

State-listed Species Potentially Occurring in the Project Area

Species	Status	Habitat Comments	Impacts and Mitigation
Long-solid *Fusconaia maculata maculata*	OH-E	Medium to large rivers in gravel with a strong current often in sand and gravel (NatureServe, 2015).	
Louisiana fatmucket *Lampsilis hydiana*	MS-S2?	Found in low-gradient, medium sized rivers, streams, and reservoirs with mud or sand substrate (NatureServe, 2015).	
Monkeyface *Quadrula metanevra*	OH-E	Found in medium to large rivers in gravel or mixed sand substrates (NatureServe, 2015).	
Ohio pigtoe *Pleurobema cordatum*	OH-E	Inhabits medium- to large-sized rivers in various currents and can also be found in some lakes (NatureServe, 2015).	
Pink mucket *Lampsilis abrupta*	F-E OH-E	Mud and sand in shallow stream riffles. Requires stable, undisturbed habitat (USFWS, 1997e).	
Pocketbook *Lampsilis ovata*	KY-E	Considered a large river species, but occurs in medium-sized streams in gravel, sand, or mud (KSNPC, 2014).	
Pyramid pigtoe *Pleurobema rubrum*	OH-E KY-E MS-E	Inhabits medium to large rivers and usually occurs in sand or gravel bottoms in deep waters (KSNPC, 2014).	
Rabbitsfoot *Quadrula cylindrica cylindrica*	F-T KY-T TN-R	Large rivers in sand and gravel. In Tennessee, present in the Tennessee and Cumberland River systems (TDEC, 2015).	
Ring pink *Obovaria retusa*	F-E KY-E	Gravel and sandbars in medium to large rivers (NatureServe, 2015).	
Rock pocketbook *Arcidens confragosus*	MS-S2	Occurs in in standing or slow flowing water with mud and sand bottom pools in medium to large rivers (NatureServe, 2015).	
Rough pigtoe *Pleurobema plenum*	F-E KY-E	Sand or gravel in deep waters of medium to large rivers (USFWS, 2015a; NatureServe, 2015).	
Salamander mussel *Simpsonaias ambigua*	KY-T	Often found buried in substrate such as soft mud or gravel, or under flat stones in shallow water in small streams where the current may be swift (KSNPC, 2014).	
Sheepnose *Plethobasus cyphyus*	F-E OH-E KY-E	Gravel and cobbles in riffles in medium to large rivers. Also found in reservoirs (NatureServe, 2015).	

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State-listed Species Potentially Occurring in the Project Area

Species	Status	Habitat Comments	Impacts and Mitigation
Spike *Elliptio dilatata*	MS-E	Medium streams and large rivers primarily in shoal habitats and occasionally in the tailwaters of dams. Widespread throughout the Mississippi River Valley (NatureServe, 2016).	
Snuffbox *Epioblasma triquetra*	F-E OH-E KY-E	Swift current of small- to medium-sized creeks, large rivers, and in Lake Erie (USFWS, 2014c).	
Tapered pondhorn *Uniomerus declivis*	MS-S2	Occurs in shallow, slow-moving water including shallow sloughs and ditches with fine sand or mud substrate (NatureServe, 2015).	
Wartyback *Quadrula nodulata*	MS-S3	Pools of large to medium rivers, and prefers sand and mud substrate (NatureServe, 2015).	
White wartyback *Plethobasus cicatricosus*	F-E KY-X	Shoals and riffles in large rivers (NatureServe, 2015).	
Other Invertebrates			
Acuminate snaketail *Ophiogomphus acuminatus*	TN-R	Clear, mostly shaded streams with at least pockets of sandy gravel. In Tennessee, present in the western highland rim and western uplands (TDEC, 2015).	See discussion of potential impacts on state-listed fish and mussels, above.
American burying beetle *Nicrophorus americanus*	F-E OH-E	Upland grasslands or near fringe of grassland/forest areas (NatureServe, 2015).	See section 2.4.1 for discussion of potential impacts and mitigation.
Bottlebrush crayfish *Barbicambarus cornutus*	KY-S TN-R	Under slabrock in medium to large tributaries of Barren River watershed; Sumner, Macon, and Clay Counties, Tennessee (TDEC, 2015).	No impacts on river habitats in the Barren River watershed proposed.
Geniculate river snail *Lithasia geniculata fuliginosa*	TN-R	Medium-sized river form of *L. geniculate.* In Tennessee, occurs in portions of lower Cumberland and lower Tennessee River systems and the Duck and Buffalo Rivers (TDEC, 2015).	No impacts on river habitats in the lower Cumberland and lower Tennessee River systems proposed.
Hatchie burrowing crayfish *Fallicambarus hortoni*	TN-E	Primary burrower; uses saturated or seasonally saturated soils associated with permanent bodies of water. In Tennessee, occurs in Mississippi River tributaries (TDEC, 2015).	See discussion of potential impacts on state-listed fish and mussels, above.
Helmet rocksnail *Lithasia duttoniana*	TN-R	Rocky substrates in riffle systems; bedrock in flowing water below main section of riffles. In Tennessee, occurs in the Duck River (TDEC, 2015).	No impacts on river habitats in the Duck River watershed proposed.

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State-listed Species Potentially Occurring in the Project Area

Species	Status	Habitat Comments	Impacts and Mitigation
Mammoth Cave crayfish *Orconectes pellucidus*	KY-S	Subterranean waters (KSNPC, 2014).	No impacts on cave habitats are proposed.
Ohio shrimp *Macrobrachium ohione*	AR-S1?	Large rivers; probably associated with aquatic vegetation or organic debris (KSNPC, 2014).	No impacts on large river habitats proposed.
Plants			
Ashy sunflower *Helianthus mollis*	OH-T	Open land species typically found growing in well-drained soils and full sun (Thomassie et al., 2012).	Impacts on state-listed plant species could occur as a result of temporary and permanent impacts on upland forest, wetland forest, open land, open wetland, and vegetated developed habitats associated with construction and operation of Project infrastructure. Impacts could include temporary habitat disturbance and alteration associated with construction activities and permanent habitat loss associated with construction of new facilities. Based on minimal potential loss of habitat and with consideration for measures committed to by TGP, we conclude that the Project would have significant adverse impacts on state-listed plant species. See section 2.4.1 for additional discussion of potential impacts and mitigation for impacts on federally listed species. See section 2.3.1 for additional discussion of potential impacts on vegetation.
Bearded rattlesnake-root *Prenanthes barbata*	TN-S	Barrens and dry woodlands (TDEC, 2015).	
Blunt-leaved milkweed *Asclepias amplexicaulis*	OH-PT	Dry fields and open woods, usually in sandy soil (Connecticut Botanical Society, 2015).	
Bradley's spleenwort *Asplenium bradleyi*	OH-E	Crevices of sandstone cliffs and ledges where other vegetation is typically lacking (NatureServe, 2015).	
Butternut *Juglans cinerea*	TN-T	Rich woods and hollows (TDEC, 2015).	
Canada milkvetch *Astragalus canadensis*	OH-T	Moist prairies, open woodlands, roadsides, thickets, and streambanks (NRCS, 2006).	
Cypres-knee sedge *Carex decomposita*	LA-S3	Swamps, sinkhole ponds, often on floating logs; also often growing on cypress knees, cypress bases at or near water level (LDWF, 2015).	
Delta post oak *Quercus mississippiensis*	MS-S3	Not available.	
Drummond's aster *Symphyotrichum drummondii*	OH-T	Woodlands; thicket edges; open, rocky sites (Lady Bird Johnson Wildflower Center, 2015).	
Duck river bladderpod *Paysonia densipila*	TN-S	Cultivated fields (TDEC, 2015).	
Eggert's Sunflower *Helianthus eggertii*	TN-S	Barrens and roadsides (TDEC, 2015).	

Table E-2

State-listed Species Potentially Occurring in the Project Area

Species	Status	Habitat Comments	Impacts and Mitigation
False scurf-pea *Orbexilum pedunculatum*	OH-PT	Sandy wooded areas, east and southeast Texas. Well-drained soils (Lady Bird Johnson Wildflower Center, 2015).	
Flattened sedge *Carex complanata*	OH-E	Dry open woods, neutral to acidic soils (Flora of North America Editorial Committee, 2003).	
Grape honeysuckle *Lonicera prolifera*	TN-E	Sandy wooded slopes (TDEC, 2015).	
Hairy mountain-mint *Pycnanthemum verticillatum var. pilosum*	OH-T	Dry to moist woods, thickets, and clearings (ODNR, 1983a).	
Hairy umbrella sedge *Fuirena squarrosa*	TN-S	Stream and lake margins (TDEC, 2015).	
Howe's sedge *Carex atlantica ssp. capillacea*	OH-T	Moist areas in acidic substrates; sphagnum bogs, shrub borders, clearings in wet woods, thickets (ODNR, 1981).	
Lance-leaved violet *Viola lanceolata*	OH-PT	Mesic floodplain forests and bogs (Lady Bird Johnson Wildflower Center, 2015).	
Large marsh St. John's-wort *Triadenum tubulosum*	OH-T	Swamps, marshy shores, bogs, sometimes in floating mats of vegetation, or submersed of floating logs (NatureServe, 2015).	
Leathery grape fern *Botrychium multifidum*	OH-E	Savannahs, prairies, meadows, and fields (Lady Bird Johnson Wildflower Center, 2015).	
Necklace sedge *Carex projecta*	OH-T	Stream banks, moist depressions in mixed and deciduous forests, moist to wet grasslands, meadows, thickets, shores, ditches (Flora of North America Editorial Committee, 2003).	
Northern bush-honeysuckle *Diervilla lonicera*	TN-T	Rocky woodlands and bluffs (TDEC, 2015).	
Pin oak *Quercus palustris*	MS-S2?	Wet woods and bottomlands (Lady Bird Johnson Wildflower Center, 2015).	
Pink sundew *Drosera capillaris*	TN-T	Acidic swamps (TDEC, 2015).	

Table E-2

State-listed Species Potentially Occurring in the Project Area

Species	Status	Habitat Comments	Impacts and Mitigation
Potato-dandelion *Krigia dandelion*	OH-T	Eastern deciduous forest biome and tallgrass prairies (Flora of North America Editorial Committee, 2006).	
Prairie parsley *Polytaenia nuttallii*	TN-T	Prairies and open dry areas (TDEC, 2015).	
Price's potato-bean *Apios priceana*	F-T TN-E	Openings in rich woods (TNHIP, 2014).	
Pubescent Sedge *Carex hirtifolia*	TN-S	Lowland forests (TDEC, 2015).	
Pumpkin ash *Fraxinus profunda*	MS-S3	Low woods, floodplains, swamps, and bottomlands (NatureServe, 2015).	
Richardson's pondweed *Potamogeton richardsonii*	OH-T	Inhabits the Great Lakes and connecting waterways, inland lakes, rivers, and creeks; in waters up to 5 meters; frequently in brackish or alkaline waters (NatureServe, 2015).	
Ridge-stem false-foxglove *Agalinis oligophylla*	TN-E	Barrens (TDEC, 2015).	
Riverbank paspalum *Paspalum repens*	OH-T	Shallow water or wet muddy soils; margins of temporary pools, riverbanks, and riverine woodlands (ODNR, 1998b).	
Rock skullcap *Scutellaria saxatilis*	OH-T	Woods, hillsides, and moist cliffs without large canopy gaps and free from burning, grazing, or human disturbance hazards (Pennsylvania Natural Heritage Program, 2007).	
Rock-harlequin *Corydalis sempervirens*	OH-T	Well-drained openings and clearings; often on sandstone exposures; usually found on slightly acidic substrates (ODNR, 1984a).	
Round-fruited hedge-hyssop *Gratiola virginiana*	OH-T	Woodland streams, seepage areas in woodlands and swamps, vernal pools, alluvial outwash areas, and in wet ditches (Godfrey and Wooten, 1981).	
Short's hedge hyssop *Gratiola viscidula*	OH-T	Steam margins, ditches, ponds, and swamps, in both sun and semi-shade (ODNR, 1994a).	
Southern woodrush *Luzula bulbosa*	OH-T	Dry, open to semi-open situations, often in sandy, acid soil: open oak woods, clearings, and fields (ODNR, 1984b).	

Table E-2

State-listed Species Potentially Occurring in the Project Area

Species	Status	Habitat Comments	Impacts and Mitigation
Spanish oak *Quercus falcata*	OH-T	Dry upland woods, less frequently in alluvial woods (ODNR, 1994b).	
Spotted pondweed *Potamogeton pulcher*	OH-T	Peaty or muddy, acid waters or shores (ODNR, 1983b).	
Spotted wintergreen *Chimaphila maculate*	MS-S2	Grows in leaf and needle mulch in moist forests; occasionally seen on roadsides and forest edges (NatureServe, 2015).	
Sweetbay magnolia *Magnolia virginiana*	TN-T	Forested acidic wetlands (TDEC, 2015).	
Sweetscented Indian-plantain *Hasteola suaveolens*	TN-S	Alluvial woods and moist slopes (TDEC, 2015).	
Tennessee milkvetch *Astragalus tennesseensis*	TN-S	Glades (TDEC, 2015).	
Tennessee pondweed *Potamogeton tennesseensis*	OH-PT	Still or flowing water (ODNR, 1983c).	
Twisted spike-rush *Eleocharis tortilis*	TN-S	Swamps (TDEC, 2015).	
Virginia meadow-beauty *Rhexia virginica*	OH-PT	Open meadows and fields; often in moist sandy soil, less often in moist peaty soils (ODNR, 1998c).	
Walter's St. John's-wort *Triadenum walteri*	OH-T	Swamp woods, buttonbush swamps, thickets, and streambanks (ODNR, 1994c).	
Willdenow's croton *Croton willdenowii*	OH-T	Dry, sandy soil, railroad embankments (Tennessee Flora Committee, 2015).	

Table E-2

State-listed Species Potentially Occurring in the Project Area

Species	Status	Habitat Comments	Impacts and Mitigation

F = Federal; OH = Ohio; KY = Kentucky; TN = Tennessee; MS = Mississippi; AR = Arkansas; LA = Louisiana.

E = Endangered. Any species or subspecies whose prospects of survival or recruitment within the state are in jeopardy or are likely to become so within the foreseeable future).

T = Threatened. Any species or subspecies that is likely to become an endangered species within the foreseeable future).

C = Candidate.

SOC = Species of Concern

D = Deemed in Need of Management. Any species or subspecies of nongame wildlife which the executive director of the TWRA believes should be investigated in order to develop information relating to populations, distribution, habitat needs, limiting factors, and other biological and ecological data to determine management measures necessary for their continued ability to sustain themselves successfully. This category is analogous to "Special Concern."

S = Species of Special Concern.

R = Rare.

X = Extirpated. A species or subspecies that occurred in the state at the time of European settlement and that has since disappeared from the state.

PT = Proposed Threatened.

S1 = Extremely rare. Typically 5 or fewer estimated occurrences in the state, or only a few remaining individuals, may be especially vulnerable to extirpation.

S2 = Very rare. Typically between 5 and 20 estimated occurrences or with many individuals in fewer occurrences, often susceptible to becoming extirpated.

S3 = Rare to uncommon. Typically between 20 and 100 estimated occurrences, may have fewer occurrences but with large number of individuals in some populations, may be susceptible to large-scale disturbances.

S4 = Common, apparently secure under present conditions. Typically 100 or more estimated occurrences, but may be fewer with many large populations, may be restricted to only a portion of the state, usually not susceptible to immediate threats.

B = Refers to the breeding population of a species in the state.

N = Refers to the non-breeding population of a species in the state.

? = A question mark is used to denote an inexact numeric rank.

Sources: ANHC (2015b), KSNPC (2014), LDWF (2015), MMNS (2014a), ODNR (2015c), TDEC (2015)

Appendix F

Land Uses Affected by the Project

Appendix F

Land Uses Affected by the Project (acres) [a]

State, County	Forest/ Woodland Const	Forest/ Woodland Oper	Agricultural Const	Agricultural Oper	Open Land Const	Open Land Oper	Residential Const	Residential Oper	Industrial/ Commercial Const	Industrial/ Commercial Oper	Other [b] Const	Other [b] Oper	Total Const	Total Oper
Compressor Stations														
Ohio														
CS 202.5	7.2	7.0	9.0	6.2	7.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0	23.5	14.5
CS 206.5	4.6	3.9	21.5	4.3	3.5	1.4	0.0	0.0	0.0	0.0	0.1	0.1	29.7	9.7
CS 211.5	0.3	0.2	19.6	12.7	0.2	0.2	0.0	0.0	1.1	0.8	0.0	0.0	21.2	14.1
CS 216.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.0	13.3	0.0	0.0	22.0	13.3
Ohio Subtotal	12.1	11.1	50.1	23.2	11.0	2.9	0.0	0.0	23.1	14.1	0.1	0.1	96.4	51.6
Kentucky														
CS 875	0.0	0.0	23.6	0.0	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.6	0.0
CS 110	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	2.7	0.0	0.0	3.5	2.7
Kentucky Subtotal	0.0	0.0	23.6	0.0	<0.1	0.0	0.0	0.0	3.5	2.7	0.0	0.0	27.1	2.7
Compressor Stations Subtotal	12.1	11.1	73.7	23.2	11.0	2.9	0.0	0.0	26.6	16.8	0.1	0.1	123.5	54.3
New-build Pipeline														
Kentucky														
Carter County	46.2	17.6	9.7	3.5	29.7	10.4	1.4	0.6	0.4	0.2	0.8	0.3	88.2	32.5
Lewis County	33.5	13.3	0.0	0.0	2.5	0.6	0.0	0.0	0.3	0.1	0.0	0.0	36.2	14.1
New-build Pipeline Total	79.7	30.9	9.7	3.5	32.2	11.0	1.4	0.6	0.7	0.3	0.8	0.3	124.4	46.6
Replacement Pipelines														
Kentucky (MLV 874)														
Madison County	0.0	0.0	4.6	0.0	7.3	0.0	0.1	0.0	2.8	0.0	0.0	0.0	14.8	0.0
Kentucky Subtotal														
Mississippi (MLV 53)														
Washington County	0.0	0.0	2.5	0.0	6.2	0.0	<0.1	0.0	<0.1	0.0	0.4	0.0	9.2	0.0
Mississippi Subtotal														
Replacement Pipeline Total	0.0	0.0	7.1	0.0	13.5	0.0	0.1	0.0	2.9	0.0	0.4	0.0	24.0	0.0
Off-right-of-way Tap Reconnects														
Ohio														

Appendix F

Land Uses Affected by the Project (acres) [a]

State, County	Forest/ Woodland Const	Forest/ Woodland Oper	Agricultural Const	Agricultural Oper	Open Land Const	Open Land Oper	Residential Const	Residential Oper	Industrial/ Commercial Const	Industrial/ Commercial Oper	Other [b] Const	Other [b] Oper	Total Const	Total Oper
Morgan County	3.6	0.8	1.1	0.5	1.2	0.8	0.0	0.0	3.7	3.2	0.5	0.4	10.1	5.7
Tuscarawas County	0.0	0.0	0.2	0.0	0.9	0.4	0.0	0.0	1.2	1.2	0.0	0.0	2.3	1.6
Ohio Subtotal	3.6	0.8	1.3	0.5	2.1	1.2	0.0	0.0	4.9	4.4	0.5	0.4	12.4	7.3
Kentucky														
Madison County	0.0	0.0	0.0	0.0	1.2	0.0	0.1	0.0	4.6	4.2	0.0	0.0	5.9	4.2
Rowan County	3.1	1.9	1.9	1.0	8.3	5.4	0.2	0.2	4.0	2.3	0.1	0.0	17.6	10.9
Kentucky Subtotal	3.1	1.9	1.9	1.0	9.5	5.4	0.3	0.2	8.6	6.5	0.1	0.0	23.5	15.1
Tennessee														
Perry County	1.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.9	0.0	0.0	2.0	1.5
Hickman County	2.4	1.2	0.0	0.0	0.9	0.6	0.0	0.0	0.9	0.9	0.0	0.0	4.2	2.7
Tennessee Subtotal	3.4	1.8	0.0	0.0	0.9	0.6	0.0	0.0	1.9	1.8	0.0	0.0	6.2	4.2
Mississippi														
Sunflower County	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	3.7	3.7	0.0	0.0	5.1	3.7
Tallahatchie County	0.0	0.0	0.5	0.2	0.1	0.0	0.0	0.0	3.0	2.3	0.0	0.0	3.6	2.5
Quitman County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	4.0	0.0	0.0	5.6	4.0
Panola County	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.0	1.2	1.2	0.0	0.0	1.6	1.2
Benton County	6.6	2.7	0.0	0.0	0.0	0.0	0.0	0.0	5.0	4.6	0.0	0.0	11.6	7.3
Mississippi Subtotal	6.7	2.7	1.9	0.2	0.4	0.0	0.0	0.0	18.5	15.8	0.0	0.0	27.5	18.7
Off-right-of-way Tap Reconnect Total	16.8	7.2	5.1	1.7	12.9	7.2	0.3	0.2	33.9	28.5	0.6	0.4	69.6	45.3
Access Roads														
Ohio														
Jackson County	1.1	1.1	0.9	0.9	1.2	0.8	0.0	0.0	0.0	0.0	0.0	0.0	3.2	2.8
Morgan County	0.1	0.1	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1
Tuscarawas County	0.2	0.2	2.9	1.8	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	3.3	2.0
Mahoning County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	2.2	0.0	0.0	2.2	2.2
Ohio Subtotal	1.4	1.4	4.8	3.7	1.2	0.8	0.0	0.0	2.4	2.2	0.0	0.0	9.8	8.1
Kentucky														
Rowan County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.6	0.0
Carter County	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	9.2	0.0	0.0	0.0	9.5	0.0

Appendix F

Land Uses Affected by the Project (acres) [a]

State, County	Forest/ Woodland Const	Forest/ Woodland Oper	Agricultural Const	Agricultural Oper	Open Land Const	Open Land Oper	Residential Const	Residential Oper	Industrial/ Commercial Const	Industrial/ Commercial Oper	Other [b] Const	Other [b] Oper	Total Const	Total Oper
Lewis County	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
Kentucky Subtotal	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	9.8	0.0	0.0	0.0	10.1	0.0
Access Road Total	1.4	1.4	4.8	3.7	1.4	0.8	0.1	0.0	12.2	2.2	0.0	0.0	19.9	8.1
Pipe and Contractor Yards														
Ohio														
Athens County	0.1	0.0	4.4	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	7.0	0.0
Guernsey County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.7	0.0
Carroll County	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0
Ohio Subtotal	0.1	0.0	6.3	0.0	0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.0	9.6	0.0
Kentucky														
Powell County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	1.9	0.0
Rowan County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0	0.0	4.5	0.0
Carter County	0.0	0.0	0.0	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0
Greenup County	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
Kentucky Subtotal	0.0	0.0	0.0	0.0	7.7	0.0	0.0	0.0	6.4	0.0	0.0	0.0	14.1	0.0
Tennessee														
Hardeman County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1	0.0	0.0	0.0	5.1	0.0
Perry County	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0
Sumner County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	2.3	0.0
Tennessee Subtotal	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	7.4	0.0	0.0	0.0	12.4	0.0
Mississippi														
Washington County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.8	0.0
Panola County	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0
Mississippi Subtotal	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.8	0.0	0.0	0.0	3.3	0.0
Louisiana														
Natchitoches Parish	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	2.6	0.0	0.0	0.0	3.9	0.0
Ouachita Parish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.0	3.2	0.0
Louisiana Subtotal	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	5.8	0.0	0.0	0.0	7.1	0.0
Pipe and Contractor Yards Total	0.1	0.0	6.3	0.0	16.5	0.0	0.0	0.0	23.6	0.0	0.0	0.0	46.5	0.0

Appendix F

Land Uses Affected by the Project (acres) [a]

State, County	Forest/ Woodland Const	Forest/ Woodland Oper	Agricultural Const	Agricultural Oper	Open Land Const	Open Land Oper	Residential Const	Residential Oper	Industrial/ Commercial Const	Industrial/ Commercial Oper	Other [b] Const	Other [b] Oper	Total Const	Total Oper
Other Facilities [c]														
Ohio														
Scioto County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	1.9	0.0	0.0	1.9	1.9
Jackson County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.9	0.0	0.0	0.9	0.9
Vinton County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.0	0.0	0.4	0.4
Athens County	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	1.3	1.1	0.0	0.0	1.5	1.1
Morgan County	0.2	0.0	0.4	0.0	0.1	0.0	0.0	0.0	3.3	3.3	0.0	0.0	4.0	3.3
Guernsey County	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.7	0.6	0.0	0.0	1.0	0.6
Tuscarawas County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	1.7	0.0	0.0	1.7	1.7
Carroll County	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	2.4	1.9	0.0	0.0	2.5	1.9
Columbiana County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	2.3	0.0	0.0	2.3	2.3
Mahoning County	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
Ohio Subtotal	0.3	0.0	0.5	0.0	0.5	0.0	0.0	0.0	14.9	14.1	0.0	0.0	16.2	14.1
Kentucky														
Simpson County	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0	1.3	1.0
Allen County	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	1.7	1.7	0.0	0.0	1.8	1.7
Barren County	0.0	0.0	0.5	0.0	0.1	0.0	0.0	0.0	1.6	1.5	0.0	0.0	2.2	1.5
Hart County	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.4	0.4	0.0	0.0	0.7	0.4
Green County	0.1	0.0	0.5	0.0	0.0	0.0	0.0	0.0	3.4	3.4	0.0	0.0	4.0	3.4
Taylor County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Marion County	0.0	0.0	0.1	0.0	0.6	0.0	0.0	0.0	3.3	3.3	0.0	0.0	4.0	3.3
Boyle County	0.0	0.0	0.0	0.0	1.1	0.1	0.0	0.0	6.2	6.2	0.0	0.0	7.3	6.3
Garrard County	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.8	0.5
Madison County	0.0	0.0	1.0	0.0	0.2	0.0	0.0	0.0	1.4	1.4	0.0	0.0	2.6	1.4
Powell County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Montgomery County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	1.8	0.0	0.0	1.8	1.8
Bath County	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.0	0.0	0.8	0.7
Rowan County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	1.2	0.0	0.0	1.4	1.2
Carter County	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.4	0.0	0.0	0.4	0.4
Lewis County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.0	0.0	0.6	0.6

Appendix F

Land Uses Affected by the Project (acres) [a]

State, County	Forest/ Woodland Const	Forest/ Woodland Oper	Agricultural Const	Agricultural Oper	Open Land Const	Open Land Oper	Residential Const	Residential Oper	Industrial/ Commercial Const	Industrial/ Commercial Oper	Other [b] Const	Other [b] Oper	Total Const	Total Oper
Greenup County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	2.0	0.1	0.1	2.3	2.1
Kentucky Subtotal	0.1	0.0	3.0	0.0	2.2	0.1	0.1	0.0	26.8	26.1	0.1	0.1	32.2	26.3
Tennessee														
Hardeman County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
McNairy County	0.6	0.0	0.9	0.0	1.3	0.0	0.0	0.0	7.0	6.3	0.0	0.0	9.8	6.3
Chester County	0.0	0.0	1.2	0.8	0.1	0.1	0.0	0.0	0.2	0.1	0.0	0.0	1.5	1.0
Henderson County	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.7	0.5
Decatur County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.0	0.0	0.6	0.6
Perry County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	3.3	0.0	0.0	3.4	3.3
Hickman County	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.9	0.9	0.0	0.0	1.1	0.9
Dickson County	0.2	0.0	0.0	0.0	0.9	0.0	0.0	0.0	4.4	4.1	0.0	0.0	5.5	4.1
Cheatham County	0.5	0.0	0.0	0.0	0.3	0.0	0.0	0.0	1.7	1.7	0.0	0.0	2.5	1.7
Robertson County	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	3.6	3.5	0.0	0.0	3.8	3.5
Sumner County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Tennessee Subtotal	1.3	0.0	2.1	0.8	3.2	0.1	0.0	0.0	22.5	21.0	0.0	0.0	29.1	21.9
Mississippi														
Washington County	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	3.1	3.0	0.0	0.0	3.2	3.0
Bolivar County	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.6	0.6	0.0	0.0	0.8	0.7
Sunflower County	0.0	0.0	0.4	0.0	0.4	0.0	0.0	0.0	4.0	3.4	0.0	0.0	4.8	3.4
Tallahatchie County	0.0	0.0	0.3	0.0	0.1	0.0	0.0	0.0	1.5	1.5	0.0	0.0	1.9	1.6
Quitman County	0.0	0.0	0.8	0.0	0.1	0.0	0.0	0.0	1.8	1.8	0.1	0.1	2.8	1.9
Panola County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	2.6	0.0	0.0	2.7	2.6
Lafayette County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	3.4	0.0	0.0	3.5	3.4
Marshall County	0.0	0.0	0.5	0.0	0.1	0.0	0.0	0.0	1.4	1.3	0.0	0.0	2.0	1.3
Benton County	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	2.5	2.3	0.0	0.0	2.8	2.3
Mississippi Subtotal	0.1	0.0	2.2	0.0	1.0	0.0	0.0	0.0	21.1	19.9	0.1	0.1	24.5	20.2
Arkansas														
Ashley County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.7	0.0	0.0	0.8	0.7
Chicot County	0.0	0.0	0.3	0.0	0.1	0.0	0.0	0.0	1.4	1.4	0.2	0.1	2.0	1.5
Arkansas Subtotal	0.0	0.0	0.3	0.0	0.1	0.0	0.0	0.0	2.2	2.1	0.2	0.1	2.8	2.2

Appendix F

Land Uses Affected by the Project (acres) [a]

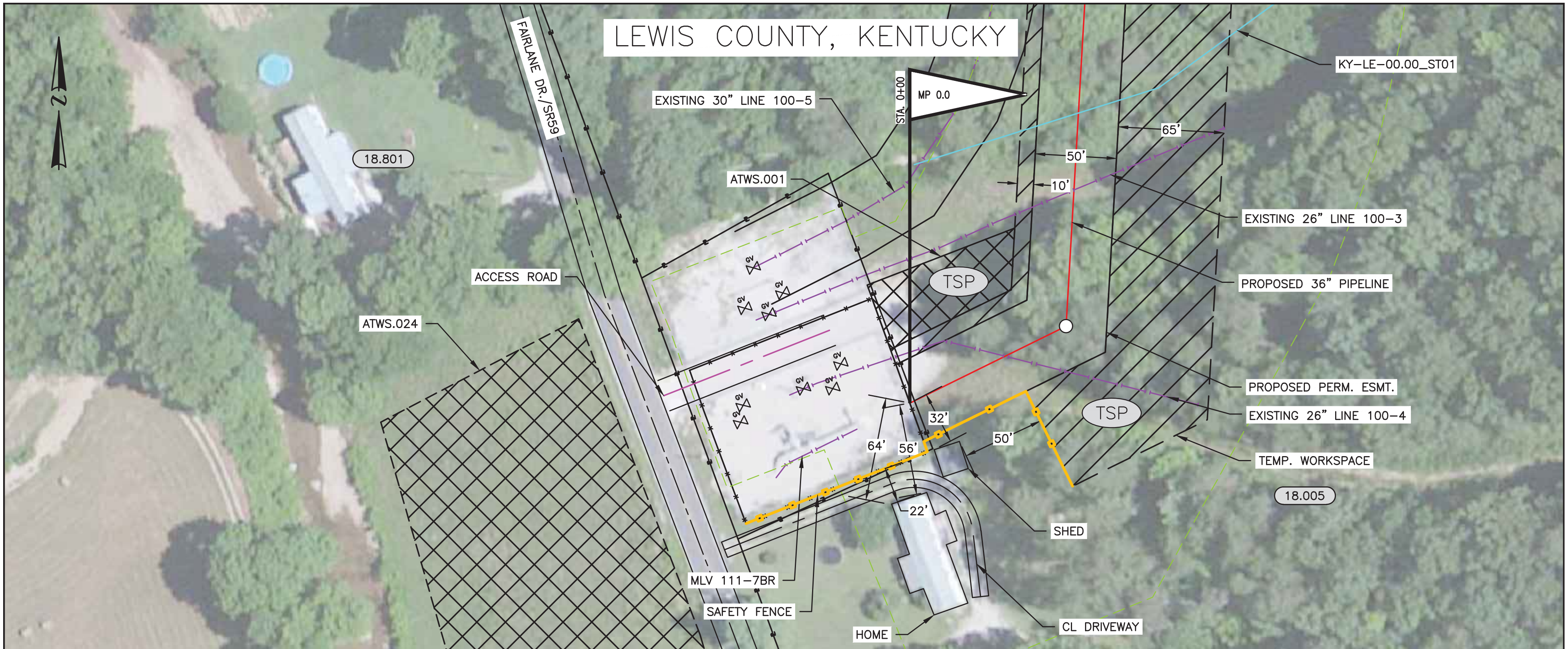
State, County	Forest/ Woodland Const	Forest/ Woodland Oper	Agricultural Const	Agricultural Oper	Open Land Const	Open Land Oper	Residential Const	Residential Oper	Industrial/ Commercial Const	Industrial/ Commercial Oper	Other [b] Const	Other [b] Oper	Total Const	Total Oper
Louisiana														
Natchitoches Parish	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	4.2	3.8	0.0	0.0	4.4	3.8
Winn Parish	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	3.6	3.5	0.0	0.0	3.7	3.6
Jackson Parish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	2.6	0.0	0.0	2.6	2.6
Ouachita Parish	0.0	0.0	0.1	0.0	0.3	0.0	0.1	0.0	4.6	4.3	0.0	0.0	5.1	4.3
Morehouse Parish	0.0	0.0	0.6	0.0	0.4	0.0	0.0	0.0	3.6	3.3	0.0	0.0	4.6	3.3
Louisiana Subtotal	0.0	0.0	0.7	0.0	1.0	0.0	0.1	0.0	18.6	17.5	0.0	0.0	20.4	17.6
Other Facilities Total	**1.8**	**0.0**	**8.8**	**0.8**	**8.0**	**0.2**	**0.2**	**0.0**	**106.1**	**100.7**	**0.4**	**0.3**	**125.2**	**102.3**
Project Total	**111.9**	**50.6**	**115.5**	**33.0**	**95.2**	**22.2**	**2.1**	**0.8**	**206.0**	**148.5**	**2.3**	**1.1**	**533.1**	**256.6**

Const = Construction
Oper = Operation
a The totals shown in this table may not equal the sum of addends due to rounding.
b Land use category “other” includes waterbodies that would be affected by the Project.
c Other facilities include tap removal/reconnects, gas disconnects, crossover removals, and launcher/receiver disconnects.

Appendix G

Site-specific Residential Construction Plans and Compressor Station NSA Maps

Site-specific Residential Construction Plans



LEGEND

EXISTING PERMANENT EASMENT	EXISTING LINE
PROPOSED PERMANENT EASMENT	PROPOSED 36" PIPELINE
TEMPORARY WORKSPACE	SAFETY FENCE
ADDITIONAL TEMPORARY WORKSPACE (ATWS)	WATERBODY
ACCESS ROAD	WETLAND
HIGHWAY	ENVIRONMENTALLY SENSITIVE AREA
	ENVIRONMENTAL SURVEY EXTENTS
	PROPERTY LINE
	FENCE
	TSP TEMPORARY SPOIL PILE

GRAPHIC SCALE

60' 30' 0 60'

PLAN VIEW

SCALE: 1" = 60'

NOTES:

1. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE LIMIT OF DISTURBANCE (L.O.D.) FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF THE RESIDENCE OR BUSINESS ESTABLISHMENT.
2. STRUCTURES WITHIN L.O.D. WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
3. STRUCTURES ARE BASED ON DIGITIZED PUBLICLY AVAILABLE IMAGERY. THE PROJECT WAS FLOWN IN EARLY 2015 AND STRUCTURES WILL BE UPDATED PRIOR TO IMPLEMENTATION PLAN.
4. STRUCTURE TYPES ARE BEING CONFIRMED PRIOR TO IMPLEMENTATION PLAN.

CONSTRUCTION TECHNIQUES

ONE OF THE FOLLOWING TECHNIQUES SHALL BE UTILIZED FOR A RESIDENCE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE FOR A LONGITUDINAL DISTANCE OF 100 FEET EITHER SIDE OF THE RESIDENCE OR COMMERCIAL STRUCTURE:

1. THE SEWER LINE TECHNIQUE WILL BE USED WHEN THE PIPELINE IS TO BE INSTALLED IN VERY CLOSE PROXIMITY TO AN EXISTING STRUCTURE OR WHEN AN OPEN DITCH WOULD ADVERSELY IMPACT A COMMERCIAL/RESIDENTIAL ESTABLISHMENT. THE TECHNIQUE INVOLVES INSTALLING PIPE ONE JOINT AT A TIME WHEREBY THE WELDING, X-RAY AND COATING ACTIVITIES ARE ALL PERFORMED IN THE OPEN TRENCH. AT THE END OF EACH DAY THE NEWLY INSTALLED PIPE IS BACKFILLED OR THE OPEN TRENCH IS COVERED WITH STEEL PLATES OR TIMBER MATS.
2. THE DRAG SECTION CONSTRUCTION TECHNIQUE, WHILE LESS EFFICIENT THAN MAINLINE METHODS, IS NORMALLY PREFERRED OVER THE SEWER LINE ALTERNATIVE. THIS TECHNIQUE INVOLVES THE TRENCHING, INSTALLATION AND BACKFILL OF A PREFABRICATED LENGTH OF PIPE CONTAINING SEVERAL SEGMENTS ALL IN ONE DAY. AT THE END OF EACH DAY THE NEWLY INSTALLED PIPE IS BACKFILLED AND/OR COVERED WITH STEEL PLATES OR TIMBER MATS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division: CENTRAL		Op. Area.: CATLETTSBURG	
State: KENTUCKY		Co./Par.: LEWIS	
Section: ----	Township: ----	Range: ----	
Dft: TTN	Date: 12/01/15	Scale: 1" = 60'	
Chk: JOI	Date: 12/15/15	Filename: TO-T6-100-7-231A1.DWG	
Appr:	Date:		

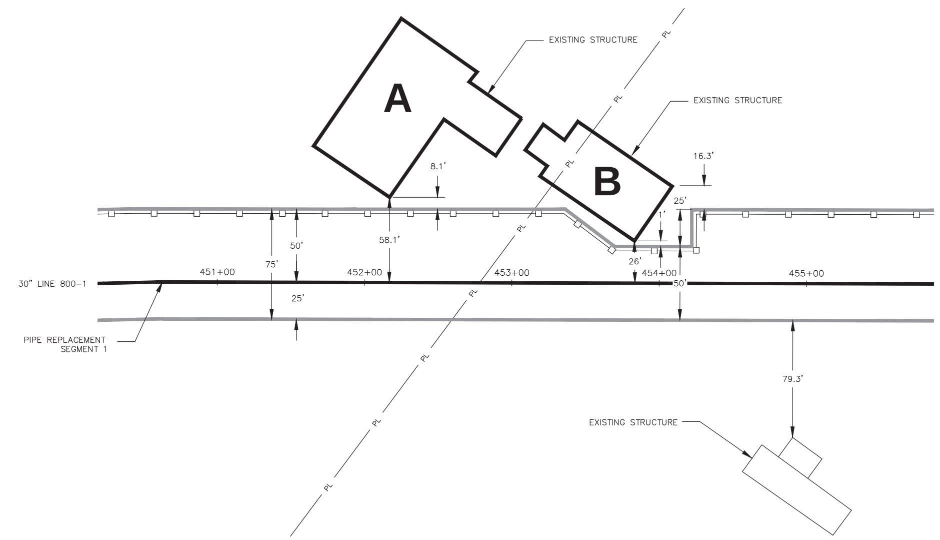
ABANDONMENT & CAPACITY RESTORATION PROJECT
TGP 100 SYSTEM LINE 100-7 – MLV 111-7
MP 0.0 – RESIDENTIAL DETAIL
LOCATION MAP

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

	Sheet	Rev.
TO-T6-100-7-231A1	Sheet: 1 of 1, Type: ACAD	0

G-2

MADISON COUNTY, KENTUCKY



SITE PLAN OF
SEGMENT 1 REPLACEMENT
SCALE: 1" = 40'

NOTES:

1. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION ROW FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF THE RESIDENTIAL OR BUSINESS ESTABLISHMENT.
2. RESIDENTIAL STRUCTURE IDENTIFICATION PER KINDER MORGAN O&M MANUAL, PROCEDURE OM 220.
3. STRUCTURES TYPES WILL BE CONFIRMED PRIOR TO CONSTRUCTION.

CONSTRUCTION TECHNIQUES

ONE OF THE FOLLOWING TECHNIQUES SHALL BE UTILIZED FOR A RESIDENCE WITHIN 50 FEET OF THE CONSTRUCTION ROW FOR A LONGITUDINAL DISTANCE OF 100 FEET EITHER SIDE OF THE RESIDENCE OR COMMERCIAL STRUCTURE:

1. THE STOVE PIPE TECHNIQUE WILL BE USED WHEN THE PIPELINE IS TO BE INSTALLED IN VERY CLOSE PROXIMITY TO AN EXISTING STRUCTURE OR WHEN AN OPEN DITCH WOULD ADVERSELY IMPACT A COMMERCIAL/RESIDENTIAL ESTABLISHMENT. THE TECHNIQUE INVOLVES INSTALLING PIPE ONE JOINT AT A TIME WHEREBY THE WELDING, X-RAY AND COATING ACTIVITIES ARE ALL PERFORMED IN THE OPEN TRENCH. AT THE END OF EACH DAY THE NEWLY INSTALLED PIPE IS BACKFILLED OR THE OPEN TRENCH IS COVERED WITH STEEL PLATES OR TIMBER MATS.
2. THE DRAG SECTION CONSTRUCTION TECHNIQUE, WHILE LESS EFFICIENT THAN MAINLINE METHODS, IS NORMALLY PREFERRED OVER THE SEWER LINE ALTERNATIVE. THIS TECHNIQUE INVOLVES THE TRENCHING, INSTALLATION AND BACKFILL OF A PREFABRICATED LENGTH OF PIPE CONTAINING SEVERAL SEGMENTS ALL IN ONE DAY. AT THE END OF EACH DAY THE NEWLY INSTALLED PIPE IS BACKFILLED AND/OR COVERED WITH STEEL PLATES OR TIMBER MATS.

LEGEND

SAFETY FENCE
EXISTING TGP PIPELINE
REPLACEMENT PIPE
CONSTRUCTION ROW
PROPERTY LINE
STRUCTURE WITHIN 50 FEET OF CONSTRUCTION ROW
PROPOSED ACCESS ROAD

DRAWING NO.	TITLE	DRAWING NO.	TITLE

REFERENCE DRAWINGS

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.
0	10-06-16	TTP	ISSUE FOR FERC	N/A	JL

REVISIONS

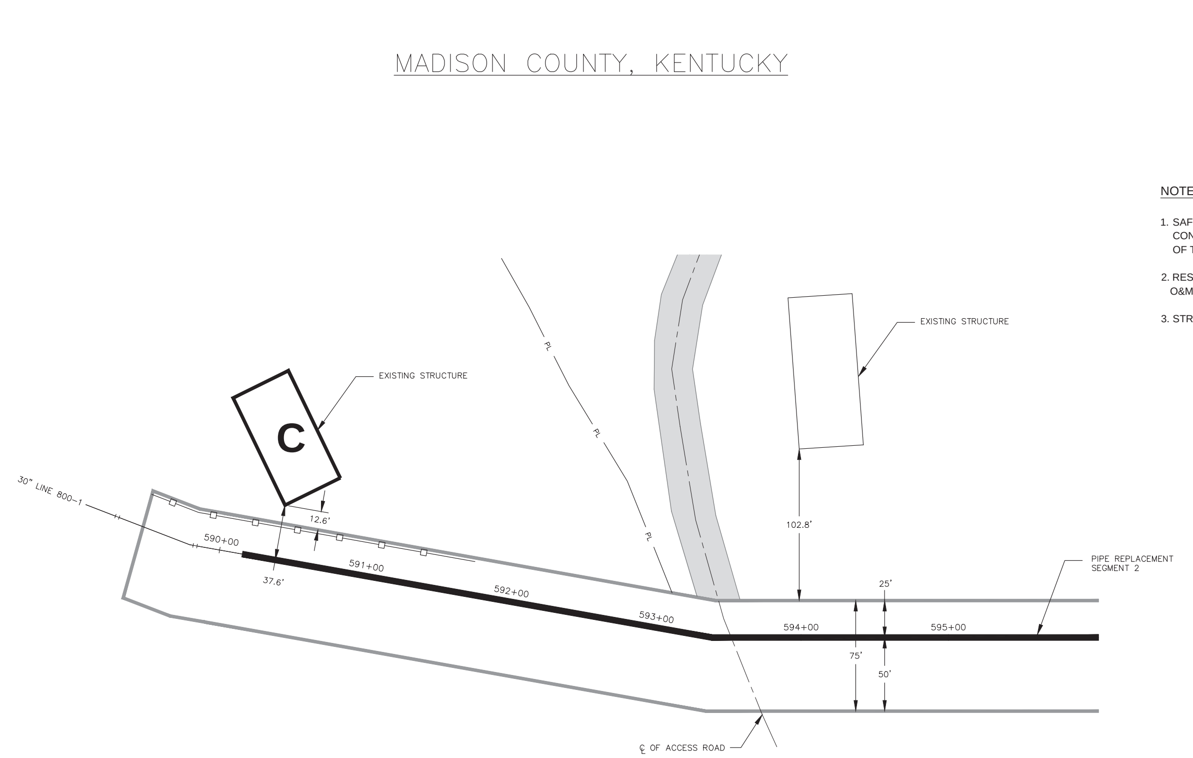
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

ACR PROJECT
30" TGP LINE 800-1
MLV. 874-1 SEGMENT 1 REPLACEMENT
RESIDENTIAL SITE SPECIFIC
MADISON COUNTY, KENTUCKY

Division: CENTRAL		Op. Area: CATLETTSBURG	
State: KENTUCKY		Co./Par.: MADISON	
Section: N/A	Township: N/A	Range: N/A	
Drafter: TTP	Date: 09-13-2016	Project ID: PENDING	Type: ACAD
Chk'd: JL	Date: 09-13-2016	Scale: AS SHOWN	
Appr: JL	Date: 09-13-2016	Filename: SP-SEG_1_RES_001.dwg	
SP-SEG_1_RES_001		Sheet: 1 of 1	Rev. 0

Oct 06, 2016 - 9:51AM

MADISON COUNTY, KENTUCKY



NOTES:

1. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION ROW FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF THE RESIDENTIAL OR BUSINESS ESTABLISHMENT.
2. RESIDENTIAL STRUCTURE IDENTIFICATION PER KINDER MORGAN O&M MANUAL, PROCEDURE OM 220.
3. STRUCTURES TYPES WILL BE CONFIRMED PRIOR TO CONSTRUCTION.

SITE PLAN OF SEGMENT 2 REPLACEMENT

SCALE: 1" = 40'

CONSTRUCTION TECHNIQUES

ONE OF THE FOLLOWING TECHNIQUES SHALL BE UTILIZED FOR A RESIDENCE WITHIN 50 FEET OF THE CONSTRUCTION ROW FOR A LONGITUDINAL DISTANCE OF 100 FEET EITHER SIDE OF THE RESIDENCE OR COMMERCIAL STRUCTURE:

1. THE STOVE PIPE TECHNIQUE WILL BE USED WHEN THE PIPELINE IS TO BE INSTALLED IN VERY CLOSE PROXIMITY TO AN EXISTING STRUCTURE OR WHEN AN OPEN DITCH WOULD ADVERSELY IMPACT A COMMERCIAL/RESIDENTIAL ESTABLISHMENT. THE TECHNIQUE INVOLVES INSTALLING PIPE ONE JOINT AT A TIME WHEREBY THE WELDING, X-RAY AND COATING ACTIVITIES ARE ALL PERFORMED IN THE OPEN TRENCH. AT THE END OF EACH DAY THE NEWLY INSTALLED PIPE IS BACKFILLED OR THE OPEN TRENCH IS COVERED WITH STEEL PLATES OR TIMBER MATS.
2. THE DRAG SECTION CONSTRUCTION TECHNIQUE, WHILE LESS EFFICIENT THAN MAINLINE METHODS, IS NORMALLY PREFERRED OVER THE SEWER LINE ALTERNATIVE. THIS TECHNIQUE INVOLVES THE TRENCHING, INSTALLATION AND BACKFILL OF A PREFABRICATED LENGTH OF PIPE CONTAINING SEVERAL SEGMENTS ALL IN ONE DAY. AT THE END OF EACH DAY THE NEWLY INSTALLED PIPE IS BACKFILLED AND/OR COVERED WITH STEEL PLATES OR TIMBER MATS.

LEGEND

- SAFETY FENCE
- EXISTING TGP PIPELINE
- REPLACEMENT PIPE
- CONSTRUCTION ROW
- PROPERTY LINE
- STRUCTURE WITHIN 50 FEET OF CONSTRUCTION ROW
- PROPOSED ACCESS ROAD

DRAWING NO.	TITLE	DRAWING NO.	TITLE

REFERENCE DRAWINGS

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.
0	10-06-16	TTP	ISSUE FOR FERC	N/A	JL

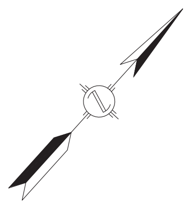
REVISIONS

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

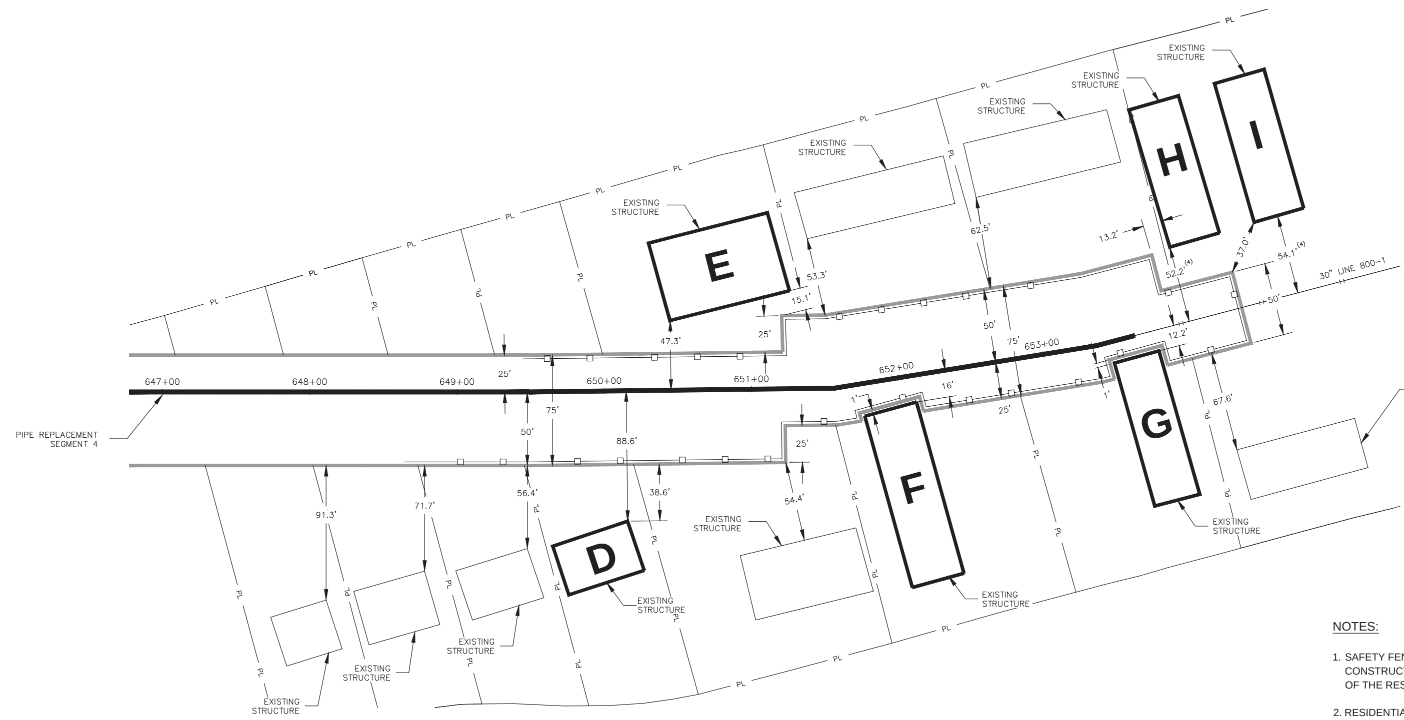
ACR PROJECT
30" TGP LINE 800-1
MLV. 874-1 SEGMENT 2 REPLACEMENT
RESIDENTIAL SITE SPECIFIC
MADISON COUNTY, KENTUCKY

Division: CENTRAL	Op. Area: CATLETTSBURG		
State: KENTUCKY	Co./Par.: MADISON		
Section: N/A	Township: N/A	Range: N/A	
Drafter: TTP	Date: 09-13-2016	Project ID: PENDING	Type: ACAD
Chk'd: JL	Date: 09-13-2016	Scale: AS SHOWN	
Appr: JL	Date: 09-13-2016	Filename: SP-SEG_2_RES_001.dwg	
SP-SEG_2_RES_001		Sheet: 1 of 1	Rev. 0

Oct 06, 2016 - 9:53AM



MADISON COUNTY, KENTUCKY



SITE PLAN OF
SEGMENT 4 REPLACEMENT
SCALE: 1" = 40'

NOTES:

1. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION ROW FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF THE RESIDENTIAL OR BUSINESS ESTABLISHMENT.
2. RESIDENTIAL STRUCTURE IDENTIFICATION PER KINDER MORGAN O&M MANUAL, PROCEDURE OM 220.
3. STRUCTURES TYPES WILL BE CONFIRMED PRIOR TO CONSTRUCTION.
4. DIMENSION REFLECTS LENGTH FROM EDGE OF EXISTING RESIDENTIAL STRUCTURE TO EXISTING 30" LINE 800-1 THAT IS BEYOND THE PROPOSED REPLACEMENT SEGMENT.

CONSTRUCTION TECHNIQUES

ONE OF THE FOLLOWING TECHNIQUES SHALL BE UTILIZED FOR A RESIDENCE WITHIN 50 FEET OF THE CONSTRUCTION ROW FOR A LONGITUDINAL DISTANCE OF 100 FEET EITHER SIDE OF THE RESIDENCE OR COMMERCIAL STRUCTURE:

1. THE STOVE PIPE TECHNIQUE WILL BE USED WHEN THE PIPELINE IS TO BE INSTALLED IN VERY CLOSE PROXIMITY TO AN EXISTING STRUCTURE OR WHEN AN OPEN DITCH WOULD ADVERSELY IMPACT A COMMERCIAL/RESIDENTIAL ESTABLISHMENT. THE TECHNIQUE INVOLVES INSTALLING PIPE ONE JOINT AT A TIME WHEREBY THE WELDING, X-RAY AND COATING ACTIVITIES ARE ALL PERFORMED IN THE OPEN TRENCH. AT THE END OF EACH DAY THE NEWLY INSTALLED PIPE IS BACKFILLED OR THE OPEN TRENCH IS COVERED WITH STEEL PLATES OR TIMBER MATS.
2. THE DRAG SECTION CONSTRUCTION TECHNIQUE, WHILE LESS EFFICIENT THAN MAINLINE METHODS, IS NORMALLY PREFERRED OVER THE SEWER LINE ALTERNATIVE. THIS TECHNIQUE INVOLVES THE TRENCHING, INSTALLATION AND BACKFILL OF A PREFABRICATED LENGTH OF PIPE CONTAINING SEVERAL SEGMENTS ALL IN ONE DAY. AT THE END OF EACH DAY THE NEWLY INSTALLED PIPE IS BACKFILLED AND/OR COVERED WITH STEEL PLATES OR TIMBER MATS.

LEGEND

- SAFETY FENCE
- EXISTING TGP PIPELINE
- REPLACEMENT PIPE
- CONSTRUCTION ROW
- PL — PROPERTY LINE
- STRUCTURE WITHIN 50 FEET OF CONSTRUCTION ROW
- PROPOSED ACCESS ROAD

DRAWING NO.	TITLE	DRAWING NO.	TITLE

REFERENCE DRAWINGS

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.
0	10-06-16	TTP	ISSUE FOR FERC	N/A	JL

REVISIONS

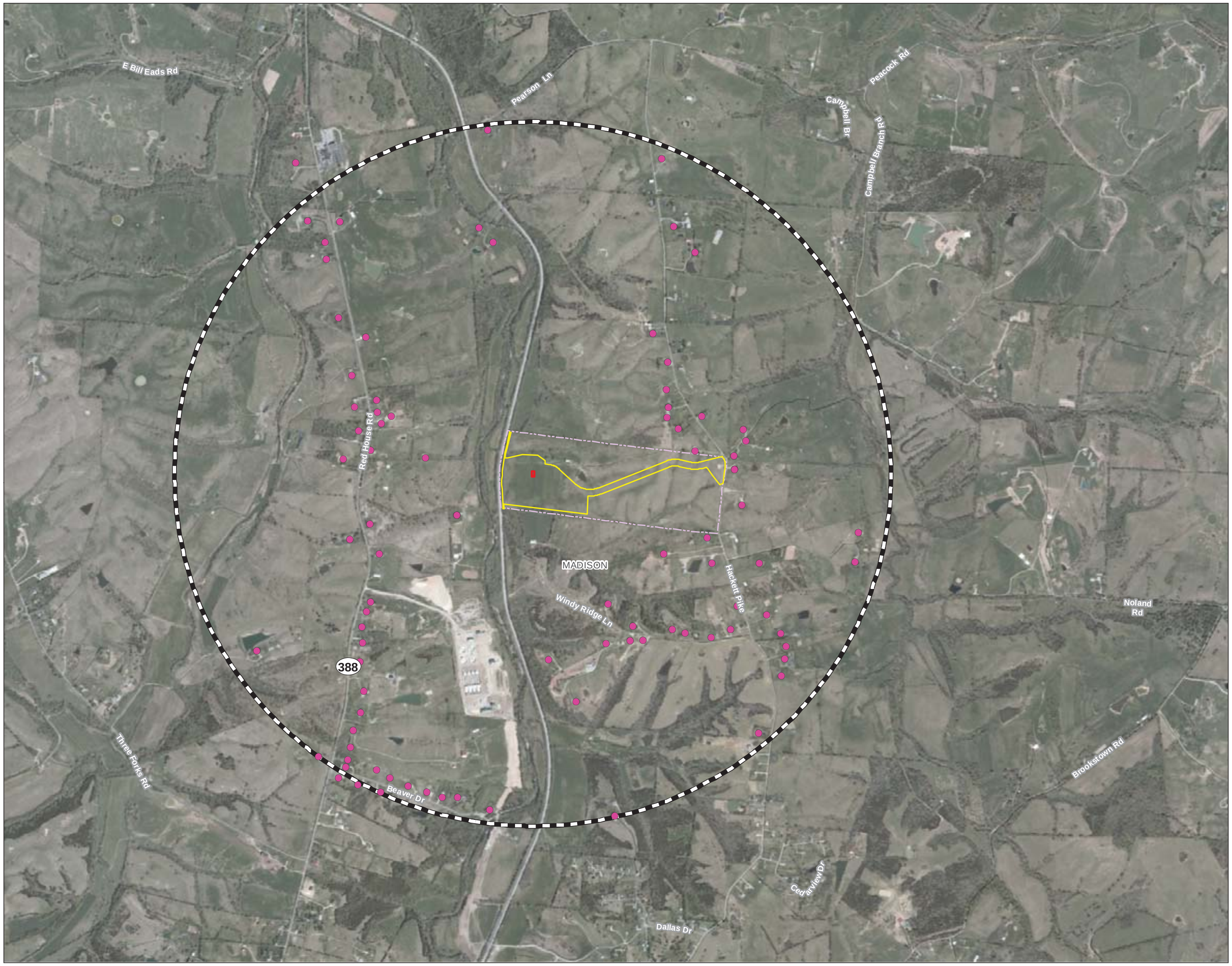
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

ACR PROJECT
30" TGP LINE 800-1
MLV. 874-1 SEGMENT 4 REPLACEMENT
RESIDENTIAL SITE SPECIFIC
MADISON COUNTY, KENTUCKY

Division: CENTRAL	Op. Area: CATLETTSBURG		
State: KENTUCKY	Co./Par.: MADISON		
Section: N/A	Township: N/A	Range: N/A	
Drafter: TTP	Date: 08-25-2016	Project ID: PENDING	Type: ACAD
Chk'd: JL	Date: 08-25-2016	Scale: AS SHOWN	
Appr: JL	Date: 08-25-2016	Filename: SP-SEG_4_RES_001.dwg	
SP-SEG_4_RES_001		Sheet: 1 of 1	Rev. 0

G-5

Compressor Station NSA Maps



Title

CS 875 Modified Compressor Station and NSAs

Client/Project

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

Project Location
Ohio, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana

Prepared by PM on 2015-01-12
Technical Review by CP on 2015-01-12
Independent Review by LW on 2015-01-19

0 1,200 2,400 Feet

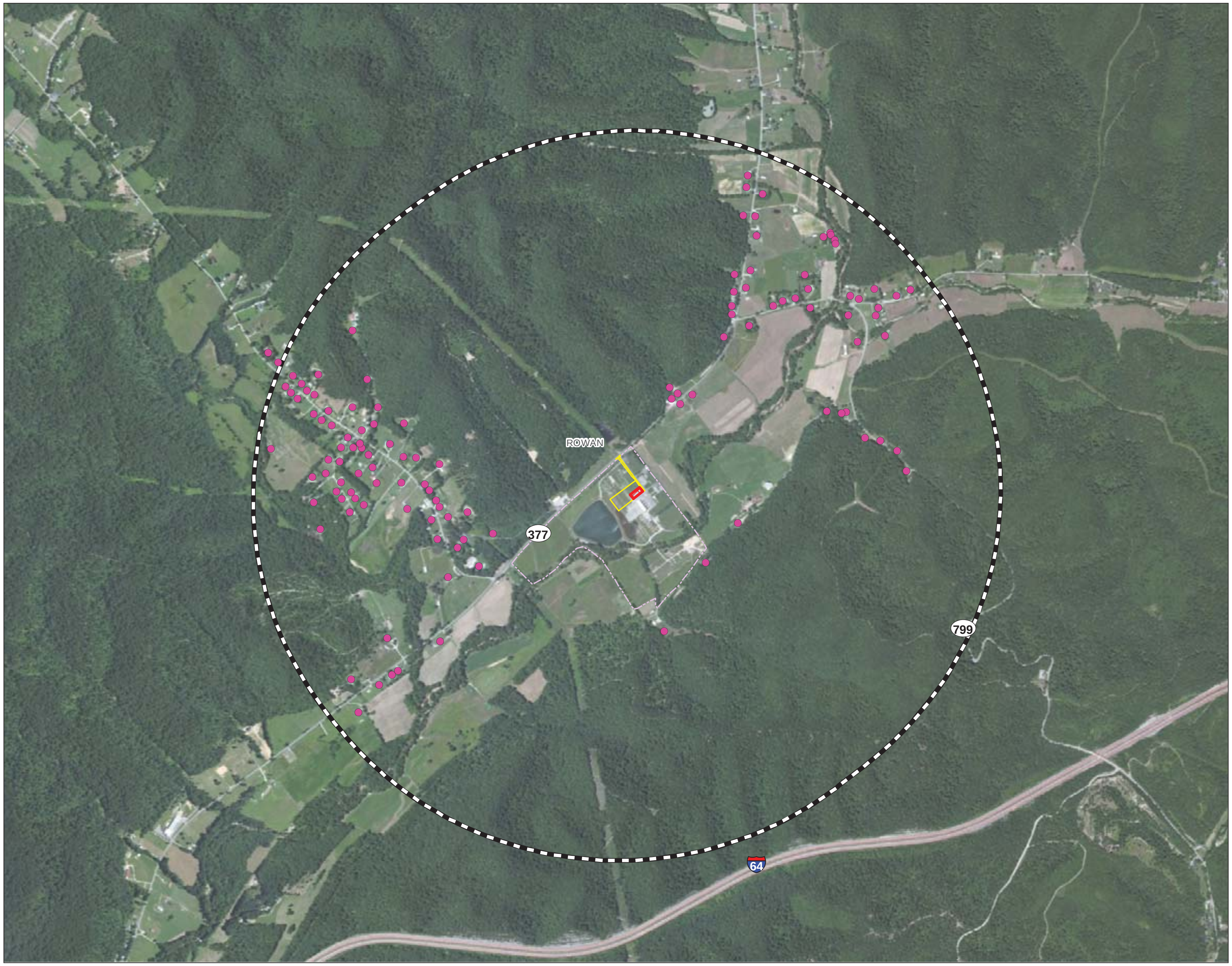
1:18,000 (At original document size of 11x17)

N

Legend

- NSA
- CS 875 ACRP Operational Area
- CS 875 Operational Footprint
- Approx. CS 875 Property Line
- CS 875 ACRP Operational Area 1-Mile Buffer

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources Include: Kinder Morgan, Stantec, ESRI
3. Background: ESRI



Title

CS 110 Modified Compressor Station and NSAs

Client/Project

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

Project Location
Ohio, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana

Prepared by PM on 2014-12-16
Technical Review by CP on 2014-12-16
Independent Review by LW on 2015-01-19

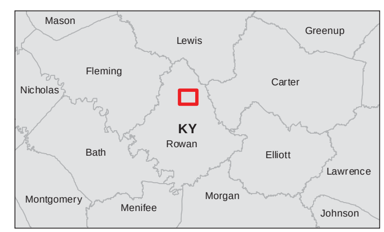
0 750 1,500 Feet

1:18,000 (At original document size of 11x17)

N

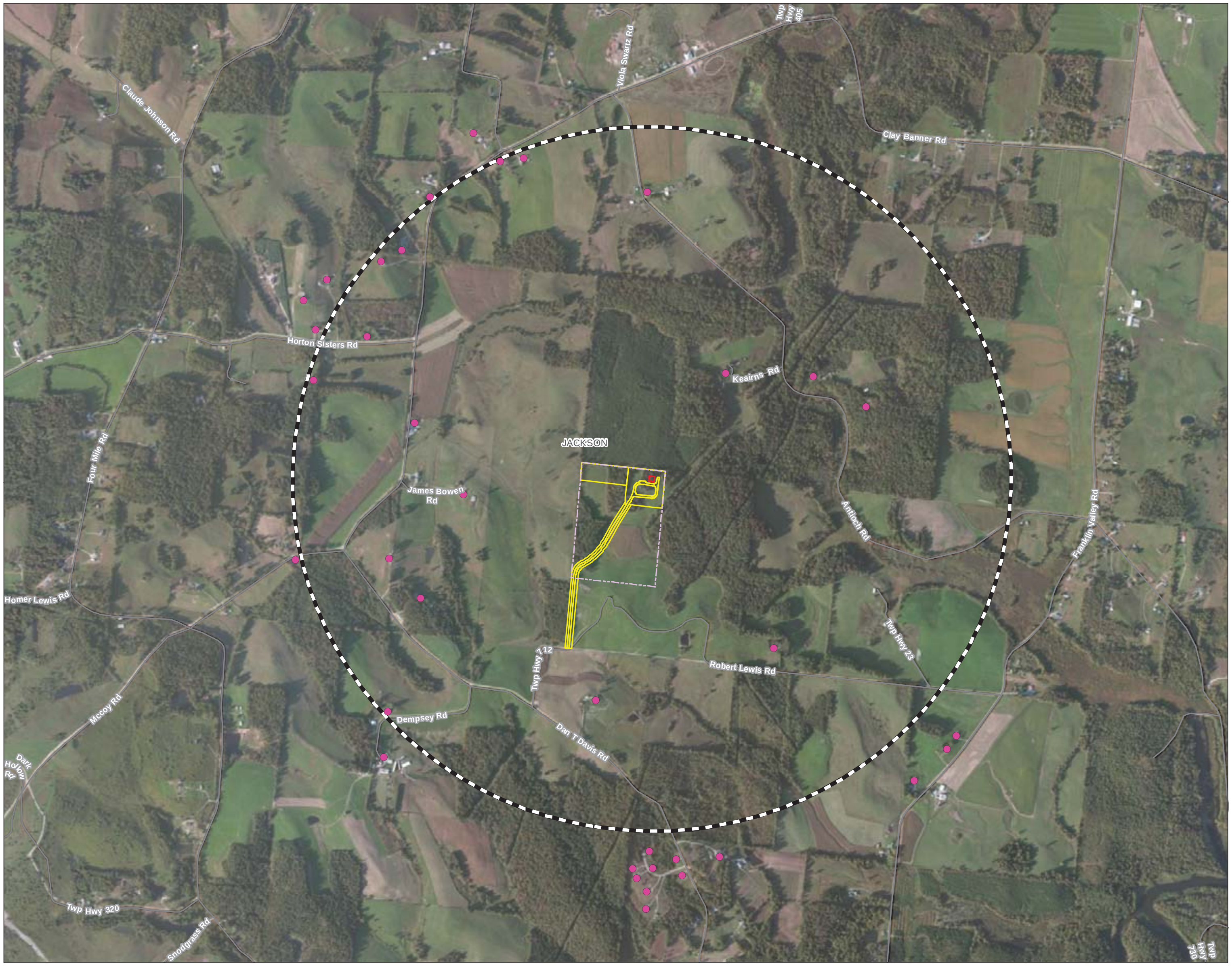
Legend

- NSA
- CS 110 ACRP Operational Area
- CS 110 ACRP Operational Footprint
- CS 110 ACRP Operational Area 1-Mile Buffer
- Approx. CS 110 Property Line



Notes

1. Coordinate System: GCS North American 1983 UTM Zone 16S (Calculated)
2. Data Sources Include: Kinder Morgan, Stantec, ESRI
3. Background: ESRI



Title

CS 202.5 New Compressor Station and NSAs

Client/Project

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

Project Location
Ohio, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana

Prepared by PM on 2014-12-16
Technical Review by CP on 2014-12-16
Independent Review by LW on 2015-01-19

0 750 1,500 Feet

1:18,000 (At original document size of 11x17)

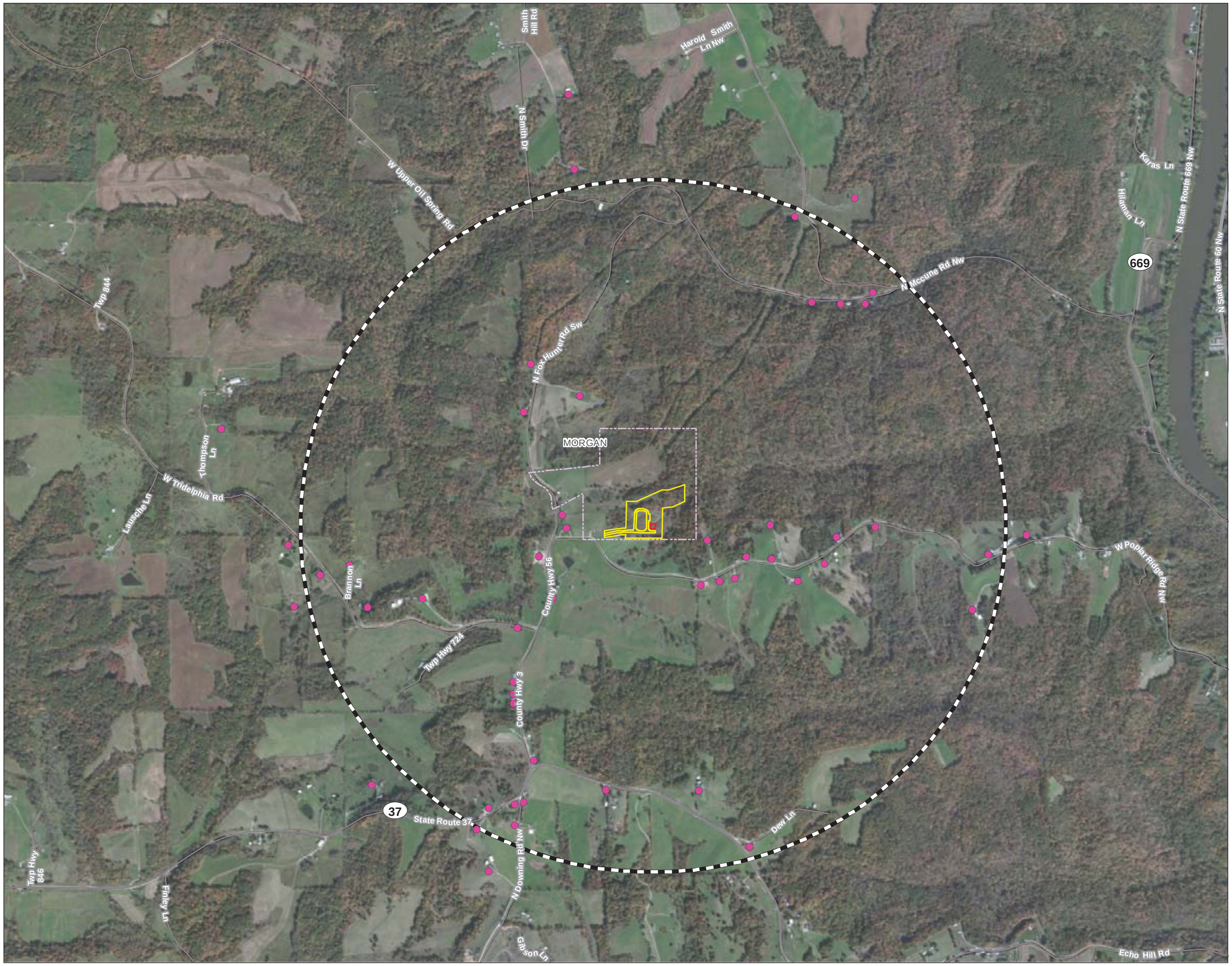
N

Legend

- NSA
- CS 202.5 Building
- CS 202.5 Operational Footprint
- Approx. CS 202.5 Property Line
- CS 202.5 Building 1-Mile Buffer

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Data Sources Include: Kinder Morgan, Stantec, ESRI
3. Background: ESRI



Title

CS 206.5 New Compressor Station and NSAs

Client/Project

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

Project Location
Ohio, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana

Prepared by PM on 2014-12-16
Technical Review by CP on 2014-12-16
Independent Review by LW on 2015-01-19

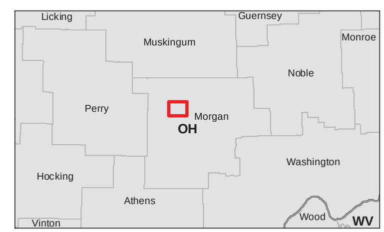
0 750 1,500 Feet

1:18,355 (At original document size of 11x17)

N

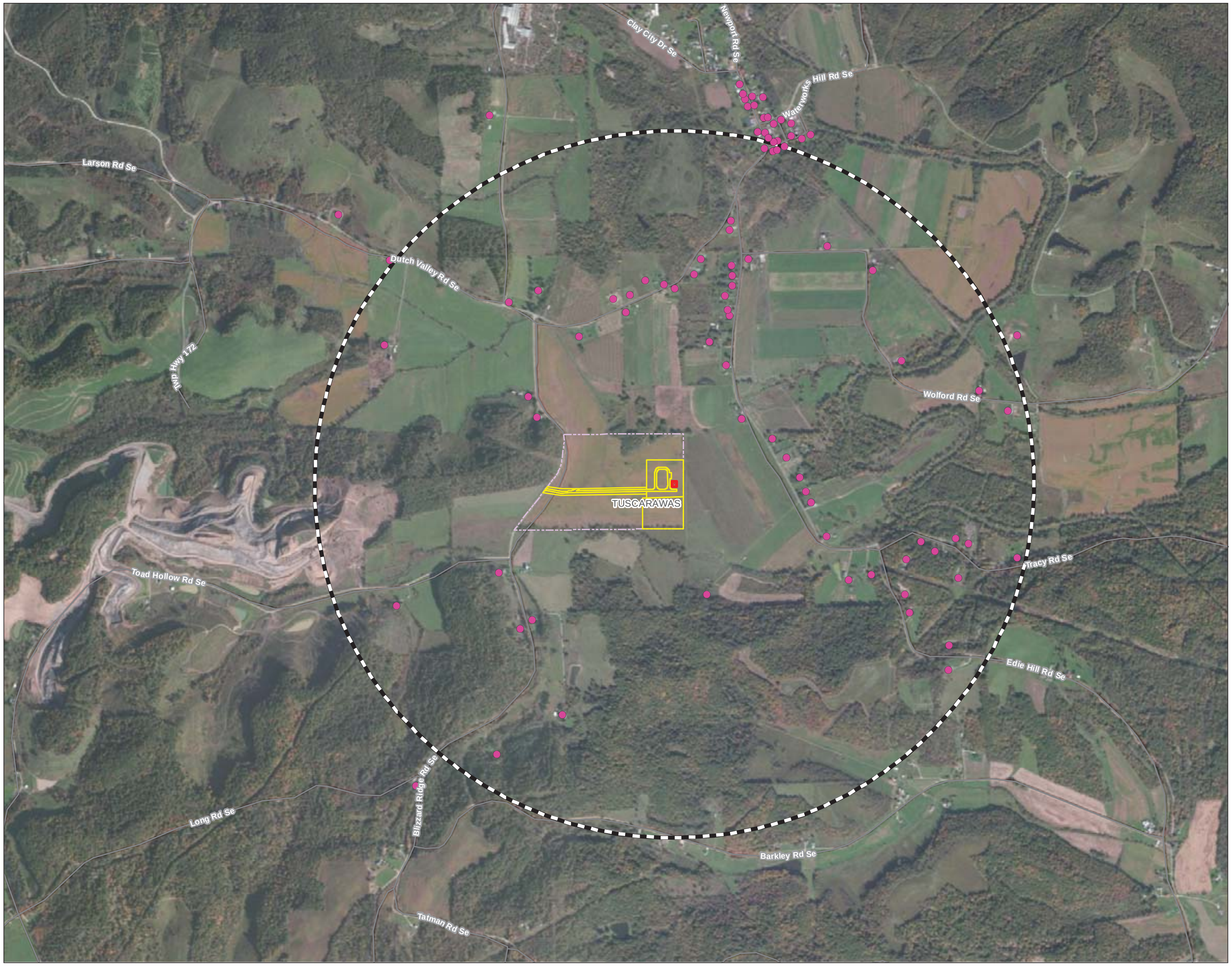
Legend

- NSA Locations
- CS 206.5 Building
- Approx. CS 206.5 Property Line
- CS 206.5 Operational Footprint
- CS 206.5 Building 1-Mile Buffer



Notes

1. Coordinate System: GCS North American 1983 UTM Zone 16S (Calculated)
2. Data Sources Include: Kinder Morgan, Stantec, ESRI
3. Background: ESRI



Title

CS 211.5 New Compressor Station and NSAs

Client/Project

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

Project Location
Ohio, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana

Prepared by PM on 2014-12-08
Technical Review by MP on 2014-12-09
Independent Review by LW on 2015-01-19

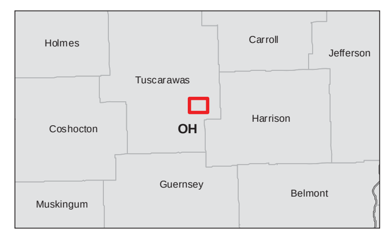
0 750 1,500 Feet

1:18,000 (At original document size of 11x17)

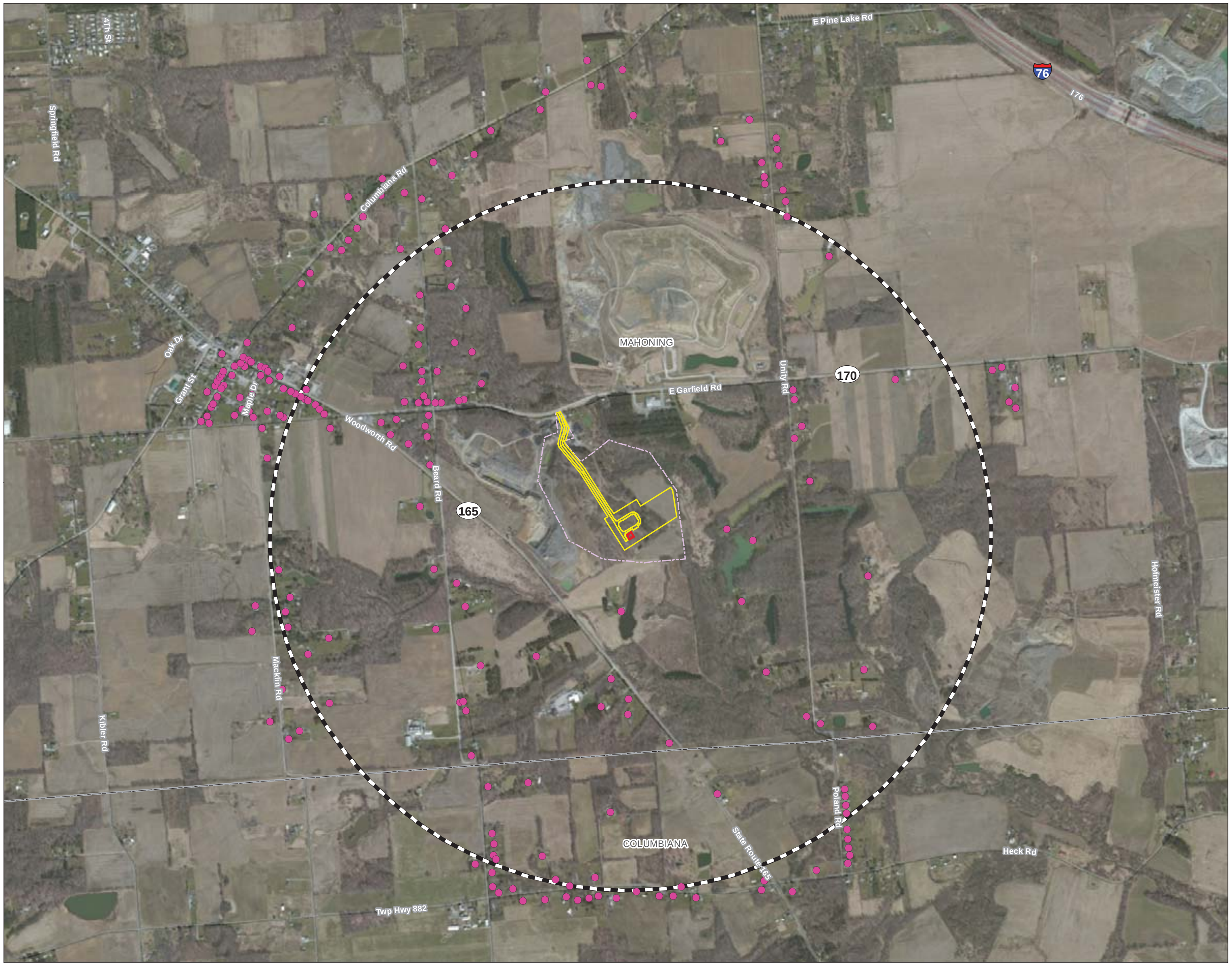
N

Legend

- NSA
- CS 211.5 Building
- CS 211.5 Operational Footprint
- Approx. CS 211.5 Property Line
- CS 211.5 Building 1-Mile Buffer



Notes
1. Coordinate System: GCS North American 1983 UTM Zone 16S (Calculated)
2. Data Sources Include: Kinder Morgan, Stantec, ESRI.
3. Background: ESRI



Title

CS 216.5 New Compressor Station and NSAs

Client/Project

Tennessee Gas Pipeline Company, L.L.C.
Abandonment and Capacity Restoration Project

Project Location
Ohio, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana

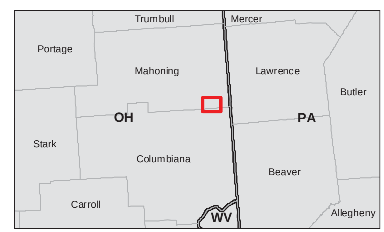
Prepared by PM on 2014-12-16
Technical Review by CP on 2014-12-16
Independent Review by LW on 2015-01-19

0 750 1,500 Feet
1:18,000 (At original document size of 11x17)

N

Legend

- NSA
- CS 216.5 Building
- CS 216.5 Operational Footprint
- Approx. CS 216.5 Property Line
- CS 216.5 Building 1-Mile Buffer



Notes
1. Coordinate System: GCS North American 1983 UTM Zone 16S (Calculated)
2. Data Sources Include: Kinder Morgan, Stantec, ESRI
3. Background: ESRI

Appendix H

Socioeconomic Conditions in the Project Area

Table H-1

Demographic Conditions in the Project Area

Area (State/County or Parish)	2010 Census Population [a]	2013 Population Estimate [b]	2013 Density (persons/sq. mile) [c]	Population Change 2010 to 2013 (%)
Louisiana				
Natchitoches Parish	39,566	39,138	31.6	-1.1
Winn Parish	15,313	14,813	16.1	-3.3
Jackson Parish	16,274	16,112	28.6	-1.0
Ouachita Parish	153,720	156,220	251.8	1.6
Morehouse Parish	27,979	27,057	35.2	-3.3
Arkansas				
Ashley County	21,853	21,283	23.6	-2.6
Chicot County	11,800	11,335	18.3	-3.9
Mississippi				
Washington County	51,137	49,688	70.6	-2.8
Bolivar County	34,145	34,049	39.0	-0.3
Sunflower County	29,450	27,997	42.2	-4.9
Tallahatchie County	15,378	15,081	23.8	-1.9
Quitman County	8,223	7,803	20.3	-5.1
Panola County	34,707	34,402	50.7	-0.9
Lafayette County	47,351	51,318	75.0	8.4
Tate County	28,886	28,373	71.4	-1.8
Marshall County	37,144	36,515	52.6	-1.7
Benton County	8,729	8,571	21.5	-1.8
Tippah County	22,232	22,084	48.6	-0.7
Tennessee				
Hardeman County	27,253	26,306	40.8	-3.5
McNairy County	26,075	26,140	46.3	0.2
Chester County	17,131	17,321	60.0	1.1
Hardin County	26,026	26,034	45.1	0.0
Henderson County	27,769	28,048	53.4	1.0
Decatur County	11,757	11,661	35.2	-0.8
Perry County	7,915	7,869	19.1	-0.6
Hickman County	24,690	24,267	40.3	-1.7
Dickson County	49,666	50,266	101.4	1.2
Cheatham County	39,105	39,492	129.3	1.0
Davidson County	626,681	658,602	1,243.3	5.1
Robertson County	66,283	67,383	139.2	1.7
Sumner County	160,645	168,888	303.4	5.1

Table H-1

Demographic Conditions in the Project Area

Area (State/County or Parish)	2010 Census Population [a]	2013 Population Estimate [b]	2013 Density (persons/sq. mile) [c]	Population Change 2010 to 2013 (%)
Kentucky				
Simpson County	17,327	17,793	74.0	2.7
Allen County	19,956	20,311	58.0	1.8
Barren County	42,173	43,027	86.5	2.0
Hart County	18,199	18,573	44.2	2.1
Green County	11,258	11,180	39.4	-0.7
Taylor County	24,512	24,649	92.0	0.6
Marion County	19,820	20,045	57.8	1.1
Boyle County	28,432	29,013	157.8	2.0
Garrard County	16,912	16,915	73.5	0.0
Madison County	82,916	85,590	189.6	3.2
Clark County	35,613	35,614	141.1	0.0
Powell County	12,613	12,494	70.5	-0.9
Montgomery County	26,499	27,251	134.3	2.8
Bath County	11,591	11,961	41.6	3.2
Rowan County	23,333	23,527	83.4	0.8
Carter County	27,720	27,202	67.7	-1.9
Lewis County	13,870	13,806	28.7	-0.5
Greenup County	36,910	36,519	107.2	-1.1
Ohio				
Scioto County	79,499	78,153	130.3	-1.7
Jackson County	33,225	32,783	79.0	-1.3
Vinton County	13,435	13,276	32.6	-1.2
Meigs County	23,770	23,496	55.3	-1.2
Athens County	64,757	64,681	128.6	-0.1
Morgan County	15,054	14,904	36.2	-1.0
Muskingum County	86,074	85,231	129.5	-1.0
Guernsey County	40,087	39,636	76.8	-1.1
Tuscarawas County	92,582	92,672	163.1	0.1
Harrison County	15,864	15,622	39.4	-1.5
Carroll County	28,836	28,275	73.1	-1.9
Columbiana County	107,841	105,893	202.7	-1.8

a Data from U.S. Census Bureau (2010).
b Data from U.S. Census Bureau (2015a).
c Calculated based on U.S. Census Bureau data.
Sources: U.S. Census Bureau (2010, 2015a)

Table H-2

Economic Conditions in the Project Area (2009–2013 Average)

Area (State/County or Parish)	Per Capita Personal Income [a]	Civilian Labor Force	Unemployment Rate (%)	Major Industries [b]
Louisiana				
Natchitoches Parish	$20,802	17,730	10.1	E, R, M
Winn Parish	$16,789	5,347	8.4	E, M, R
Jackson Parish	$19,188	6,472	7.2	E, M, R
Ouachita Parish	$21,917	71,365	8.1	E, R, A
Morehouse Parish	$16,683	11,135	10.7	E, R, M
Arkansas				
Ashley County	$19,761	9,585	11.2	M, E, R
Chicot County	$16,538	4,262	13.1	E, M, Ag
Mississippi				
Washington County	$16,671	21,859	21.4	E, R, A
Bolivar County	$16,462	15,001	17.6	E, R, M
Sunflower County	$12,588	10,800	21.7	E, R, M
Tallahatchie County	$12,747	4,946	16.5	E, R, Ag
Quitman County	$13,954	3,049	15.5	E, R, Ag
Panola County	$18,073	13,737	12.0	E, M, R
Lafayette County	$21,388	23,112	9.6	E, R, A
Tate County	$20,431	13,146	11.8	E, R, T
Marshall County	$17,978	16,501	14.0	M, E, R
Benton County	$18,597	3,766	20.2	M, T, E
Tippah County	$18,493	9,763	14.5	M, E, R
Tennessee				
Hardeman County	$14,975	10,458	20.1	E, M, R
McNairy County	$18,428	10,744	15.1	E, M, R
Chester County	$18,817	8,236	12.5	E, M, R
Hardin County	$20,127	11,418	16.1	E, M, R
Henderson County	$20,449	12,940	12.1	E, M, R
Decatur County	$25,368	5,318	13.1	E, M, R
Perry County	$17,214	3,206	13.0	E, C, P
Hickman County	$18,383	10,813	10.8	E, M, R
Dickson County	$21,547	24,055	9.5	E, M, R
Cheatham County	$23,459	20,310	9.1	E, M, R
Davidson County	$28,467	354,145	8.8	E, P, A
Robertson County	$23,809	33,959	9.4	E, M, R
Sumner County	$27,795	83,869	7.5	E, R, M

Table H-2

Economic Conditions in the Project Area (2009–2013 Average)

Area (State/County or Parish)	Per Capita Personal Income [a]	Civilian Labor Force	Unemployment Rate (%)	Major Industries [b]
Kentucky				
Simpson County	$19,441	8,327	9.5	M, E, R
Allen County	$19,086	9,219	13.2	E, M, R
Barren County	$19,745	19,940	8.4	M, E, R
Hart County	$17,273	7,676	10.3	M, E, R
Green County	$17,984	4,994	10.7	E, M, R
Taylor County	$18,790	11,708	11.9	E, M, R
Marion County	$18,865	8,690	8.8	M, E, R
Boyle County	$22,249	13,320	10.4	E, M, R
Garrard County	$21,341	8,251	12.5	E, M, R
Madison County	$21,800	42,763	9.1	E, R, M
Clark County	$24,524	17,503	9.6	E, M, R
Powell County	$15,174	4,529	11.5	E, M, R
Montgomery County	$20,436	12,038	13.2	M, E, R
Bath County	$16,367	4,584	12.9	E, M, R
Rowan County	$17,094	10,155	7.5	E, R, M
Carter County	$19,204	11,588	11.4	E, R, M
Lewis County	$16,132	5,510	10.1	E, M, C
Greenup County	$22,035	15,043	10.8	E, R, M
Ohio				
Scioto County	$19,437	31,865	11.7	E, R, M
Jackson County	$19,405	14,537	11.5	E, M, R
Vinton County	$18,101	5,648	9.4	E, M, C
Meigs County	$18,816	10,039	15.9	E, R, C
Athens County	$17,019	30,685	12.4	E, A, R
Morgan County	$21,027	6,504	10.4	E, R, M
Muskingum County	$20,775	41,231	10.1	E, R, M
Guernsey County	$20,537	18,354	11.4	E, M, R
Tuscarawas County	$21,966	45,935	9.4	M, E, R
Harrison County	$21,029	7,113	7.6	E, R, M
Carroll County	$21,783	13,502	8.9	M, E, R
Columbiana County	$21,575	51,118	10.8	E, M, R

a Incomes are reported in 2013 dollars
b Major industries:
A = Arts, entertainment, and recreation; and accommodation and food services
Ag = Agriculture, forestry, fishing, and hunting; and mining
C = Construction
E = Educational, health, and social services
M = Manufacturing
P = Professional, scientific, management, administrative, and waste management services
R = Retail trade
T = Transportation and warehousing and utilities
Source: U.S. Census Bureau (2015b)

Appendix I

Cultural Resources Correspondence and Investigations

Table I-1

State and Local Archaeological and Historical Organizations Contacted by TGP and its Consultants About the ACRP

Organizations Sent Letters on September 25, 2015	Responses
Ohio	
Archaeological Society of Ohio	No comments filed to date.
Ohio Archaeological Council	No comments filed to date.
Amish and Mennonite Heritage Center	No comments filed to date.
Athens County Historical Society and Museum	No comments filed to date.
Carroll County Historical Society	No comments filed to date.
Historical Society of Columbiana and Fairfield Township	No comments filed to date.
Aboriginal Explorers Club	No comments filed to date.
Guernsey County Historical Society	No comments filed to date.
Jackson Historical Society	No comments filed to date.
Mahoning Valley Historical Society	No comments filed to date.
Mahoning Valley Chapter of the Ohio Archaeological Society	No comments filed to date.
Malta Township Trustees	No comments filed to date.
Morgan County Historical Society	No comments filed to date.
Southern Ohio Museum	No comments filed to date.
Springfield Township Trustees	No comments filed to date.
Sugarcreek Chapter of the Ohio Archaeological Society	No comments filed to date.
Tuscarawas County Historical Society	No comments filed to date.
Vinton County Historical and Genealogical Society	No comments filed to date.
Kentucky	
Kentucky Historical Society	No comments filed to date.
Kentucky Society #170 Archaeological Institute of America	No comments filed to date.
Kentucky Archaeological Survey	No comments filed to date.
Green River Archaeological Society of Kentucky	No comments filed to date.
Licking Valley Archaeological Society	No comments filed to date.
W.S. Webb Archaeological Society	No comments filed to date.
Kentucky Organization of Professional Archaeologists	No comments filed to date.
Kentucky Native American Heritage Commission	No comments filed to date.
Kentucky Ombudsman	No comments filed to date.
Preservation Kentucky	No comments filed to date.
Allen County Historical Society	No comments filed to date.
South Central Kentucky Cultural Center	No comments filed to date.
Bath County Memorial Library	No comments filed to date.
Boyle County Genealogical and Historical Society	No comments filed to date.
Carter County Historical and Genealogical Society	No comments filed to date.
Olive Hill Historical Society	No comments filed to date.
Garrard County Public Library	No comments filed to date.
Green County Historical Society	No comments filed to date.
Greenup County Genealogy and Historical Society	No comments filed to date.
Hart County Historical Society	No comments filed to date.
Lewis County Historical Society	No comments filed to date.
Richmond Chamber of Commerce	No comments filed to date.
City of Richmond	No comments filed to date.
Marion County Historical Society/Marion County Heritage Center	No comments filed to date.
Montgomery County Historical Society	No comments filed to date.

Table I-1

State and Local Archaeological and Historical Organizations Contacted by TGP and its Consultants About the ACRP

Organizations Sent Letters on September 25, 2015	Responses
Red River Historical Society	No comments filed to date.
Rowan County Historical Society	No comments filed to date.
Morehead-Rowan Chamber of Commerce	No comments filed to date.
Simpson County Historical Society	No comments filed to date.
Taylor County Historical Society	No comments filed to date.
Tennessee	
Tennessee Historical Society	No comments filed to date
East Tennessee Historical Society	No comments filed to date.
West Tennessee Historical Society	No comments filed to date.
Middle Tennessee Genealogical Society	No comments filed to date.
Highland Rim Historical Society	No comments filed to date.
East Tennessee Society #450, Archaeological Institute of America	No comments filed to date.
Middle Cumberland Archaeological Society	No comments filed to date.
Volunteer State Archaeological Society of Tennessee	No comments filed to date.
Tennessee Council for Professional Archaeology	No comments filed to date.
Cheatham County Historical and Genealogical Association	No comments filed to date.
Chester County Public Library	No comments filed to date.
Decatur County Historical Society	No comments filed to date.
Dickson County Historical and Genealogical Society	No comments filed to date.
Old Spencer Mill	No comments filed to date.
Bolivar-Hardeman County Library	No comments filed to date.
Hardeman County Chapter, Association for the Preservation of Tennessee Antiquities	No comments filed to date.
Beech River Heritage Museum	No comments filed to date.
The Parker's Crossroads Battlefield Association	No comments filed to date.
Hickman County Historical Society	No comments filed to date.
Hickman County Public Library	No comments filed to date.
McNairy County Historical Museum	No comments filed to date.
Coon Creek Science Center	No comments filed to date.
Perry County Historical Society	No comments filed to date.
Robertson County Historical Society & Museum	No comments filed to date.
Sumner County Historical Society	No comments filed to date.
Sumner County Museum	No comments filed to date.
Mississippi	
Mississippi Historical Society	No comments filed to date.
Mississippi Archaeological Association	No comments filed to date.
Mississippi State Archaeological Association	No comments filed to date.
Magnolia State Archaeological Society	No comments filed to date.
Bond Memorial Library	No comments filed to date.
Hickory Flat Library	No comments filed to date.
The Hill Country Project	No comments filed to date.
Benton County Historical Society	No comments filed to date.
Bolivar County Historical Society	No comments filed to date.
Bolivar County Library	No comments filed to date.
Lafayette County Historical and Genealogical Society	No comments filed to date.

Table I-1

State and Local Archaeological and Historical Organizations Contacted by TGP and its Consultants About the ACRP

Organizations Sent Letters on September 25, 2015	Responses
Burns-Belfry Museum	No comments filed to date.
University of Mississippi Museum	No comments filed to date.
Marshall County Historical Museum	No comments filed to date.
Como Library	No comments filed to date.
Panola County Historical and Genealogical Society	No comments filed to date.
Marks-Quitman County Library	No comments filed to date.
Sunflower County Library	No comments filed to date.
Tallahatchie County Library	No comments filed to date.
Emmett Till Museum	No comments filed to date.
William Alexander Percy Memorial Library	No comments filed to date.
Washington County Historical Society	No comments filed to date.
Hebrew Union Temple Century of History Museum	No comments filed to date.
Arkansas	
Arkansas Historical Association	No comments filed to date.
Arkansas Archaeological Society	No comments filed to date.
Ashley County Genealogical Society	No comments filed to date.
Ashley County Museum	No comments filed to date.
Civil War Roundtable of Arkansas	No comments filed to date.
Lake Chicot State Park	No comments filed to date.
Lakeport Plantation	No comments filed to date.
Louisiana	
Louisiana Historical Society	No comments filed to date.
Louisiana Archaeological Society	No comments filed to date.
Jackson Parish Library	No comments filed to date.
Jackson Parish Museum	No comments filed to date.
Morehouse Parish Library	No comments filed to date.
Collinston Museum	No comments filed to date.
Snyder Museum	No comments filed to date.
Natchitoches Genealogical and Historical Association	No comments filed to date.
Ouachita Genealogical Society	No comments filed to date.
Ouachita Parish Public Library	No comments filed to date.
Winn Genealogical and Historical Association	No comments filed to date.

Table I-2

Indian Tribes Contacted by FERC and TGP

Tribes Contacted by FERC via April 17, 2015, NOI	Tribes Contacted by TGP via February 11, 2015, and December 29, 2015, Letters	Tribal Responses
Absentee-Shawnee Tribe of Oklahoma, c/o Joseph Blanchard	Absentee-Shawnee Tribe of Oklahoma, c/o Edwina Butler-Wolfe and Joseph Blanchard	No comments filed to date.
Alabama-Coushatta Tribe of Texas, c/o Ronnie Thomas	Alabama-Coushatta Tribe of Texas, c/o Nita Battise, Ronnie Thomas, and Celestine Bryant	No comments filed to date.
Alabama Quassarte Tribal Town in Oklahoma, c/o Tarpie Yargee	Alabama Quassarte Tribal Town in Oklahoma, c/o Tarpie Yargee	No comments filed to date.
Apache Tribe of Oklahoma, c/o Ernest Redbird	Apache Tribe of Oklahoma, c/o Ernest Redbird, Lyman Guy, and Darin Cisco	No comments filed to date
Caddo Nation of Oklahoma, c/o Melanie Oyebi	Caddo Nation of Oklahoma, c/o Melanie Oyebi, Tamara Francis-Fourkiller, and Kim Penrod	March 7, 2015 memo to TGP stated that the Project would not impact sites important to the tribe. May 15, 2015 email requested copy of Louisiana survey reports.
Cayuga Nation of New York, c/o Clint Halftown	Cayuga Nation of New York, c/o Clint Halftown	No comments filed to date.
	Cherokee Nation of Oklahoma, c/o Bill John Baker and Richard Allen	No comments filed to date.
	Chickasaw Nation of Oklahoma, c/o Bill Anoatubby and Gingy Nail	No comments filed to date.
	Chippewa-Cree Indians of the Rocky Boy's Reservation in Montana, c/o Dustin Whitford and Alvin Windy Boy	No comments filed to date.
Chitimacha Tribe of Louisiana, c/o John Paul Darden	Chitimacha Tribe of Louisiana, c/o John Paul Darden and Kimberly Walden	No comments filed to date.
Choctaw Nation of Oklahoma, c/o Gary Batton	Choctaw Nation of Oklahoma, c/o Gary Batton and Ian Thompson	March 16, 2015 email to TRC requested GIS shape files. March 24, 2015 email to TRC requested Louisiana survey report. February 12, 2016 and March 5, 2016 emails requested shapefiles.
Citizen Potawatomi Nation of Oklahoma, c/o John Barrett	Citizen Potawatomi Nation of Oklahoma, c/o John Barrett and Kelli Mosteller	No comments filed to date.
Comanche Nation of Oklahoma, c/o Wallace Coffey	Comanche Nation of Oklahoma, c/o Wallace Coffey and Jimmy Arterberry	January 26, 2016 letter to Verdanterra that no properties important to the Comanche Nation would be affected.
Coushatta Tribe of Louisiana, c/o Lovelin Poncho	Coushatta Tribe of Louisiana, c/o Lovelin Poncho and Linda Langley	No comments filed to date.
Delaware Nation of Oklahoma, c/o Clifford Peacock	Delaware Nation of Oklahoma, c/o Clifford Peacock, Cleanan Watkins, and Jason Ross	Requested copies of survey reports for KY.
Delaware Tribe of Indians in Oklahoma, c/o Paula Pechonick	Delaware Tribe of Indians in Oklahoma, c/o Paula Pechonick, Chester Brooks, and Brice Obermeyer	Requested copies of survey reports for OH. June 17, 2015 letter to TRC provided comments on OH survey report.
Eastern Band of Cherokee Indians of North Carolina, c/o Michell Hicks	Eastern Band of Cherokee Indians of North Carolina, c/o Michell Hicks and Russell Townsend	No comments filed to date.
Eastern Shawnee Tribe of Oklahoma, c/o Glenna Wallace	Eastern Shawnee Tribe of Oklahoma, c/o Glenna Wallace and Robin Dushane	No comments filed to date.

Table I-2

Indian Tribes Contacted by FERC and TGP

Tribes Contacted by FERC via April 17, 2015, NOI	Tribes Contacted by TGP via February 11, 2015, and December 29, 2015, Letters	Tribal Responses
Forest County Potawatomi Community in Wisconsin, c/o Harold Frank	Forest County Potawatomi Community in Wisconsin, c/o Harold Frank and Melissa Cook	No comments filed to date.
Ft. Sill Apache Tribe of Oklahoma, c/o Jeff Houser	Ft. Sill Apache Tribe of Oklahoma, c/o Jeff Haozous and Leland Darrow	No comments filed to date.
	Grand Traverse Band of Ottawa and Chippewa Indians in Michigan, c/o Alvin Pedwaydon and Cindy Winslow	No comments filed to date.
Hannahville Indian Community of Michigan, c/o Kenneth Meshigaud	Hannahville Indian Community of Michigan, c/o Kenneth Meshigaud and Earl Meshigaud	No comments filed to date.
Jena Band of Choctaw Indians in Louisiana, c/o Cheryl Smith	Jena Band of Choctaw Indians in Louisiana, c/o Cheryl Smith and Alina Shively	March 9, 2015 email to TRC requested additional data about new build elements in LA, including reports. February 18, 2016 email to Verdanterra approved the Discovery Plans
Jicarilla Apache Nation of New Mexico, c/o Ty Vicenti	Jicarilla Apache Nation of New Mexico, c/o Ty Vicenti and Jeffery Blythe	No comments filed to date.
	Keweenaw Bay Indian Community in Michigan, c/o Warren Swartz and Chris Chosa	No comments filed to date.
	Kialegee Tribal Town of Oklahoma, c/o Jeremiah Hobia	No comments filed to date.
Kickapoo Traditional Tribe of Texas, c/o Juan Garza	Kickapoo Traditional Tribe of Texas, c/o Juan Garza	No comments filed to date.
	Kickapoo Tribe of Oklahoma, c/o Gilbert Salazar and Kent Collier	No comments filed to date.
Kiowa Indian Tribe of Oklahoma, c/o Amber Toppah	Kiowa Indian Tribe of Oklahoma, c/o Amber Toppah and Amie Tah-Bone	January 8, 2016 email to Verdanterra indicated no concerns, but requested copy of Discovery Plan.
	Lac Courte Oreilles Band of Lake Superior Chippewa Indians in Wisconsin, c/o Michael Isham and Jerry Smith	No comments filed to date.
	Lac du Flambeau Band of Lake Superior Chippewa Indians in Wisconsin, c/o Henry St. Germaine and Melinda Young	No comments filed to date.
	Little River Band of Ottawa Indians In Michigan, c/o Larry Romanelli and Jonnie Sam	No comments filed to date.
	Little Traverse Bay Bands of Odawa Indians in Michigan, c/o Regina Gasco-Bentley and Eric Hemenway	No comments filed to date.
	Match-e-be-nash-she-wish Band of Potawatomi Indians in Michigan, c/o David Sprague	No comments filed to date.
Mescalero Apache Tribe of New Mexico, c/o Danny Breuninger	Mescalero Apache Tribe of New Mexico, c/o Danny Breuninger and Holly Houghten	No comments filed to date.
Miami Tribe of Oklahoma, c/o Douglas Lankford	Miami Tribe of Oklahoma, c/o Douglas Lankford and George Strack	March 1, 2016 email to Verdanterra indicated that the tribe would like to continue to consult about the Project.
	Minnesota Chippewa Tribe, c/o Norman Deschampe	No comments filed to date.

Table I-2

Indian Tribes Contacted by FERC and TGP

Tribes Contacted by FERC via April 17, 2015, NOI	**Tribes Contacted by TGP via February 11, 2015, and December 29, 2015, Letters**	**Tribal Responses**
	Minnesota Chippewa Tribe - Bois Forte Band, c/o Kevin Leecy and Bill Latady	February 10, 2016 phone call to Verdanterra that the Bois Forte Band has no interest in the Project.
	Minnesota Chippewa Tribe - Fond du Lac Band, c/o Karen Diver and Leah Savage	No comments filed to date.
	Minnesota Chippewa Tribe - Mille Lacs Band, c/o Melanie Benjamin	March 3, 2016 phone call to Verdanterra that the tribe would like to continue to receive materials related to the Project.
Mississippi Band of Choctaw Indians, c/o Phyliss Anderson	Mississippi Band of Choctaw Indians, c/o Phyliss Anderson	No comments filed to date.
	Muscogee (Creek) Nation of Oklahoma, c/o Rae Lynn Butler, David Proctor, George Tiger, and Emman Spain	April 14, 2015 phone call with TRC requesting survey reports. May 29, 2015, email to TRC stated that no Muscogee sites would be affected by the Project.
	Nottawaseppi Huron Band of the Potawatomi in Michigan, c/o Homer Mandoka and Jeff Chivis	No comments filed to date.
	Oneida Nation of New York, c/o Ray Halbritter	No comments filed to date.
	Oneida Tribe of Wisconsin, c/o Cristina Danforth and Corina Mrozinsk	No comments filed to date.
	Onondaga Nation of New York, c/o Irving Powless	No comments filed to date.
	Osage Nation c/o John Fox	April 27, 2016 letter to Verdanterra requested copies of reports for OH, KY, and LA.
	Osage Nation of Oklahoma, c/o Geoffery Standing Bear and Andrea Hunter	No comments filed to date.
Ottawa Tribe of Oklahoma, c/o Ethel Cook	Ottawa Tribe of Oklahoma, c/o Ethel Cook and Rhonda Hayworth	No comments filed to date.
Peoria Tribe of Indians in Oklahoma, c/o John Froman	Peoria Tribe of Indians in Oklahoma, c/o John Froman, Cynthia Stacy, and Jason Dollerhide	March 3, 2015 letter to TRC stated no objections to the Project.
	Poarch Band of Creeks in Alabama, c/o Stephanie Bryan and Robert Thrower	No comments filed to date
Pokagon Band of Potawatomi Indians, c/o Matthew Wesaw	Pokagon Band of Potawatomi Indians in Michigan, c/o John Warren and Marcus Winchester	January 21, 2016 letter to Verdanterra indicated the tribe is unaware of any historical, religious, or culturally significant resources in vicinity to the Project.
Prairie Band of Potowatomi Nation, c/o Steve Ortiz	Prairie Band of Potowatomi Nation in Kansas, c/o Liana Onnen and Hattie Mitchell	No comments filed to date.
Quapaw Tribe of Indians in Oklahoma, c/o Donna Mercer	Quapaw Tribe of Indians in Oklahoma, c/o Donna Mercer, John Berrey, and Everett Bandy	January 13, 2016 letter to Verdanterra requested copies of cultural resources survey reports for MS and AR.
	Red Cliff Band of Lake Superior Chippewa Indians in Wisconsin, c/o Bryan Bainbridge and Larry Balber	No comments filed to date.
	Red Lake Band of Chippewa Indians in Minnesota, c/o Darrell Seki	No comments filed to date.

Table I-2

Indian Tribes Contacted by FERC and TGP

Tribes Contacted by FERC via April 17, 2015, NOI	Tribes Contacted by TGP via February 11, 2015, and December 29, 2015, Letters	Tribal Responses
	Saginaw Chippewa Indians of Michigan, c/o Steven Pego and John Graveratte	No comments filed to date.
	St. Croix Chippewa Indians in Wisconsin, c/o Lewis Taylor	No comments filed to date.
	St. Regis Mohawk Tribe of New York, c/o Beverly Cook, Ronald LaFrance, Paul Thompson, and Arnold Printup	No comments filed to date.
	Sault St. Marie Tribe of Chippewa Indians in Michigan, c/o Aaron Payment and Colleen Medicine	No comments filed to date.
Seminole Nation of Oklahoma, c/o Leonard Harjo	Seminole Nation of Oklahoma, c/o Leonard Harjo and Alan Emarthle	No comments filed to date.
Seminole Tribe of Florida, c/o James Billie	Seminole Tribe of Florida, c/o James Billie and Paul Backhouse	No comments filed to data.
Seneca-Cayuga Tribe of Oklahoma, c/o William Fisher	Seneca-Cayuga Tribe of Oklahoma, c/o William Fisher and Paul Barton	No comments filed to date.
Seneca Nation of New York, c/o Maurice John	Seneca Nation of New York, c/o Maurice John and Scott Abrams	No comments filed to date.
Shawnee Tribe of Oklahoma, c/o Ron Sparkman	Shawnee Tribe of Oklahoma, c/o Ron Sparkman	No comment filed to date.
	Sokaogon Chippewa Community in Wisconsin, c/o Chris McGeshick	No comments filed to date.
Thlopthlocco Tribal Town in Oklahoma, c/o George Scott	Thlopthlocco Tribal Town in Oklahoma, c/o George Scott, Ryan Morrow, and Charles Coleman	No comments filed to date.
Tonkawa Tribe of Oklahoma, c/o Donald Patterson	Tonkawa Tribe of Oklahoma, c/o Donald Patterson, Russell Martin, and Miranda Allen	The tribe has no sites in the Project area.
Towanda Band of Seneca in New York, c/o Darwin Hill	Towanda Band of Seneca in New York, c/o Darwin Hill	No comments filed to date.
Tunica-Biloxi Indian Tribe of Louisiana, c/o Earl Barbry	Tunica-Biloxi Indian Tribe of Louisiana, c/o Earl Barbry and Joey Barbry	No comments filed to date.
Turtle Mountain Band of Chippewa Indians of North Dakota, c/o Richard McCloud	Turtle Mountain Band of Chippewa Indians of North Dakota, c/o Richard McCloud and Bruce Nadeau	No comments filed to date.
	Tuscarora Nation of New York, c/o Leo Henry	No comments filed to date.
United Keetoowah Band of Cherokee Indians in Oklahoma, c/o George Wickliffe	United Keetoowah Band of Cherokee Indians in Oklahoma, c/o George Wickliffe and Lisa LaRue-Baker	No comments filed to date.
White Mountain Apache Tribe in Arizona, c/o Ronnie Lupe	White Mountain Apache Tribe in Arizona, c/o Ronnie Lupe and Mark Altaha	February 24, 2015, memo to TRC stated that the Project would have no impact on historic or traditional cultural properties important to the tribe.
Wyandotte Nation of Oklahoma, c/o Billy Friend	Wyandotte Nation of Oklahoma, c/o Billy Friend and Sherri Clemons	No comments filed to date.
Ysleta de Sur Pueblo in Texas, c/o Carlos Hisa	Ysleta de Sur Pueblo of Texas, c/o Carlos Hisa and Javier Loera	February 26, 2015, letter to TRC stated that the Project is outside of the tribe's area of interest.

Table I-3

Cultural Resources Investigations at TGP's Proposed ACRP Elements in Ohio

Workspace	County	Activity	Disturbance [a]	Survey and Testing	Results
CS216.5 OH0003	Mahoning	New Compressor Station	22.0 acres	71.89 acres (Klinge et al., 2015)	MAH-2212-15 MAH-2213-15 MAH-2214-14 MAH-2215-15
CS216.5 OH0003 ACRD-001	Mahoning	New Permanent Access Road	2.2 acres	Included with CS 216.5	
OH0005	Columbiana	Crossover Removal	1.0 acre	1.0 acre (Klinge et al., 2015)	Negative
OH0006	Columbiana	Crossover Removal	1.3 acres	1.3 acres (Klinge et al., 2015)	Negative
OH0007	Carroll	Gas Disconnect	0.2 acre	0.5 acre (Klinge et al., 2015)	Negative
OH-213-003 OH0007	Carroll	Yard at existing Compressor Station 214	1.9 acres	1.9 acres (Klinge, 2015)	Negative
OH0012	Carroll	Tap Removal	0.5 acre	0.2 acre (Klinge et al., 2015) 0.5 acre (Klinge, 2015)	Negative
OH0015	Carroll	Crossover Removal	1.7 acres	1.7 acres (Klinge et al., 2015)	Negative
CS211.5 OH0025	Tuscarawas	New Compressor Station	21.2 acres	222.4 acres(Hornum, Godwin, et al., 2012; Kuranda et al., 2012)	TUS-1090-10 (TUS-1042-10) TUS-1091-10 (TUS-1041-10) TUS-1092-10 (TUS-1037-10) TUS-1093-10 (TUS-1036-10) TUS-1094-13 TUS-1095-13 TUS-1096-13 (TUS-1029-13) TUS-1034-13
CS211.5 OH0025 ACRD-001	Tuscarawas	New Permanent Access Road	2.0 acres	Included with CS 211.5	
CS211.5 OH0025 ACRD-002	Tuscarawas	New Temporary Access Road	1.3 acres	Included with CS 211.5	
OH0030	Tuscarawas	Off-right-of-way Tap Reconnect	2.3 acres	3.6 acres (Klinge et al., 2015)	Newport Cemetery
OH0040	Tuscarawas	Crossover Removal	1.7 acres	1.7 acres (Klinge et al., 2015)	Negative
OH0050	Guernsey	Tap Removal	0.9 acre	0.9 acre (Klinge et al., 2015)	Negative
OH0070	Guernsey	Gas Disconnect	0.1 acre	1.2 acres (Klinge et al., 2015)	Negative
OH-208-000 OH0070	Guernsey	Yard at existing Compressor Station 209	0.7 acre	0.7 acre (Klinge, 2015)	Negative
OH0090	Morgan	Crossover Removal-Reconnect	2.5 acres	2.5 acres (Klinge et al., 2015)	Negative
CS 206.5 OH0095	Morgan	New Compressor Station	29.7 acres	2.3 acres (Stoll, 2013) 71.9 acres (Klinge et al., 2015)	MRG-314-6 MRG-315-6 MRG-316-6 (Risen Cemetery) MRG-317-6 MRG-318-6 MRG-319-6 Taylor Cemetery
CS 206.5 OH0095 ACRD-001	Morgan	New Permanent Access Road	1.1 acres	Included with CS 206.5	

Table I-3

Cultural Resources Investigations at TGP's Proposed ACRP Elements in Ohio

Workspace	County	Activity	Disturbance [a]	Survey and Testing	Results
OH0100	Morgan	Crossover Removal	1.4 acres	1.5 acres (Klinge et al., 2015)	Negative
OH0110	Morgan	Off-right-of-way Tap Reconnect	10.1 acres	15.3 acres (Klinge et al., 2015; Klinge and Ericksen, 2015)	Negative
OH0115	Athens	Tap Removal	0.7 acre	0.6 acre (Klinge et al., 2015)	Negative
OH0120	Athens	Crossover Removal	0.6 acre	0.6 acre (Klinge et al., 2015)	Negative
OH0140	Athens	Gas Disconnect	0.2 acre	0.2 acre (Klinge et al., 2015)	Negative
OH203-002 OH0140	Athens	Yard at existing Compressor Station 204	7.0 acres	7.0 acres (Klinge, 2015)	Negative
OH0150	Vinton	Crossover Removal	0.4 acre	0.5 acre (Klinge et al., 2015)	Negative
OH0160	Jackson	Crossover Removal	0.9 acre	0.9 acre (Klinge et al., 2015)	Negative
CS 202.5	Jackson	New Compressor Station	23.5 acres	52.5 acres (Klinge et al., 2015)	JAC-224-11
CS 202.5 OH0155 ACRD-001	Jackson	New Temporary Access Road	0.4 acre	Included with CS 202.5	
CS 202.5 OH0155 ACRD-002	Jackson	New Permanent Access Road	2.8 acres	Included with CS 202.5	
OH0170	Scioto	Tap Removal-Reconnect	1.4 acres	1.5 acres (Hornum, Grose, et al., 2012) 1.7 acres (Klinge et al., 2015)	Negative
OH0180	Scioto	Crossover Removal - Reconnect	0.5 acre	0.5 acre (Klinge et al., 2015) 0.5 acre (Klinge, 2015).	Negative
OH0200	Scioto	Gas Disconnect	<0.1 acre	0.9 acre (Klinge and Ericksen, 2015)	Negative

a Totals may not add up to those provided in text due to rounding.

Table I-4

Cultural Resources Investigations at TGP's Proposed ACRP Elements in Kentucky

Workspace	County	Activity	Disturbance [a]	Survey and Testing	Results
KY0002	Greenup	Gas Disconnect	0.1 acre	1.4 acres (Barrett and McKeighen, 2015a; Hayes 2015)	Negative
KY0010	Greenup	Crossover Removal	0.9 acre	0.9 acre (Barrett and McKeighen, 2015a; Hayes 2015)	Negative
KY0020	Greenup	Tap Removal-Reconnect	1.2 acres	1.3 acres (Barrett and McKeighen, 2015a; Hayes 2015)	Negative
KY0030	Greenup	Gas Disconnect	0.1 acre	0.1 acre (Barrett and McKeighen, 2015a; Mustain and Klinge, 2015)	Negative
KY-111-003 KY0030	Greenup	Yard at existing Compressor Station 200	1.0 acre	1.0 acre (Mustain and Klinge, 2015; Terpstra et al., 2015)	Negative
KY0040/KY0050	Carter	Crossover Removal	0.4 acre	0.4 acre (Barrett and McKeighen, 2015a)	Negative
KY0055	Carter	New-build Pipeline	124.4 acres	147.9 acres (Barrett and McKeighen, 2015a; Giedd and Klinge, 2016; Henry and Rankin, 2015; Mustain and Klinge, 2015; Schwarz et al., 2015; Terpstra et al., 2015)	15CR252 15CR271 15CR272 15CR273 15CR274 15CR275 IF-1 IF-2 IF-3 15CR280 15CR281 15CR283 RDR1-IF1 RDR1-IF2 CR-155
KY0055 New Pipeline Yard ATWS.010	Carter	Yard near the New-build Pipeline	6.7 acres	6.7 acres (Mustain and Klinge, 2015)	15CR282
KY0055 New Pipeline ACRD-001	Carter	Existing Temporary Access Road	1.4 acres	1.4 acres (Mustain and Klinge, 2015; Terpstra et al., 2015)	Negative
KY0055 New Pipeline ACRD-002	Carter	Existing Temporary Access Road	2.4 acres	2.4 acres (Mustain and Klinge, 2015; Terpstra et al., 2015)	Negative
KY0055 New Pipeline ACRD-003	Carter	Existing Temporary Access Road	0.6 acre	0.6 acre (Mustain and Klinge, 2015; Terpstra et al., 2015)	Negative
KY0055 New Pipeline ACRD-004	Carter	Existing Temporary Access Road	1.7 acres	1.7 acres (Mustain and Klinge, 2015; Terpstra et al., 2015)	15CR280
KY0055 New Pipeline ACRD-005	Carter	Existing Temporary Access Road	3.1 acres	3.1 acres (Mustain and Klinge, 2015; Terpstra et al., 2015)	15CR275
KY0055 New Pipeline ACRD-006	Carter	New Permanent Access Road	0.3 acre	0.3 acre (Mustain and Klinge, 2015; Terpstra et al., 2015)	15CR282
KY0060	Lewis	Crossover Removal – Reconnect	0.6 acre	0.6 acre (Barrett and McKeighen, 2015a)	Negative
KY0070	Rowan	Gas Disconnect	0.1 acre	0.1 acre (Mustain and Klinge, 2015)	RW-36
CS 110 KY0070	Rowan	Modified Compressor Station	3.5 acres	4.1 acres (Henry and Rankin, 2015; Mustain and Klinge, 2015)	Negative
CS 110 ACRD-001 KY0070	Rowan	Existing Temporary Access Road	0.6 acre	Included with CS 110	
CS 110 ACRD-002 KY0070	Rowan	Existing Permanent Access Road	0.0 acre	Included with CS 110	

Table I-4

Cultural Resources Investigations at TGP's Proposed ACRP Elements in Kentucky

Workspace	County	Activity	Disturbance [a]	Survey and Testing	Results
KY-109-003 (West) KY0070	Rowan	Yard at existing Compressor Station 110	3.3 acres	10.9 acres (Mustain and Klinge, 2015)	Negative
KY-109-003 (East) KY0070	Rowan	Yard at existing Compressor Station 110	1.2 acres	1.2 acres (Mustain and Klinge, 2015)	Negative
KY0080	Rowan	Off-right-of-way Tap Reconnect	17.6 acres	3.7 acres (Barrett and McKeighen, 2015a; Mustain and Klinge, 2015)	Negative
KY0100	Rowan	Crossover Removal - Reconnect	1.3 acres	1.3 acres (Barrett and McKeighen, 2015a)	Negative
KY0110	Bath	Crossover Removal	1.1 acres	1.1 acres (Barrett and McKeighen, 2015a; Schwarz et al., 2015)	15BH140
KY0120	Montgomery	Crossover Removal - Reconnect	1.8 acres	1.8 acres (Barrett and McKeighen, 2015a)	Negative
KY0130	Powell	Gas Disconnect	0.1 acre	0.1 acre (Barrett and McKeighen, 2015a)	Negative
KY-105-002 KY0130	Powell	Yard at existing Compressor Station 106	1.9 acres	1.9 acres (Mustain and Klinge, 2015)	Negative
KY0150	Madison	Crossover Removal	1.4 acres	1.4 acres (Barrett and McKeighen, 2015a)	Negative
CS 875	Madison	Modified Compressor Station	23.6 acres	87.6 acres (Barrett, 2014; Henry and Rankin, 2014)	MA-1031
MLV 874 Replacement Pipeline	Madison	Replacement Pipeline	14.9 acres	Not Surveyed	Pending Survey
KY0160	Madison	Crossover Removal	5.9 acres	0.7 acre (Barrett and McKeighen, 2015a; Mustain and Klinge, 2015)	Negative
KY0170	Madison	Off-right-of-way Tap Reconnect	Included with KY0160		
KY0180	Madison	Crossover Removal	1.2 acres	1.2 acres (Barrett and McKeighen, 2015a)	Negative
KY0190	Garrard	Disconnect Crossover	0.9 acre	0.9 acre (Barrett and McKeighen, 2015a)	Negative
KY0220	Boyle	Crossover Removal	2.9 acres	3.0 acres (Barrett and McKeighen, 2015a)	Negative
KY0230	Boyle	Tap Removal	1.5 acres	1.5 acres (Barrett and McKeighen, 2015a)	Negative
KY0240	Boyle	Crossover Removal	1.2 acres	1.2 acres (Barrett and McKeighen 2015a)	Negative
KY0250	Boyle	Tap Removal-Reconnect	Included with KY0240		
KY0260	Boyle	Tap Removal-Reconnect	1.5 acres	1.6 acres (Barrett and McKeighen, 2015a)	Negative
KY0280	Marion	Crossover Removal-Reconnect	0.9 acre	0.9 acre (Barrett and McKeighen, 2015a)	Negative
KY0290	Marion	Tap Removal-Reconnect	1.4 acres	1.4 acres (Barrett and McKeighen, 2015a)	Negative
KY0300	Marion	Crossover Removal-Reconnect	Included with KY0290		
KY0310	Marion	Tap Removal-Reconnect	1.7 acres	1.7 acres (Barrett and McKeighen, 2015a)	Negative
KY0320	Taylor	Gas Disconnect Compressor Station 96	0.1 acre	0.1 acre (Barrett and McKeighen, 2015a)	Negative

Table I-4

Cultural Resources Investigations at TGP's Proposed ACRP Elements in Kentucky

Workspace	County	Activity	Disturbance [a]	Survey and Testing	Results
KY0330	Green	Tap Removal-Reconnect	1.9 acres	1.9 acres (Barrett and McKeighen, 2015a)	Negative
KY0340	Green	Crossover Removal and River Crossing-Launcher/Receiver	0.9 acre	0.9 acre (Barrett and McKeighen, 2015a)	Negative
KY0350	Green	Crossover Removal	1.2 acres	1.2 acres (Barrett and McKeighen, 2015a)	Negative
KY0360	Hart	Crossover Removal	0.8 acre	0.8 acre (Barrett and McKeighen, 2015a)	Negative
KY0370	Barren	Tap Removal-Reconnect	1.4 acres	1.5 acres (Barrett and McKeighen, 2015a)	Negative
KY0380	Barren	Crossover Removal-Reconnect	0.6 acre	0.3 acre (Barrett and McKeighen, 2015a)	Negative
KY0400	Allen	Crossover Removal	0.6 acre	0.6 acre (Barrett and McKeighen, 2015a)	Negative
KY0410	Allen	Tap Removal-Reconnect	0.4 acre	0.4 acre (Barrett and McKeighen, 2015a)	Negative
KY0420	Allen	Crossover Removal	0.7 acre	0.1 acre (Barrett and McKeighen, 2015a) 0.7 acre (Mustain and Klinge, 2015)	Negative
KY0430	Simpson	Crossover Removal	1.3 acres	1.2 acres (Barrett and McKeighen, 2015a)	Negative

a Totals may not add up to those provided in text due to rounding.

Table I-5

Cultural Resources Investigations at TGP's Proposed ACRP Elements in Tennessee

Workspace	County	Activity	Disturbance [a]	Survey and Testing	Results
TN0010	Sumner	Gas Disconnect	0.1 acre	0.1 acre (Barrett and McKeighen, 2015b)	Negative
TN-86-003 TN0010	Sumner	Yard at existing Compressor Station 87	2.3 acres	2.3 acres (Ryan, Munger, et al., 2015)	Negative
TN0020	Robertson	Tap Removal – Reconnect	1.2 acres	1.2 acres (Barrett and McKeighen, 2015b)	Negative
TN0030	Robertson	Crossover Removal-Reconnect	Included with TN0020		
TN0040 TN0050	Robertson	Crossover Removal and Tap Removal-Reconnect	1.6 acres	1.6 acres (Barrett and McKeighen, 2015b)	Negative
TN0060	Robertson	Tap Removal - Reconnect	1.0 acre	1.0 acre (Barrett and McKeighen, 2015b)	Negative
TN0070	Cheatham	Crossover Removal	0.8 acre	0.8 acre (Barrett and McKeighen, 2015b)	Negative Trail of Tears 3.5 miles away
TN0080	Cheatham	Tap Removal - Reconnect	0.3 acre	0.3 acre (Barrett and McKeighen, 2015b)	Negative
TN0100	Cheatham	Tap Removal - Reconnect	1.4 acres	1.4 acres (Barrett and McKeighen, 2015b)	Negative
TN0125	Dickson	Crossover Removal-River Crossing-Launcher/Receiver	1.8 acres	1.8 acres (Barrett and McKeighen, 2015b; Ezell and Wampler, 2001, as cited in Barrett and McKeighen, 2015b)	40DS69
TN0140 TN0150	Dickson	Crossover Removal, River Crossing and Launcher/Receiver Disconnect	1.3 acres	1.3 acres (Barrett and McKeighen, 2015b)	Negative
TN0160	Dickson	Tap Removal-Reconnect	2.5 acres	2.6 acres (Barrett and McKeighen, 2015b) 0.13 acre (Ryan, Munger, et al., 2015)	Negative
TN0170	Hickman	Crossover Removal	1.1 acres	1.1 acres (Barrett and McKeighen, 2015b)	Negative
TN0190	Hickman	Off-right-of-way Tap Reconnect	2.1 acres	2.1 acres (Barrett and McKeighen, 2015b)	Negative
TN0200	Hickman	Off-right-of-way Tap Reconnect	2.2 acres	2.1 acres (Barrett and McKeighen, 2015b) <0.14 acre (Ryan, Munger, et al., 2015)	Negative
TN0210	Perry	Off-right-of-way Tap Reconnect	2.0 acres	0.5 acre (Barrett and McKeighen, 2015b) 1.5 acres (Ryan, Munger, et al., 2015)	Negative
TN0220	Perry	Off-right-of-way Tap Reconnect	Included with TN0210		
TN0230	Perry	Gas Disconnect	0.1 acre	0.1 acre (Barrett and McKeighen, 2015b)	Negative
TN-78-002 TN0230	Perry	Yard at existing Compressor Station 79	5.0 acres	5.0 acres (Barrett and McKeighen, 2015b)	Negative
TN0250	Perry	Crossover Removal	3.3 acres	3.3 acres (Barrett and McKeighen, 2015b)	Negative
TN0260	Perry	Tap Removal-Reconnect	Included with TN0250		

Table I-5

Cultural Resources Investigations at TGP's Proposed ACRP Elements in Tennessee

Workspace	County	Activity	Disturbance [a]	Survey and Testing	Results
TN0280	Decatur	Crossover Removal	0.6 acre	0.6 acre (Barrett and McKeighen, 2015b)	Negative
TN0290	Henderson	Crossover Removal	0.7 acre	0.7 acre (Barrett and McKeighen, 2015b)	Negative
TN0300	Chester	Tap Removal-Reconnect	1.5 acres	1.5 acres (Barrett and McKeighen, 2015b)	Negative
TN0310	McNairy	Crossover Removal	0.4 acre	0.4 acre (Barrett and McKeighen, 2015b)	Negative
TN0320	McNairy	Tap Removal-Reconnect	0.7 acre	0.7 acre (Barrett and McKeighen, 2015b)	Negative
TN0330	McNairy	Crossover Removal	0.7 acre	0.7 acre (Barrett and McKeighen, 2015b)	Negative
TN0340	McNairy	Tap Removal-Reconnect	4.4 acres	4.5 acres (Barrett and McKeighen, 2015b)	Negative. Trail of Tears 1 mile north
TN0350	McNairy	Tap Removal-Reconnect	Included with TN0350		
TN0360	McNairy	Crossover Removal	1.1 acres	1.1 acres (Barrett and McKeighen, 2015b)	Negative
TN0370	McNairy	Tap Removal-Reconnect	1.5 acres	1.6 acres (Barrett and McKeighen, 2015b)	Negative
TN0380	McNairy	Crossover Removal	1.0 acre	1.0 acre (Barrett and McKeighen, 2015b)	Negative
TN0400	Hardeman	Gas Disconnect	0.1 acre	0.1 acre (Barrett and McKeighen, 2015b)	Negative
TN-71-000 TN0400 CS 71	Hardeman	Yard at existing Compressor Station 71	5.1 acres	5.2 acres (Ryan, Munger, et al., 2015)	Negative

a Totals may not add up to those provided in text due to rounding.

Table I-6

Cultural Resources Investigations at TGP's Proposed ACRP Elements in Mississippi

Workspace	County	Activity	Disturbance [a]	Survey and Testing	Results
MS0010	Benton	Crossover Removal	0.7 acre	0.7 acre (Holland et al., 2015a)	Negative
MS0030	Benton	Tap Removal-Reconnect	0.5 acre	0.5 acre (Holland et al., 2015a)	Negative
MS0040	Benton	Off-right-of-way Tap Reconnect	11.6 acres	11.7 acres (Holland et al., 2015a)	Negative
MS0045	Benton	Gas Disconnect	0.5 acre	0.5 acre (Holland et al., 2015a)	Negative
MS0050	Benton	Crossover Removal-River Crossing-Launcher/ Receiver	1.1 acres	1.2 acres (Holland et al., 2015a)	Negative
MS0060	Benton	Crossover Removal-River Crossing-Launcher/ Receiver	Included with MS0050		
MS0070	Marshall	Crossover Removal-Reconnect	0.9 acre	0.9 acre (Holland et al., 2015a)	Negative
MS0075	Marshall	Crossover Removal-Reconnect	1.0 acre	1.0 acre (Holland et al., 2015a)	Negative
MS0080	Lafayette	Crossover Removal-Reconnect	3.5 acres	3.5 acres (Holland et al., 2015a)	Negative
MS0090	Lafayette	Tap Removal-Reconnect	Included with MS0080		
MS0100	Panola	Crossover Removal-Reconnect	1.1 acres	1.1 acres (Holland et al., 2015a)	Negative
MS0110	Panola	Off-right-of-way Tap Reconnect	1.6 acres	1.5 acres (Holland et al., 2015a)	Negative
MS0120	Panola	Crossover Removal	1.3 acres	1.3 acres (Holland et al., 2015a)	Negative
MS0130	Panola	Tap Removal	0.2 acre	0.2 acre (Holland et al., 2015a)	Negative
MS0140	Panola	Gas Disconnect	0.1 acre	0.1 acre (Holland et al., 2015a)	Negative
MS-62-002 MS0140	Panola	Yard at existing Compressor Station 63	2.5 acres	2.5 acres (Holland et al., 2015a; Ryan, Johnson, et al., 2015; Reeves and Taylor, 2015b)	Negative
MS0150	Quitman	Crossover Removal	1.1 acres	1.2 acres (Holland et al., 2015a)	Negative
MS0160	Quitman	Tap Removal-Reconnect	1.6 acres	0.2 acre (Holland et al., 2015a)	Negative
MS0170	Quitman	Off-right-of-way Tap Reconnect	5.6 acres	5.6 acres (Holland et al., 2015a; Goodwin, 2015b)	22QU1048
MS0180	Quitman	Crossover Removal	Included with MS0170		
MS0190	Tallahatchie	Crossover Removal	0.7 acre	0.8 acre (Holland et al., 2015a)	Negative
MS0200	Tallahatchie	Off-right-of-way Tap Reconnect	3.6 acres	3.5 acres (Holland et al., 2015a)	Negative
MS0210	Tallahatchie	Crossover Removal	1.1 acres	1.1 acres (Holland et al., 2015a)	Negative
MS0220	Sunflower	Tap Removal-Reconnect	1.1 acres	1.1 acres (Holland et al., 2015a)	Negative
MS0230	Sunflower	Crossover Removal	1.6 acres	1.6 acres (Holland et al., 2015a)	Negative
MS0260	Sunflower	Tap Removal-Reconnect	1.2 acres	1.2 acres (Holland et al., 2015a)	Negative
MS0270	Sunflower	Crossover Removal	1.0 acre	1.0 acre (Holland et al., 2015a; Goodwin, 2015b)	Negative
MS0280	Sunflower	Off-right-of-way Tap Reconnect	5.1 acres	5.1 acres (Holland et al., 2015a)	IF#1
MS0290	Bolivar	Crossover Removal	0.9 acre	0.3 acre (Holland et al., 2015a)	Negative
MS0300	Washington	Crossover Removal	1.0 acre	1.0 acre (Holland et al., 2015a)	Negative
MS0310	Washington	Tap Removal-Reconnect	0.8 acre	0.2 acre (Holland et al., 2015a)	Negative
MS0320	Washington	Gas Disconnect	0.1 acre	0.1 acre (Holland et al., 2015a)	Negative
MS-53-002 MS320	Washington	Yard at existing Compressor Station 54	0.8 acre	0.8 acre (Holland et al., 2015a; Ryan, Johnson, et al., 2015)	Negative

Table I-6

Cultural Resources Investigations at TGP's Proposed ACRP Elements in Mississippi

Workspace	County	Activity	Disturbance [a]	Survey and Testing	Results
MLV 53 Replacement Pipeline	Washington	Replacement Pipeline	9.2 acres	Not Surveyed	Pending Survey
MS0340	Washington	Crossover Removal-River Crossing-Launcher/ Receiver	1.3 acres	1.3 acres (Holland et al., 2015a)	Negative

a Totals may not add up to those provided in text due to rounding.

Table I-7

Cultural Resources Investigations at TGP's Proposed ACRP Elements in Arkansas

Workspace	County	Activity	Disturbance[a]	Survey and Testing	Results
AR0010	Chicot	Crossover Removal – River Crossing – Launcher/ Receiver	1.0 acre	1.0 acre (Holland et al., 2015b; Goodwin, 2015d)	Ditch Bayou Battlefield Trail of Tears
AR0020	Chicot	Crossover Removal	1.0 acre	1.0 acre (Holland et al., 2015b)	Negative
AR0030	Ashley	Crossover Removal	0.8 acre	0.2 acre (Holland et al., 2015b)	Negative

a Totals may not add up to those provided in text due to rounding.

Table I-8

Cultural Resources Investigations at TGP's Proposed ACRP Elements in Louisiana

Workspace	Parish	Activity	Disturbance	Survey and Testing	Results
LA0010	Morehouse	Crossover Removal	1.6 acres	1.6 acres (Holland et al., 2015c)	16MO26
LA0020	Morehouse	Crossover Removal	1.4 acres	1.4 acres (Holland et al., 2015c)	Negative
LA0030	Morehouse	Crossover Removal	1.6 acres	1.6 acres (Holland et al., 2015c)	Negative
LA0040	Ouachita	Crossover Removal	1.6 acres	1.6 acres (Holland et al., 2015c)	Negative
LA0050	Ouachita	Crossover Removal	0.5 acre	0.6 acre (Holland et al,. 2015c) Tested (Goodwin, 2015f)	Negative
LA0060	Ouachita	Gas Disconnect	0.1 acre	0.1 acre (Holland et al., 2015c)	Negative
LA-46-004 LA0060	Ouachita	Yard at existing Compressor Station 47	3.2 acres	3.2 acres (Ryan, McLean, et al., 2015; Holland et al., 2015c; Reeves and Taylor, 2015c)	Negative
LA0075	Ouachita	Tap Removal	0.8 acre	0.8 acre (Holland et al., 2015c)	Negative
LA0080	Ouachita	Tap Removal	0.2 acre	0.2 acre (Holland et al., 2015c)	Negative
LA0090	Ouachita	Crossover Removal	1.2 acres	1.2 acres (Holland et al., 2015c)	Negative
LA0100	Ouachita	Tap Removal	0.6 acre	0.6 acre (Holland et al., 2015c)	Negative
LA0110	Jackson	Tap Removal	1.0 acre	1.0 acre (Holland et al., 2015c)	Negative
LA0120	Jackson	Tap Removal	Included with LA0110		
LA0130	Jackson	Crossover Removal	0.2 acre	0.2 acre (Holland et al., 2015c)	Negative
LA0140	Jackson	Tap Removal-Reconnect	0.9 acre	0.9 acre (Holland et al., 2015c)	IF#1 IF#2
LA0150	Jackson	Crossover Removal	0.5 acre	0.5 acre (Holland et al., 2015c)	Negative
LA0170	Winn	Crossover Removal, River Crossing, Launcher/ Receiver	0.3 acre	0.3 acre (Holland et al., 2015c)	Negative
LA0180	Winn	Crossover Removal	0.6 acre	0.6 acre (Holland et al., 2015c)	Negative
LA0190	Winn	Tap Removal	0.1 acre	0.1 acre (Ryan, McLean, et al., 2015)	Negative
LA0200	Winn	Tap Removal	1.2 acres	1.2 acres (Lehmann and Mayer, 2002 and Moore et al., 2008, both as cited in Holland et al., 2015c)	Negative
LA0210	Winn	Tap Removal	1.0 acre	1.0 acre (Moore et al., 2008, as cited in Holland et al., 2015c)	Negative
LA0220	Winn	Crossover Removal	0.6 acre	0.6 acre (Moore et al., 2008, as cited in Holland et al., 2015c)	Negative
LA0230	Natchitoches	Crossover Removal	0.5 acre	0.5 acre (Holland et al., 2015c)	Negative
LA0240	Natchitoches	Tap Removal-Reconnect	2.0 acres	2.0 acres (Holland et al., 2015c)	Negative
LA0250	Natchitoches	Tap Removal	0.6 acre	0.6 acre (Holland et al., 2015c)	Negative
LA0260	Natchitoches	Crossover Removal	1.1 acres	1.2 acres (Holland et al., 2015c)	Negative
LA0270	Natchitoches	Tap Removal	Included with LA0270		
LA0280	Natchitoches	Gas Disconnect	0.1 acre	0.1 acre (Holland et al., 2015c)	Negative
LA-40-000 (East) LA0280	Natchitoches	Yard at existing Compressor Station 40	1.7 acres	1.7 acres (Ryan, McLean, et al., 2015; Reeves and Taylor, 2015c)	Negative
LA-40-000 (West) LA0280	Natchitoches	Yard at existing Compressor Station 40	2.2 acres	2.2 acres (Ryan, McLean, et al., 2015; Reeves and Taylor, 2015c)	Negative

a Totals may not add up to those provided in text due to rounding.

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
OIL & GAS						
Wrinkle bend replacements associated with the Abandonment and Capacity Restoration Project (ACRP) [a]	Exact locations are not known at this time but would be on the abandoned line in OH, KY, TN, MS, AR, and/or LA Replacement of about 2,800 short sections of pipeline, each typically requiring a workspace about 75 feet wide by 250 feet long	Unknown	1,200 (estimated)	All	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation and Visual Resources Cultural Resources Socioeconomics Noise Air Quality	Concurrent with ACRP
Non-jurisdictional facilities associated with the ACRP (see table 1-4)	OH Power and telephone utilities outside the operational footprint of new compressor stations	0	33 (all locations combined)	CS 202.5 CS 206.5 CS 211.5 CS 216.5	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation and Visual Resources Cultural Resources Socioeconomics Noise Air Quality	Concurrent with ACRP
Broad Run Expansion Project Compressor Station (CS) 875 Tennessee Gas Pipeline Company, LLC (TGP) FERC Docket No. CP15-77	Madison, KY Construct new CS 875	0, 3	48.6 during construction	CS 875 (this compressor station would be built as part of the proposed Broad Run Expansion Project and then modified by ACRP), MLV 874 Replacement Pipeline	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation and Visual Resources Cultural Resources Socioeconomics Noise Air Quality	March 2016 to October 2017

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Broad Run Expansion Project CS 106 TGP FERC Docket No. CP15-77	Powell, KY Modify existing Compressor Station 106	0, 19.5	Existing facility, no new disturbance	KY0130 [b] (Workspace – Disconnect for CS 106), MLV 874 Replacement Pipeline	Air Quality	March 2016 to October 2017
Utica Marcellus Texas Pipeline (UMTP) Project Tuscarawas NGL Storage Facility Liquids Tanks UMTP, LLC	Tuscarawas, OH Construct an NGL storage and distribution terminal near Newport, OH, for handling various petroleum liquids	0.0	68.3	CS 211.5 (collocated with the proposed Tuscarawas NGL Storage Facility)	Soils Vegetation, Wildlife and T&E Land Use Recreation and Visual Resources Cultural Resources Socioeconomics Noise Air Quality	Fourth quarter 2018
UMTP Project Dix River horizontal directional drill (HDD) UMTP, LLC	Boyle and Garrard, KY Construct HDD	0.2, 17.5	8.9	KY0220 [b], MLV 874 Replacement Pipeline	Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project Pump Station 02 UMTP, LLC	Athens, OH Construct pump station	0.1	18.3	OH0140 [b]	Soils Water Resources Vegetation, Wildlife and T&E Cultural Resources Noise Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project Pump Station 03 UMTP, LLC	Greenup, KY Construct pump station	<0.1	7.3	KY0030 [b]	Soils Water Resources Vegetation, Wildlife and T&E Cultural Resources Noise Air Quality	Planned in-service date: fourth quarter 2018

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
UMTP Project Pump Station 04 UMTP, LLC	Rowan, KY Construct pump station	0.1	9.1	CS 110	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation and Visual Resources Cultural Resources Socioeconomics Noise Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project Pump Station 05 UMTP, LLC	Powell, KY Construct pump station	0.1, 19.7	12.7	KY0130 [b], MLV 874 Replacement Pipeline	Soils Water Resources Vegetation, Wildlife and T&E Cultural Resources Noise Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project Pump Station 06 UMTP, LLC	Garrard, KY Construct pump station	Unknown, 9.9	5.8	KY0170, MLV 874 Replacement Pipeline	Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project Pump Station 11 UMTP, LLC	Dickson, TN Construct pump station	0.3	10.3	TN0190	Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project Pump Station 12 UMTP, LLC	Perry, TN Construct pump station	0.1	8.5	TN0230 [b] TN0210/TN0220	Soils Water Resources Vegetation, Wildlife and T&E Land Use Cultural Resources Socioeconomics Noise Air Quality	Planned in-service date: fourth quarter 2018

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
UMTP Project Pump Station 13 UMTP, LLC	Chester, TN Construct pump station	0.1	5.9	TN0300 [b]	Soils Water Resources Vegetation, Wildlife and T&E Cultural Resources Noise Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project Pump Station 14 UMTP, LLC	Hardeman, TN Construct pump station	0.1	10.6	TN0400 [b]	Soils Water Resources Vegetation, Wildlife and T&E Cultural Resources Noise Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project Pump Station 16 UMTP, LLC	Panola, MS Construct pump station	0.1	9.4	MS0140 [b]	Soils Water Resources Vegetation, Wildlife and T&E Cultural Resources Socioeconomics Noise Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project Pump Station 17 UMTP, LLC	Sunflower, MS Construct pump station	<0.1	11.4	MS0220 [b] MS0230 [b]	Soils Water Resources Vegetation, Wildlife and T&E Cultural Resources Socioeconomics Noise Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project Pump Station 18 UMTP, LLC	Washington, MS Construct pump station	0.1, 1.7	10.4	MS0320 [b] MLV 53 Replacement Pipeline	Soils Water Resources Vegetation, Wildlife and T&E Cultural Resources Socioeconomics Noise Air Quality	Planned in-service date: fourth quarter 2018

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
UMTP Project Pump Station 20 UMTP, LLC	Ouachita, LA Construct pump station	0.1	11.3	LA0060 [b]	Soils Water Resources Vegetation, Wildlife and T&E Cultural Resources Socioeconomics Noise Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project Pump Station 21 UMTP, LLC	Jackson, LA Construct pump station	0.1	7.6	LA0150 [b]	Soils Water Resources Vegetation, Wildlife and T&E Cultural Resources Socioeconomics Noise Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project Pump Station 22 UMTP, LLC	Natchitoches, LA Construct pump station	0.1	14.9	LA0280 [b]	Soils Water Resources Vegetation, Wildlife and T&E Cultural Resources Socioeconomics Noise Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project Lewis Branch Lateral UMTP LLC	Harrison, OH; Natural gas liquids (NGL) pipeline construction	4.2	19.0	CS 211.5 OH0030	Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project Scio-Hopedale Branch Lateral UMTP LLC	Tuscarawas, Harrison, OH NGL pipeline construction	0.0	419	CS 211.5	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation/ Visual Resources Cultural Resources Socioeconomics Noise Air Quality	Planned in-service date: fourth quarter 2018

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
UMTP Project Dickson Pipeline UMTP LLC	Dickson, TN NGL pipeline construction	0.0	80.1	TN0140/TN0150 [b] TN0125 [b]	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation/ Visual Resources Cultural Resources Socioeconomics Noise Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project Snow Lake Pipeline UMTP LLC	Benton, MS NGL pipeline construction	0.0	37.3	MS0050 [b] MS0045 [b] MS0040	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation/ Visual Resources Cultural Resources Socioeconomics Noise Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project LA/TX New-build Pipeline UMTP LLC	LA, TX NGL pipeline construction	0.1	2,486	LA0280 [b]	Soils Water Resources Vegetation, Wildlife and T&E Cultural Resources Noise Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project CS 214 Short Pipeline Segment Bypass UMTP LLC	Carroll, OH NGL pipeline construction	0.0	0.8	OH0007 [b] OH0030	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation/ Visual Resources Cultural Resources Socioeconomics Noise Air Quality	Planned in-service date: fourth quarter 2018

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
UMTP Project CS 209 Short Pipeline Segment Bypass UMTP LLC	Guernsey, OH NGL pipeline construction	0.0	1.4	OH0070 [b] CS 206.5	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation/ Visual Resources Cultural Resources Socioeconomics Noise Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project CS 96 Short Pipeline Segment Bypass UMTP LLC	Taylor, KY NGL pipeline construction	0.0	2.4	KY0320 [b]	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation/ Visual Resources Cultural Resources Socioeconomics Noise Air Quality	Planned in-service date: fourth quarter 2018
UMTP Project CS 87 Short Pipeline Segment Bypass UMTP LLC	Sumner, TN NGL pipeline construction	0.0	4.9	TN0010 [b]	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation/ Visual Resources Cultural Resources Socioeconomics Noise Air Quality	Planned in-service date: fourth quarter 2018

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
NEXUS Gas Transmission Project Gas Pipeline Spectra Energy FERC Docket No. CP16-22	Muskingum, Jackson, Vinton, Columbiana, and Carroll, OH The NEXUS Project consists of a large-diameter natural gas pipeline that would extend approximately 250 miles from receipt points in eastern OH to interconnect with the existing pipeline grid in southeastern Michigan. Counties that would overlap with the ACRP are Columbiana and Carroll County, OH	21.2	5,011	CS 216.5	Air Quality	EIS in progress; if approved, anticipated start of construction early in 2017; completion by fourth quarter 2017
Ohio Pipeline Energy Network (OPEN) – Gas Pipeline Spectra Energy FERC Docket No. CP14-68	Columbiana and Carroll, OH The Project consisted of approximately 76 miles of new 30-inch diameter mainline pipeline, a new compressor station, and associated pipeline support facilities in OH. The Project also included reverse flow modifications at existing compressor stations along Texas Eastern's existing mainline in OH, KY, MS, and LA. Approximately 35 miles (49%) of the proposed pipeline facilities are either within or adjacent to existing transmission line or pipeline ROW. Capacity: 550,000 dekatherms per day. Counties overlapped with ACRP: Columbiana and Carroll County, OH	21.2	1,416.4	CS 216.5	Air Quality	Construction started in 2015; Project is in service
Rover Gas Pipeline Project ET Rover, LLC FERC Docket No. CP15-93	OH The Rover Pipeline would transport 3.25 billion cfd natural gas through approximately 711 miles of 24-inch, 30-inch, 36-inch and 42-inch-diameter pipeline. The Project would also build 10 compressor stations and 19 metering stations along its route. Counties overlapped with ACRP: Carroll, Tuscarawas, and Harrison Counties, OH	9.6	9.575	CS 211.5	Land Use Socioeconomics Air Quality	Final EIS issued July 29, 2016; If approved, would be placed in service by mid- to late 2017

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Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Utopia East NGL Pipeline Project Kinder Morgan Utopia LLC	Harrison, Fulton, and Carroll, OH, Windsor, Ontario, Canada Kinder Morgan would develop, construct, own, and operate a 215-mile, 12-inch diameter pipeline from Harrison County, OH, to Fulton County, OH, where the company would then move product eastward to Windsor, Ontario, Canada. The Utopia East system would transport previously refined or fractionated natural gas liquids, including ethane and ethane-propane mixtures	10	Unknown	CS 211.5	Land Use Socioeconomics Air Quality	Construction to begin in November 2016; Scheduled for completion in January 2018
Leach Xpress Project Gas Pipeline Columbia Gulf Transmission, LLC FERC Docket No. CP15-514	Muskingum, Jackson, Vinton, Columbiana, and Carroll, OH The Leach Xpress project includes 126.9 miles of 36-inch-diameter greenfield pipeline, two 36-inch diameter looping pipelines totaling 29.6 miles, and one 30-inch diameter lateral that is approximately 0.5 miles in length. The project will increase the capacity of Columbia Transmission's system by 1.5 Bcf/D and move regional gas supplies to various markets, including its interconnect with Columbia Gulf in Leach, KY. By connecting production areas to Columbia Transmission's mainline system, the project would allow producers access to high-demand energy markets and support delivery of affordable, domestic energy for consumers. Crosses ACRP in Morgan and Jackson Counties, OH	0.0	3,162	CS 202.5 CS 206.5	Soils Water Resources Vegetation, Wildlife and T&E Land Use Socioeconomics Air Quality	Final EIS issued September 1, 2016. Construction to begin in November 2016; In service in November 2017

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Texas Eastern Appalachian Lease (TEAL) Gas Pipeline Compressor Station/ Facility Work Texas Eastern Transmission, L.P. FERC Docket No. PF15-11	Monroe, Columbiana and Belmont OH Texas Eastern is proposing to construct approximately 4.5 miles of new 36-inch-diameter natural gas loop pipeline4 in Monroe County, OH; one new compressor station with 18,800 hp in Columbiana County, OH; additional 9,400 hp of compression and piping modifications at one existing compressor station (Colerain Compressor Station) in Belmont County, OH; and launchers, receivers, and various piping modifications at 2 existing regulating and receiver sites in Monroe County, OH. Counties overlapped with ACRP: Columbiana County, OH	21	213	CS 216.5	Air Quality	Construction scheduled from March to October 2017; In service by November 2017
Gulf Markets Expansion Project System Modifications and Additional Compression Texas Eastern Transmission, L.P. FERC Docket No. CP15-90	KY, LA, MS, TN, TX Texas Eastern Transmission proposes to provide 650,000 dekatherms per day (Dth/d) of natural gas to the Gulf Coast region of LA and TX from the natural gas basins in the Northeast and TX through modifications and additional compression on their existing system to allow for bi-directional flow; modifications at the Wheelersburg Compressor Station in Scioto County, OH. Counties overlapped with ACRP: Scioto County, OH, and Bath County, KY.	19 miles from CS 202.5	50	CS 202.5	Air Quality	Construction began in February 2016; Fully in service by August 2017

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Trunkline Backhaul Project Modifications to Allow for Bi-directional Flow Trunkline Gas Company, LLC FERC Docket No. CP15-96	IL, TN, Tate, MS Trunkline is proposing the upgrades and modifications to allow for bi-directional flow of natural gas on their existing pipeline systems. This project is associated with the Rover Pipeline and Panhandle Backhaul Projects. Counties overlapped with ACRP: Tate County, MS	22.5	Existing facility no new disturbance	MS0110	Air Quality	Final EIS published July 29, 2016
Access South Project, Adair Southwest Project, and Lebanon Extension Project System Modifications, New Pipeline, and Additional Compression Texas Gas Transmission, LLC FERC Docket No. PF15-17	AL, KY, MS, OH, PA, TN Texas Eastern proposes to modify existing facilities along its pipeline system in PA, OH, KY, TN, AL, and MS. The proposed facilities for the Projects include 19.9 miles of 36-inch diameter pipeline looping segments, most of which would be either within or adjacent to Texas Eastern' s current ROW. Proposed modifications to aboveground facilities would include the installation of new compression and additional modifications necessary to allow for bi-directional flow, increased horsepower requirements, and meter reversals at thirteen existing compressor stations	New pipeline construction is 26 miles from CS 202.5; CS modifications are about 16 miles from KY0080 and about 22.4 miles from the MLV 874 Replacement Pipeline	632	CS 202.5, CS 206.5, KY0080, MLV 874 Replacement Pipeline	Air Quality	Start construction in April 2017; In service by November 1, 2017
REX Zone 3 Capacity Enhancement Project New and Modified Compressor Stations Rockies Express LLC FERC Docket No. CP15-137	Muskingum, OH; IN REX proposes to construct and operate three new compressor stations and ancillary facilities in OH and IN, and add additional compression to an existing station in OH. REX would also add gas cooling facilities and/or power and control room buildings at two existing compressor stations in OH. Modifications to the Chandlersville compressor station in Muskingum County, OH, would be within the air quality region of influence for CS 206.5	11	70.4. Activities within air quality region of influence would not result in surface disturbance.	CS 206.5	Air Quality	Start construction in May 2016; In service by December 2016

Table J-1						
Existing or Proposed Projects Evaluated for Potential Cumulative Impacts						
Cumulative Action Name	**Project Location (County, State) and Project Description**	**GIS Distance (miles)**	**Potential Area of Surface Disturbance (acres)**	**Applicable ACRP Facilities**	**Resources Potentially Affected**	**Anticipated Construction Date**
E-Systems Project Pipe Replacement Columbia Gas Transmission, LLC FERC Docket No. CP15-160	Menifee, Montgomery, Bath, Nicholas, Robertson and Bracken, KY Replacement of existing high pressure, bare steel pipeline. The replacement of the existing pipeline would enable Columbia to continue providing safe and reliable transportation service to its customers. Counties overlapped by ACRP: Montgomery County, KY	0.1, 31.0	426	KY0120 [b], MLV 874 Replacement Pipeline	Soils Water Resources Vegetation, Wildlife and T&E Cultural Resources Noise Air Quality	Start construction in October 2015; In service by September 2016
Northern Supply Access Project New and Modified Compressor Stations Texas Gas Transmission, LLC FERC Docket No. CP15-513	Morehouse Parish, LA; Dearborn and Lawrence, IN; Breckinridge, Jefferson, and Webster KY; Tipton, TN; Coahoma ,MS; Hamilton, OH Modifications at eight existing compressor stations and construction of one new compressor station in Hamilton County, OH	20.4	146	MS0200	Air Quality	Start construction in second quarter 2016; In service by April 2017
Rayne Xpress Expansion Project Two Greenfield Compressor Stations and Associated Piping Columbia Gulf Transmission, LLC FERC Docket No. CP15-539	Carter, Menifee, Montgomery, KY Construct and operate facilities connected to its existing natural gas transmission system. The Project includes the installation of two greenfield compressor stations on the existing transmission system for delivery of gas. The proposed Grayson Compressor Station, a 36,400 Horsepower (hp) facility is in Carter County, KY. The proposed Means Compressor Station, a 15,400 hp facility is in Menifee and Montgomery Counties, KY	15.5, 31.0	32	New-Build Pipeline, KY0080, MLV 874 Replacement Pipeline	Land Use Socioeconomics Air Quality	Final EIS issued September 1, 2016. Start construction fourth quarter 2016; In service by November 1, 2017

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Gulf XPress Project Columbia Gulf Transmission, LLC FERC Docket No. CP16-361	Granada, MS, Wayne, TN, Garrard, KY, Boyd, KY Four of the nine proposed midpoint compressor stations along the existing Columbia pipeline system are located within the ACRP air quality region of influence	Multiple Locations	33	New-build Pipeline, KY0170, TN0210/TN0220, MS0200	Air Quality	2017–2018
Gulf XPress Project Columbia Gulf Transmission, LLC FERC Docket No. CP16-361	Rowan, Carter, KY Two of the nine proposed midpoint compressor stations along the existing Columbia pipeline system are located within counties that also include larger disturbances associated with ACRP	Multiple Locations	11.1	KY0080, New-build Pipeline	Land Use Socioeconomics Air Quality	2017–2018
Broad Run System Flexibility Project CS 110 TGP	Rowan, KY Phase I – modifications of appurtenant facilities at six existing compressor stations: reverse flow at CS 110. Phase I also includes miscellaneous pipe class changes. Phase II – modifications of appurtenant facilities at existing compressor stations: add cooling and modify pig launcher/receiver traps at CS 110. Phase II also includes hydrostatic testing.	0.0	Modifications at existing facilities	CS 110	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation and Visual Resources Cultural Resources Socioeconomics Noise Air Quality	In service November 2015
Broad Run System Flexibility Project CS 106 TGP	Powell, KY Phase I – modifications of appurtenant facilities at six existing compressor stations: reverse flow at CS 106. Phase I also includes miscellaneous pipe class changes. Phase II – modifications of appurtenant facilities at existing compressor stations: add cooling, replace unit controls, and modify pig launcher/receiver traps at CS 106. Phase II also includes hydrostatic testing.	0.1, 19.5	Modifications at existing facilities	KY0130 [b] (gas disconnect at CS 106) , MLV 874 Replacement Pipeline	Water Resources Vegetation, Wildlife and T&E Cultural Resources Noise Air Quality	In service May 2016

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Broad Run System Flexibility Project CS 200 TGP	Greenup, KY Phase I – modifications of appurtenant facilities at six existing compressor stations: add filter/separators at CS 200. Phase I also includes miscellaneous pipe class changes. Phase II – modifications of appurtenant facilities at existing compressor stations: modify pig launcher/receiver traps at CS 200. Phase II also includes hydrostatic testing.	0.1	Modifications at existing facilities	KY0030 [b] (gas disconnect at CS 200)	Soils Water Resources Vegetation, Wildlife and T&E Cultural Resources Noise Air Quality	In service March 2015
Broad Run System Flexibility Project Pipeline replacements for pipe class changes	Hickman, Cheatham Counties, TN: replace 2.1 miles of 26- to 30-inch-diameter pipeline Lowndes County, MS: replace 4.95 miles of 30- to 36-inch-diameter pipeline Ouachita, Franklin Counties, LA: replace 9.8 miles of 24- to 30-inch-diameter pipeline	0.0	Modifications at existing facilities	Multiple	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation and Visual Resources Cultural Resources Socioeconomics Noise Air Quality	Construction November 2014 to July 2016; Placed in service May 2015 to July 2016

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Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Maintenance activities on the TGP pipeline system TGP	OH, KY, TN, MS, AR, LA Generally includes four types of work: • Investigation and potential remediation of pipeline anomalies; • Repairs or upgrades to compressor stations and appurtenances; • ROW maintenance; and • Reestablishing depth of cover. TGP currently anticipates maintenance activities at the following number of sites in each state affected by the ACRP: • LA – 25 • AR – 2 • MS – 32 • TN – 47 • KY – 46 • OH – 74	Multiple Locations	Unknown	Multiple	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation and Visual Resources Cultural Resources Socioeconomics Noise Air Quality	Various
Palmer Pad Well Site PDC Energy, Inc.	Morgan, OH New production and flaring operations for the PDC Energy Palmer Production Facility	14	Over 2	CS 206.5	Land Use Socioeconomics Air Quality	Well Permit issued 4/9/2012; Expired 4/9/2014 Permit-to-Install and Operate issued 8/28/2014; Expires 8/28/2024
Leesville Cryogenic Gas Processing Plant Construction Utica East Ohio Midstream	Carroll, OH Initial installation of a 450-million standard cubic feet/day (cfd) natural gas cryogenic processing plant	9.8	About 42	CS 211.5	Air Quality	Construction occurred in late 2014 and early 2015
Carrollton Compressor Facility modifications Utica Gas Services, LLC	Carroll, OH Installation of backup generators, condensate tank, produced water tanks, and unpaved roadways. Increased emissions would require a Title V permit	22.5	Existing facility, no new disturbance	CS 211.5	Air Quality	Permit-to-Install and Operate issued 12/5/2012; Expires 12/5/2017

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Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Permitted Oil and Gas Well D T Atha, Inc.	Athens, OH One proposed and permitted well location in Rome Township	16.5	Unknown	OH0110	Air Quality	Permit issued on January 20, 2016
Permitted Oil and Gas Wells Various Operators	Belmont, OH 67 wells proposed and permitted since 2015	18 and greater	Unknown	CS 211.5	Air Quality	Permits issued in 2015 and 2016
Permitted Oil and Gas Wells Various Operators	Carroll, OH 65 wells proposed and permitted since 2015	11.8 and greater	Unknown	OH0030	Air Quality	Permits issued in 2015 and 2016
Permitted Oil and Gas Wells Various Operators	Coshocton, OH Six wells proposed and permitted since 2015	14.8 and greater	Unknown	CS 211.5	Air Quality	Permits issued in 2015 and 2016
Permitted Oil and Gas Wells Various Operators	Harrison, OH 100 wells proposed and permitted since 2015	9.8 and greater	Unknown	OH0030	Air Quality	Permits issued in 2015 and 2016
Permitted Oil and Gas Wells Various Operators	Jefferson, OH 82 wells proposed and permitted since 2015	23.6 and greater	Unknown	OH0030	Air Quality	Permits issued in 2015 and 2016
Permitted Oil and Gas Wells Energy Resources America	Mahoning, OH One proposed and permitted well in Beaver Township	3	Unknown	CS 216.5	Land Use Socioeconomics Air Quality	Permit issued on 4/21/2015
Permitted Oil and Gas Well Artex Oil Company	Morgan, OH One proposed and permitted well in Bristol Township	8.8	Unknown	CS 206.5	Land Use Socioeconomics Air Quality	Permit issued 5/15/2015
Permitted Oil and Gas Well Derrick Petroleum, Inc.	Muskingum, OH Two proposed and permitted wells in Licking Township	27.8 to 28.3	Unknown	CS 206.5	Air Quality	Permit issued 2/20/2015
Permitted Oil and Gas Wells Various Operators	Noble, OH 22 proposed and permitted wells within air quality region of influence	24	Unknown	CS 211.5	Air Quality	Permits issued in 2015 and 2016

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Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Permitted Oil and Gas Well Enervest Operating LLC	Stark, OH One proposed and permitted well in Sandy Township	21.7	Unknown	OH0030	Air Quality	Permit issued 4/14/2015
Permitted Oil and Gas Well Halcon Operating Company Inc.	Trumbull, OH One proposed and permitted well in Warren Township	26.3	Unknown	CS 216.5	Air Quality	Permit issued 6/10/2015
Permitted Oil and Gas Well NGO Development Corp.	Tuscarawas, OH One proposed and permitted well in Salem Township	11.2	Unknown	CS 211.5	Land Use Socioeconomics Air Quality	Permit issued 12/31/2015
Permitted Oil and Gas Well Chesapeake Appalachia LLC	Tuscarawas, OH One proposed and permitted well in Rush Township	2.8	Unknown	CS 211.5	Land Use Socioeconomics Air Quality	Permit issued 3/8/2016; Drilling completed 4/14/2016
Permitted Oil and Gas Wells SLC Energy Ltd	Vinton, OH Two proposed and permitted wells in Madison Township	24.7	Unknown	OH0110	Air Quality	Permits issued 2/13/2015; One well completed on 3/29/2015
Permitted Oil and Gas Wells PDC Energy Inc.	Washington, OH Five wells proposed and permitted since 2015 in Waterford Township	19.1	Unknown	CS 206.5	Air Quality	Permits issued between 8/25/2015 and 11/27/2015
Permitted Oil and Gas Wells Redbird Development LLC	Washington, OH One well proposed and permitted since 2015 in Dunham Township	20.6	Unknown	OH0110	Air Quality	Permit issued 9/23/2015
Permitted Oil and Gas Wells Various Operators	Guernsey, OH 40 proposed and permitted wells since 2015	15.3 and greater	Unknown	CS 206.5, CS 211.5	Air Quality	Permits issued between 1/6/2015 and 4/19/2016
Permitted Oil and Gas Wells Various Operators	Columbiana, OH 24 proposed and permitted wells since 2015	5.2 and greater	Unknown	CS 216.5	Air Quality	Permits issued between 1/7/2015 and 4/12/2016
Permitted Oil and Gas Wells Penneco Oil Company, Inc.	Wood, WV Two proposed and permitted wells since 2015	29.2 to 30.2	Unknown	OH0110	Air Quality	Permits issued 3/3/2015

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Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Permitted Oil and Gas Well Shelby Exploration LLC	Clark, KY One proposed and permitted well located off Jackson Ferry Road	6.9	Existing pad, no new disturbance	CS 875	Air Quality	Permit issued 3/30/2016
Permitted Oil and Gas Well Terra Nova Exploration LLC	Elliott, KY One proposed and permitted well, off Hwy 486	24.6	About 1.4	New Build Pipeline	Air Quality	Permit issued 8/6/2015; Construction completed in early 2016
Permitted Oil and Gas Wells 18 Motorsports LLC	Lincoln, KY Four proposed and permitted wells near Hwy 698 and Morse Ridge Rd	26.5	Unknown	KY0170	Air Quality	Permits issued 4/12/2016
Permitted Oil and Gas Wells Nytis Exploration Company, LLC and KWR Ventures LLC	Greenup, KY Nine proposed and permitted wells since 2015	11.4 to 18.8	Unknown	New-build Pipeline	Air Quality	Permits issued between 7/10/2015 and 2/1/2016
Permitted Oil and Gas Wells Various Operators	Lawrence, KY Five proposed and permitted wells since 2015	26.6 to 29.8	Unknown	New-build Pipeline	Air Quality	Permits issued between 1/29/2015 and 9/4/2015; Construction completed by early 2016
Permitted Unconventional Gas Wells Chesapeake Appalachia LLC, Range Resources Appalachia LLC and Pennenergy Resources LLC	Beaver, PA 48 unconventional shale gas wells proposed and permitted since 2015	7.9 and greater	Unknown	CS 216.5	Air Quality	Permits issued between 3/16/2015 and 1/21/2016
Permitted Unconventional Gas Wells Pennenergy Resources LLC, RE Gas Dev LLC, and XTO Energy Inc.	Butler, PA Six unconventional shale gas wells proposed and permitted since 2015. Four in Forward Twp, one each in Jackson and Lancaster Twps	23.2 and greater	Unknown	CS 216.5	Air Quality	Permits issued between 4/14/2015 and 12/29/2015

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
UTILITIES (ELECTRIC)						
E.W. Brown Generation Station Solar Power Plant Louisville Gas & Electric and Kentucky Utilities	Mercer, KY Universal solar facility projected to produce 19,000 MW-hours of energy per year at existing coal-fired power plant near Harrodsburg	25.6	50	KY0170	Air Quality	2016
500 kW oil emergency generator Youngstown State University	Mahoning, OH 500 kW oil fuel emergency generator located at 603 Wick Ave, Youngstown, OH	13.3	Unknown	CS216.5	Land Use Socioeconomics Air Quality	2016
127 hp Natural Gas Generator Dominion East Ohio Gas	Guernsey, OH 127 hp electrical generator fired by natural gas located at 60755 Country Club Road, Byesville, OH	27.4	Unknown	CS211.5	Air Quality	2016
Diesel Compressor Dover Municipal Light Plant	Tuscarawas, OH Installation of a diesel compressor system as a primary back-up at 303 East Broadway, Dover, OH	12.9	Unknown	OH0030	Land Use Socioeconomics Air Quality	2016
Water pumps Sunoco Pipeline Hopedale Station	Harrison, OH Two emergency diesel water pumps for fire fighting at 46725 Giacobbi Rd, Jewett, OH	21.3	Unknown	OH0030	Air Quality	2016
150 kW generator Harrison Hub Fractionation Plant	Harrison, OH 150 kW emergency generator located at 37905 Crimm Rd, Scio, OH	12.4	Unknown	OH0030	Air Quality	2016
Kentucky River Lock and Dam No. 11 Hydroelectric Project Construction Free Flow Power Project 92, LLC FERC Docket No. AD13-9	Madison and Estill, KY 5 MW Kentucky River Lock and Dam No. 11 project (P-14276) to add power at the Kentucky River Authority's existing Lock and Dam 11 on the Kentucky River	8, 11	0.47 permanent for lock and dam construction; 23 acres temporary for transmission line	CS 875, MLV 874 Replacement Pipeline	Land Use Socioeconomics Air Quality	EA published in February 2016; License issued May 2016

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Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Station Cooling Towers Installation Rolling Hills Generating, LLC	Vinton, OH Installation of two Mechanical Draft Cooling Towers. This installation is part of point source determination project with turbine modification in PTI P0110152	19	Unknown	CS 202.5	Air Quality	Ohio EPA Permit-to-Install issued May 20, 2015
Carroll County Power Plant Carroll County, OH	Carroll, OH 700 MW natural gas power plant	22.7	17	OH0030	Air Quality	Construction began in July 2015; commercial operations expected to start in December 2017
Eastern Ohio Tri-County Improvements AEP Transmission	Tuscarawas and Harrison, OH Rebuild and upgrade of approximately 20 miles of transmission line from Dennison to Desert Road substation	2.3 and greater	Unknown	OH0030	Soils Water Resources Vegetation, Wildlife and T&E Land Use Socioeconomics Air Quality	2017
Barnesville-Summerfield 138-kV Transmission Line Rebuild Project AEP Transmission	Noble, Guernsey, Belmont, OH Rebuild and upgrade 16 miles of existing power lines	26.1	Unknown	CS 211.5	Air Quality	2017–2018
Marietta Area Improvement Project AEP Transmission	Washington, Noble, Monroe, OH New construction of 96-kV and 138-kV electric transmission lines and a substation	20 and greater	Unknown	CS 206.5	Air Quality	2016–2020
Speidel-Barnesville 138-kV Transmission Line Rebuild Project AEP Transmission	Belmont, OH Replace and upgrade approximately four miles of existing transmission line near Barnesville	25.5	Unknown	CS 211.5	Air Quality	2016–2018
Wagenhals Extension 69-kV Transmission Line Project AEP Transmission	Stark, OH Replace aged wood structures with new steel, single pole structures along approximately 2 miles of transmission line in Canton	29.4	Unknown	OH0030	Air Quality	2016–2017

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Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Lordstown Power Plant Clean Energy Future – Lordstown, LLC.	Trumbull, OH New 949 MW gas-fired power plant in Lordstown	22.5	150	CS 216.5	Air Quality	2016–2018
South Field Energy Electric Generation Facility and 345-kV Transmission Line South Field Energy	Columbiana, OH 1,100 MW natural gas power plant near Wellsville and associated new three-mile-long 345-kV transmission line	Approx. 20.9	Unknown (20 acres for power plant)	CS 216.5	Air Quality	Application filed January 2016; Public hearings held June 2016; Construction proposed to begin 2017
Glenwillow-Bruce Mansfield Project FirstEnergy	Mahoning, Beaver, Columbiana, Portage, Summit, OH Construction of new 138 and 345-kV transmission lines, constructing new substations, and upgrading existing infrastructure	17.3	Unknown	CS 216.5	Land Use Socioeconomics Air Quality	2013–2016
138-kV Loops to Yager Substation Project FirstEnergy	Harrison, OH Loop extensions and connectors near Dennison	5.6	Unknown	OH0030	Air Quality	2016–2017
Campbell-Keister-McDowell Transmission Project FirstEnergy	Mercer and Butler, PA Expansion of the existing Campbell Substation in Mercer County and rebuild of transmission lines near Grove City and Slippery Rock	29.6	Unknown	CS 216.5	Air Quality	2016
Oxford-Coffeeville Transmission Line Project Tennessee Valley Authority	Lafayette and Yalobusha, MS New transmission line from Oxford to Coffeeville. Eleven miles would utilize an existing right-of-way and approximately 16 miles of new right-of-way	20.6	Unknown	MS0110, MS0170	Air Quality	2017
West Batesville-North Oakland Transmission Line Project Tennessee Valley Authority	Panola,Tallahatchie, Yalobusha, MS Proposed 40 miles of transmission line and a 161-kV substation	8.7	Unknown	MS0170	Land Use Socioeconomics Air Quality	2018–2020

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Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
UTILITIES (WATER/SEWER)						
Sewer Improvements – Scioto County Scioto County Regional Water District No. 1	Scioto, OH Permit to install holding tank and sanitary sewer extension for Scioto County Regional Water District No. 1. This project would consist of designing and constructing storm sewer to separate storm water and creek water sources from the combined sewer	9	Unknown	CS 202.5	Air Quality	Ohio EPA Permit-to-Install issued October 2014
Vocational School Waterline Replacement Construction Scioto County Regional Water District No. 2	Scioto, OH Final approval of plans and specifications. Detail plans for PWSID: OH7300212 PLAN NO: 989609 regarding Vocational School Waterline Replacement	19.5	Unknown	CS 202.5	Air Quality	Ohio EPA Permit-to-Install issued September 2014
Robbins Road Sanitary Sewer Extension Construction City of Nelsonville	Athens, OH Permit to install Sanitary Sewer Extension from Robbins Road to Hocking Parkway	11.7	Unknown	OH0110	Air Quality	Ohio EPA Permit-to-Install issued October 2014
Lake Chicot Pumping Plant USACE, Vicksburg District	Chicot, AR Pumping plant improvements for flood prevention. Permit ARR154259. Expires 10/31/2016	26, 4.2	Unknown	MS0280, MLV 53 Replacement Pipeline	Air Quality	2016
USACE Lake Jackson Palmetto Levee Enlargement	Washington, MS Clearing and grubbing, construction of semi-compacted levee embankment, ramp levee surfacing, compacted berm embankment, existing turf maintenance, new turf establishment, silt fencing, etc.	18.6	Unknown	MLV 53 Replacement Pipeline	Socioeconomics Land Use Air Quality	Construction contract awarded December 2014
TRANSPORTATION						
Athens Department of Transportation (DOT) Maintenance Facility Ohio DOT, District 10	Athens, OH Replacement of Pump Station, Gravity Sewers and Force Mains for the Athens Ohio DOT Full Service Maintenance Facility	13.5	Existing facility, no new disturbance	OH0110	Air Quality	Unknown

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Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Arkansas State Highway and Transportation Department Road Construction, Job 020509	Ashley, AR West side of the Hwy 82 bridge over Hwy 165 and UPRR tracks in Montrose, AR	23.3	Unknown	MLV 53 Replacement Pipeline	Air Quality	Unknown
County Road 406 Extension Road Improvements Lafayette County Board of Directors	Lafayette, MS Extension of CR 406 to a 3-lane with curbs and gutters. Open-Ditch roadway	23	Unknown	MS0110	Air Quality	Unknown
SR 315 Bridge Replacement	Panola, MS Replacement of deteriorated bridge along SR 315 in Pleasant Grove, MS	11.6	Unknown	MS0110	Land Use Socioeconomics Air Quality	Unknown
SR 32 Bridge replacements MS DOT	Bolivar, MS 2 bridge Replacements	27.4	Unknown	MS0280	Air Quality	2019–2020
SR 448 Bridge Replacements MS DOT	Bolivar, MS 4 bridge replacements between Benoit and Shaw	7.9	Unknown	MS0280	Air Quality	2017
SR 32 bridge replacements MS DOT	Tallahatchie, MS 16 bridge replacements between Webb and Charleston	7.5 to 17.5	Unknown	MS0200	Land Use Socioeconomics Air Quality	2016–2019
US 49 bridge replacements MS DOT	Tallahatchie, MS Bridge replacements at Black and Hopson Bayous	6.0 to 9.7	Unknown	MS0200	Land Use Socioeconomics Air Quality	2017–2019
SR 6 bridge replacements MS DOT	Quitman, MS 13 bridge replacements	10 to 17	Unknown	MS0170	Land Use Socioeconomics Air Quality	2016–2020
US 51 bridge replacements MS DOT	Panola, MS 2 bridge replacements	13.3	Unknown	MS0110	Land Use Socioeconomics Air Quality	2018
SR 6 bridge replacements MS DOT	Panola, MS Bridge replacements at Tallahatchie River and Relief bridge	12.7	Unknown	MS0110	Land Use Socioeconomics Air Quality	2016

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Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
SR 7 bridge replacement MS DOT	Lafayette, MS Bridge replacement at Burney Branch, Oxford, MS	22.1	Unknown	MS0110	Air Quality	2016
SR 7 bridge work MS DOT	Lafayette, MS Bridge grading and paving between SR 6 and SR 9W	22.1 to 23.3	Unknown	MS0110	Air Quality	2016
US 51 bridge replacements MS DOT	Yalobusha, MS 8 bridge replacements	17.0 to 24.8	Unknown	MS0170	Air Quality	2017–2020
SR 3 bridge replacements MS DOT	Tate, MS 4 bridge replacements	24.3	Unknown	MS0110	Air Quality	2018–2019
SR 4 bridge replacement MS DOT	Marshall, MS 3 bridge replacements	21.8	Unknown	MS0110	Air Quality	2017
SR 309 bridge replacements MS DOT	Marshall, MS 5 bridge replacements	28.8	Unknown	MS0110	Air Quality	2017
SR 46 Intersection Improvements MS DOT	Dickson, TN Improvements between I 40 and SR 1	22.7	Unknown	TN0200	Air Quality	2017
Highway, Road and Bridge Construction Activities PA DOT	Beaver, PA Five ongoing and two anticipated reconstruction or relocation projects. Five bridge replacements and four bridge preservation activities currently under construction and four bridge replacements and one bridge rehabilitation anticipated. Another seven bridges slated for the rapid bridge replacement project.	11 and greater	Unknown	CS 216.5	Air Quality	Currently under construction and slated for 2016 construction
SR 4002 Bridge Replacement PA DOT	Beaver, PA Bridge replacement under construction on Anderson Rd in Darlington Township	6.5	N/A (bridge replacement)	CS 216.5	Soils Water Resources Vegetation, Wildlife and T&E Air Quality	Currently under construction

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Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Highway, Road and Bridge Construction Activities PA DOT	Lawrence, PA Two current resurfacing projects and one anticipated resurfacing project. Four current bridge replacement projects and one anticipated bridge rehabilitation project. Plus four bridges slated for the rapid bridge replacement project	10.4 and greater	Unknown	CS 216.5	Air Quality	Currently under construction and slated for 2016 construction
Highway, Road, and Bridge Construction Activities PA DOT	Mercer, PA Bridge and highway replacement and rehabilitation projects. Eight ongoing projects and seven anticipated projects	16.7 and greater	Unknown	CS 216.5	Air Quality	Currently under construction and slated for 2016 construction
Highway, Road, and Bridge Construction Activities PA DOT	Butler, PA Bridge and highway replacement and rehabilitation projects. Five ongoing and seven anticipated projects	22 and greater	Unknown	CS 216.5	Air Quality	Currently under construction and slated for 2016 construction
Bridge Replacements: Island Creek Rd. and Hwy 52 Ohio DOT	Adams, OH Replace a bridge over Island Creek and one near Town Hwy 59	25.6 and 28.6	Unknown	New-build Pipeline	Air Quality	2016
Bridge Replacement and Resurfacing Ohio DOT	Jackson, OH Replace bridge on Franklin Valley Road 1.5 miles north of S.R. 279 and resurface SR 93 from Oak Hill to Gallia County line	1.1 and 3.6	Unknown	CS 202.5	Soils Water Resources Vegetation, Wildlife and T&E Land Use Socioeconomics Air Quality	2016
Roadway Repairs and Reconstruction Ohio DOT	Jackson, OH Five unique roadway reconstruction, bridge replacement, deck sealing, slide repair, and resurfacing projects throughout the county	6.8 to 14.5	Unknown	CS 202.5	Land Use Socioeconomics Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Lawrence, OH Ten projects in the 2016 construction program	25.3 to 29.9	Unknown	New-build Pipeline, CS 202.5	Air Quality	2016

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Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Pike, OH Nine projects in the 2016 construction program	18.2 to 29.9	Unknown	CS 202.5	Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Ross, OH Four projects in the 2016 construction program fall within the air quality region of influence	23.6 to 30.6	Unknown	CS 202.5	Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Athens, OH 41 projects in the 2016 construction program and carried over from 2015 construction program	4	Unknown	OH0110	Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Gallia, OH 20 projects in the 2016 construction program and carried over from 2015 construction program	10.7	Unknown	CS 202.5	Air Quality	2016
Roadway Resurfacing Ohio DOT	Gallia, OH County Road 60 resurfacing in Greenfield Township between S.R. 233 and Jackson County line	9.2	Unknown	CS 202.5	Soils Water Resources Vegetation, Wildlife and T&E Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Hocking, OH 20 projects in the 2016 construction program	12.1 to 31.3	Unknown	OH0110	Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Meigs, OH 21 projects in the 2016 construction program	20.1 to 30.6	Unknown	OH0110, CS 202.5	Air Quality	2016
Bridge Replacement, Culvert Construction, Reconstruction, Repair, and Guardrail Maintenance/Repair Ohio DOT	Morgan, OH Bridge replacement on S.R. 669; culvert construction and repair on S.R. 37; guardrail maintenance and repair at various locations in Malta Township	1.8 to 3.4	Unknown	CS 206.5	Soils Water Resources Vegetation, Wildlife and T&E Land Use Socioeconomics Air Quality	2016

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Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Morgan, OH 17 projects in the 2016 construction program	3.5 and greater	Unknown	CS 206.5	Land Use Socioeconomics Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Noble, OH 21 projects in the 2016 construction program	14.8 and greater	Unknown	CS 206.5	Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Vinton, OH 18 projects in the 2016 construction program	20.1 and greater	Unknown	OH0110 CS 202.5	Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Washington, OH 26 projects in the 2016 construction program	14.2 and greater	Unknown	CS 206.5	Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Coshocton, OH Six projects in the 2015 construction program	16.2 and greater	Unknown	CS 211.5	Air Quality	2015
Bridge Replacement Ohio DOT	Fairfield, OH Bridge replacement on US 22 just west of Rushville	28.7	Unknown	CS 206.5	Air Quality	2015
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Guernsey, OH 12 projects in the 2015 construction program	19.6 and greater	Unknown	CS 206.5 CS 211.5	Air Quality	2015
Culvert Construction, Reconstruction, and Repair Ohio DOT	Licking, OH Replacement and repair of deficient culverts throughout the County	24	Unknown	CS 206.5	Air Quality	2015
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Muskingum, OH 14 projects in the 2015 construction program	6 and greater	Unknown	CS 206.5	Air Quality	2015

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Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Perry, OH Seven projects in the 2015 construction program	5.8 and greater	Unknown	CS 206.5	Air Quality	2015
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Belmont, OH 13 projects in the 2016 construction program	17 and greater	Unknown	CS 211.5	Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Carroll, OH Six projects in the 2016 construction program	23.6 and greater	Unknown	OH0030, CS 216.5	Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Columbiana, OH 24 projects in the 2016 construction program	6 and greater	Unknown	CS 216.5	Air Quality	2016
Culvert Replacement Ohio DOT	Columbiana, OH Culvert replacement on SR 170 at Heck Rd. near Mahoning Co. line	2.6	Unknown	CS 216.5	Soils Water Resources Vegetation, Wildlife and T&E Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Harrison, OH 17 projects in the 2016 construction program	8.5 and greater	Unknown	OH0030	Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Holmes, OH Three projects in the 2016 construction program	24.4 and greater	Unknown	CS 211.5	Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Jefferson, OH 11 projects in the 2016 construction program	24.3 and greater	Unknown	CS 216.5, OH0030	Air Quality	2016

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Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Resurfacing four-lane road Ohio DOT	Tuscarawas, OH Concrete section at McCauley Drive in Uhrichsville, OH	3.3	Unknown	OH0030	Soils Water Resources Vegetation, Wildlife and T&E Land Use Socioeconomics Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Tuscarawas, OH 14 projects in the 2016 construction program	2.7 and greater	Unknown	OH0030 CS 211.5	Land Use Socioeconomics Air Quality	2016
Resurfacing SR 165 Ohio DOT	Mahoning, OH Resurfacing SR 165 between Columbiana County line and northern Beloit Corporation limit. Includes minor bridge repairs.	0.2	Unknown	CS 216.5	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation and Visual Resources Cultural Resources Socioeconomics Noise Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Mahoning, OH Seven projects continuing from 2015 program and six upcoming projects in the 2016 program	3.6	Unknown	CS 216.5	Land Use Socioeconomics Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Portage, OH One resurfacing project continuing from 2015 on S.R. 225 in Palmyra and Deerfield Townships. Two upcoming projects in the 2016 program: microsurfacing on SR 225 between Stark County line and US 224 and resurfacing of SR 183 between Stark County line and US 224	25.3 and greater	Unknown	CS 216.5	Air Quality	2016

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Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Stark, OH Approximately 10 continuing and upcoming projects, including resurfacing, widening, culvert replacement, and minor bridge repairs throughout east and south Stark County	20.1 and greater	Unknown	CS 216.5, OH0030	Air Quality	2016
Roadway Repairs, Bridge Replacement, and Reconstruction Ohio DOT	Trumbull, OH Numerous resurfacing, culvert replacement, chip seal, bridge replacement, rehabilitation projects throughout southern Trumbull County that are slated for continuation in 2016 or are upcoming in 2016	18 and greater	Unknown	CS 216.5	Air Quality	2016
Roadway Repairs, Construction, and Improvements Kentucky Transportation Cabinet	Bath, KY Six projects included in the Six Year Highway Plan, including reconstruction of KY 111, KY 965, improvements to KY 36 and US 60, and new construction near Owingsville	9.8 and greater	Unknown	KY0080	Air Quality	2016–2022
US Highway 460 Reconstruction Kentucky Transportation Cabinet	Bourbon, KY Reconstruction of US 460 from Russell Cave Road to US 27 Bypass in Paris	28	Unknown	CS 875	Air Quality	2017–2019
Safety Upgrades and Interchange Construction Kentucky Transportation Cabinet	Boyd, KY Interchange improvements on US 60 between I-64 and KY 180 and safety upgrades and construction of turn lanes on US 23 at 12th St. in Catlettsburg	21.7 to 30.1	Unknown	New-build Pipeline	Air Quality	2016–2017
Bridge Replacements, Widening, and Safety Improvements Kentucky Transportation Cabinet	Carter, KY One major widening project on KY 7, three bridge replacements (two on US 60 and one on KY 474), and three safety improvements (two on KY 773 and one on KY 1)	1.9 and greater	Unknown	New-build Pipeline	Land Use Socioeconomics Air Quality	2016–2018

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Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Roadway Repairs and Widening Kentucky Transportation Cabinet	Clark, KY One bridge replacement on KY 974, seven major widening projects on KY 89 and one on I-64, two new routes and one safety improvement on US 60	10	Unknown	CS 875	Air Quality	2016–2021
Reconstruction and Widening of KY 32 Kentucky Transportation Cabinet	Elliott, KY Reconstruction and widening of KY 32 in four separate locations	16.2 and greater	Unknown	KY0080	Air Quality	2018–2022
Reconstruction of KY 89 Kentucky Transportation Cabinet	Estill, KY Reconstruction of KY 89 in Irvine	16.9	Unknown	CS 875	Air Quality	2016
Repair, widening, reconstruction, and bridge replacement Kentucky Transportation Cabinet	Fayette, KY Numerous road and highway construction projects included in the Six Year Highway Plan	16 and greater	Unknown	CS 875	Air Quality	2016–2022
Repair, widening, reconstruction, and bridge replacement Kentucky Transportation Cabinet	Fleming, KY Seven projects included in the Six Year Highway Plan, including major widening, bridge replacement and rehabilitation, and reconstruction.	7 and greater	Unknown	KY0080	Air Quality	2016–2022
Bridge Replacements Kentucky Transportation Cabinet	Garrard, KY Replace bridge over Turkey Creek on KY-1972, replace bridge over Sugar Creek on KY-563, and replace bridge over Gilberts Creek on KY-1972	10.7 and greater	Unknown	KY0170	Air Quality	2016–2022

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Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Truck Climbing Lane, Shoulders, and Turn Lane Construction Kentucky Transportation Cabinet	Green, KY Construct a truck climbing lane, shoulders, and turn lane on US-61 at KY-323 in Summersville	0.1	Unknown	KY0330 [a]	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation and Visual Resources Cultural Resources Socioeconomics Noise Air Quality	2016–2018
Reconstruction, Bridge Replacement, New Construction Kentucky Transportation Cabinet	Greenup, KY Reconstruction on KY-2 near Greenup; bridge demolition and replacement on KY-244 over CSX Railroad; bridge replacement over Pond Run on Williams Ave in Raceland; construction of a new connector road in Flatwoods	17 and greater	Unknown	New-build Pipeline, CS 202.5	Air Quality	2016–2022
US 421 Bridge Replacement Kentucky Transportation Cabinet	Jackson, KY Replace bridge over Pigeon Roost Creek at Water Street on US 421 near McKee	29.5	Unknown	KY0170	Air Quality	2017
New Route Construction, Safety Improvements, and Bridge Replacements Kentucky Transportation Cabinet	Jessamine, KY New East Nicholasville bypass; safety improvements on KY-1980, US-68 and US-27; bridge replacements on KY-39 at Hickman Creek, KY-169 over railroad and CR-1238 over NS System	8 and greater	Unknown	KY0170	Air Quality	2016–2022

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Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
New Route Construction, Bridge Replacements, Safety Improvements and Reconstruction Kentucky Transportation Cabinet	Lewis, KY Replace bridges on KY-8 over Kinniconnick Creek, on KY-1068 over Laurel Fork, and on KY-57 over the North Fork of the Licking River. Construct a new route from KY-8 to KY-10. Reconstruct KY-57 from KY-9 to Fleming County line, KY-10 at intersection with KY-1306, and KY-9 at intersection with KY-2523	3.1 and greater	Unknown	New-build Pipeline	Land Use Socioeconomics Air Quality	2016–2022
Major Widening, New Construction, and Bridge Replacement Kentucky Transportation Cabinet	Lincoln, KY Replace bridge on KY-1247 over St. Asaph Creek and on CR-1043 over Logan Creek. Relocate a short section of Goshen Road near intersection with US 27. Major widening of US-27 from KY-590 to Bell Street.	19.7 and greater	Unknown	KY0170	Air Quality	2016–2021
US-27 to I-75 Connector Kentucky Transportation Cabinet	Madison and Jessamine, KY New four-lane connector between US-27 in Jessamine County to I-75 in Madison County	4.5	Unknown	CS 875, KY0170	Soils Water Resources Vegetation, Wildlife and T&E Land Use Socioeconomics Air Quality	2022
I-75 Rehabilitation Kentucky Transportation Cabinet	Madison, KY Rehabilitation of I-75 from Clay's Ferry Bridge to Barnes Bill Road	2.4	Unknown	CS 875, KY0170	Soils Water Resources Vegetation, Wildlife and T&E Land Use Socioeconomics Air Quality	2016
KY-627 Reconstruction and Widening at I-75 Kentucky Transportation Cabinet	Madison, KY Reconstruction and widening of KY-627 to five lanes over I-75 to reduce traffic congestion and improve safety	4.4	Unknown	CS 875	Soils Water Resources Vegetation, Wildlife and T&E Land Use Socioeconomics Air Quality	2017

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Widen US-25 Kentucky Transportation Cabinet	Madison, KY Widen US 25 from US-421 north to KY-876	5.1	Unknown	KY0170	Soils Water Resources Vegetation, Wildlife and T&E Land Use Socioeconomics Air Quality	2017
New Construction, Reconstruction, Bridge Replacement, Widening, and Safety Improvements Kentucky Transportation Cabinet	Madison, KY Construction of four-lane bypass around Berea from US-25 to KY-21. Relocation of and realignment of KY-52 from Wallace Mill Road to I-75. Widen US-25 from US 421 to 1,500 feet south of Duncannon Lane and to Pumpkin Run. Replace bridges on KY-3376, US-421, CR-1158, CR-1017, and CR-1044. Improve roadway, sidewalks, and bike paths on US-25 between Ellipse St. and Glades Rd. in Berea. Spot improvements on KY-2881 from Duncannon Rd. to the Madison County Airport	5.7 and greater	Unknown	KY0170 CS 875	Land Use Socioeconomics Air Quality	2016–2022
New Access Route, New Interchange, Reconstruction, New Turn Lanes Kentucky Transportation Cabinet	Mason, KY New access route from US 69 near Washington to KY 9. New interchange at US 62 and US 68. Reconstruction of US 62 between Sardis and KY 324. Construct right turn lane on KY-9 into Clarkson Sherman Rd	28.9 and greater	Unknown	New-build Pipeline	Air Quality	2016–2022
Spot and Safety Improvements, Major Widening Kentucky Transportation Cabinet	Menifee, KY Spot improvements on KY-36 and US-460. Major widening of US-460	17 and greater	Unknown	KY0080	Air Quality	2016–2022

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Safety Improvements, Spot Improvements, and Bridge Replacements Kentucky Transportation Cabinet	Mercer, KY Safety improvements on US-68 in Harrodsburg and US-127 in Salvisa. Spot improvements to CR1237 in northwest Harrodsburg. Replace three bridges on KY-152 over Herrington Lake and one bridge on US-68 over Shaker Creek	18.9 and greater	Unknown	KY0170	Air Quality	2016–2022
Roadway Widening, Rest Area Improvements, and Reconstruction Kentucky Transportation Cabinet	Montgomery, KY Widen KY-1991 in three different locations, widen US-60 at Mount Sterling Bypass, widen KY-213 in Jeffersonville, widen KY-686 at KY-713 intersection, widen I-64 to six lanes near Mt. Sterling. Reconstruction of US-460 at Lucky Stop Hill and rehabilitate rest area on I-64 west bound	25.5 and greater	Unknown	KY0080 CS 875	Air Quality	2016–2022
Widening, Safety Improvements, Reconstruction, and Bridge Replacement Kentucky Transportation Cabinet	Morgan, KY Widen KY-9009 in two locations near Johnson Creek Bridge. Improve safety through rock fall mitigation on KY-7 just north of KY-1161. Reconstruct and widen KY-7 in West Liberty. Replace bridge over White Oak Creek on US 460. Reconstruct KY-7 on south side of Wrigley Hill	18.3 and greater	Unknown	KY0080	Air Quality	2016–2022
Widening, Reconstruction, and Safety Improvements Kentucky Transportation Cabinet	Nicholas, KY Widen US-68 from Millersburg to Carlisle. Reconstruct KY-36 and KY-928 intersection. Complete safety improvements on KY-36 near Nicholas County Schools property and on KY-32 from Lake Road to Scrubgrass Creek	23.5 and greater	Unknown	KY0080	Air Quality	2016–2019
KY-213 Safety Improvements Kentucky Transportation Cabinet	Powell, KY Improve safety, upgrade geometrics, and address capacity issues on KY-213 from KY-11 to bottom of mountain	21.8	Unknown	CS 875	Air Quality	2018

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
I-75 Major Widening Kentucky Transportation Cabinet	Rockcastle, KY Component of major widening and improvements project on I-75 from TN state line to Lexington	18 and greater	Unknown	KY0170	Air Quality	2016–2021
KY-32 Reconstruction Kentucky Transportation Cabinet	Rowan, KY Reconstruction of KY-32 from Park Hills Drive to Viking Drive in Morehead	0	Unknown	KY0080	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation and Visual Resources Cultural Resources Socioeconomics Noise Air Quality	2016–2018
KY-377 Reconstruction Kentucky Transportation Cabinet	Rowan, KY Reconstruct KY-377 from KY-32 to just north of KY-799 to improve safety, capacity and efficiency and highway systems connectivity	0.1	Unknown	CS 110	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation and Visual Resources Cultural Resources Socioeconomics Noise Air Quality	2016
Upgrade I-64 Weigh Station and New Route from US-60 to I-64 Kentucky Transportation Cabinet	Rowan, KY Upgrade existing Rowan County weigh station and construct new 3.2 mile route from US-60 east of Morehead to I-64, including a new interchange	1.8 to 2.9	Unknown	CS 110, KY0080	Soils Water Resources Vegetation, Wildlife and T&E Land Use Socioeconomics Air Quality	2016–2018

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Safety Improvements, Widening, and Bridge Replacement Kentucky Transportation Cabinet	Rowan, KY Construct turn lanes in to Lakeside Christian Academy off US-60. Replace bridge over Bull Fork on CR-1140. Widen KY-519 from KY-801 and north two miles. Reconstruct US-60 near Glenwood Hollow Road	4 and greater	Unknown	CS 110, KY0080	Land Use Socioeconomics Air Quality	2016–2021
KY-100 Improvements Kentucky Transportation Cabinet	Simpson, KY Reconstruction of KY-100 from KY-622 to east of Sulphur Fork Creek	0.1	Unknown	KY0430 [b]	Soils Water Resources Vegetation, Wildlife and T&E Land Use Recreation and Visual Resources Cultural Resources Socioeconomics Noise Air Quality	2018
KY-191 Safety Improvements Kentucky Transportation Cabinet	Wolfe, KY Hill and curve correction on KY-191 between Hazel Green and KY-205.	29.1	Unknown	KY0080	Air Quality	2017
County Road Bridge Replacements Kentucky Transportation Cabinet	Woodford and Scott, KY Replace bridge over Grier Creek on Grier Creek Road (CR1217) about 0.8 mile west of Scotts Ferry Road (CR1215). Replace the Weisenburg Mill Road bridge at the Woodford/Scott County line	29.6 and 30.1	Unknown	KY0170, CS 875	Air Quality	2016–2022
COMMERCIAL						
Portable Mining Plant The Allen Company, Inc.	Madison, KY Construction and operation permit for a portable limestone crushing plant rated at 400 tons/hour	12, 13.1	Unknown	KY0170, MLV 874 Replacement Pipeline	Land Use Socioeconomics Air Quality	Unknown

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Mountain Materials Inc. – Portable Screen No. 2 TCI Leasing, LLC	Carter, KY Construction and operation of a screening plant rated at 250 tons/hour	7.5	Unknown	New-build Pipeline	Land Use Socioeconomics Air Quality	Unknown
River Sand and Gravel, Inc. Red River Ranch, Inc.	Carter, KY Construction and operation permit for a portable aggregate processing plant rated at 300 tons/hour	17.0	Unknown	New-build Pipeline	Land Use Socioeconomics Air Quality	Unknown
Cooling Drum Installation Osco Industries, Inc.	Scioto, OH Initial installation permit for South Cooling Drum: continuous rotary cooling drum controlled with the Wheelabrator Cartridge Collector and the East Foundry Dust Collector baghouses (replacing the existing south cooling drum formerly permitted as emissions unit P908)	20.3	Unknown	CS 202.5	Air Quality	Permit Issued 6/11/2014; Expires 6/11/2019
Melvin Stone Aggregate Aggregate Processing Melvin Stone	Jackson, OH Initial installation of sources covered by the following General Permits: 10.1 (aggregate processing plant), 5.1 (unpaved roadways and parking areas), 6.1 (paved roadways and parking areas), and 7.1 (storage piles)	3	Unknown	CS 202.5	Land Use Socioeconomics Air Quality	Unknown
Asphalt Plant Blackstone Asphalt, Inc.	Jackson, OH Permit-to-install and operate 180 total petroleum hydrocarbon Barber Greene batch hot mix asphalt plant with an annual production limit of 288,000 tonnes per year permitted to burn propane, #2 fuel oil, #4 fuel oil, #6 fuel oil and used on-spec oil	13	Unknown	CS 202.5	Land Use Socioeconomics Air Quality	Unknown

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Emission Control Work and Construction Imperial Electric Company	Meigs, OH Initial installation permit to install and operate emission units including a paint booth, varnish line, welding operation, comfort heaters, rotor heat treat oven, and die casting. Located at 345 Sycamore Street, Middleport	30.9	Unknown	CS 202.5	Air Quality	Application for air permit received 9/5/2014
Diffuser Unit Construction Southern Ohio Coal Company	Meigs, OH New construction for Ohio River Flow Diversion Pipeline and Diffuser for Meigs Mine No. 31	22.5	Unknown	CS 202.5	Air Quality	Unknown
Diesel Generator Newpark Norwich Facility	Muskingham, OH Initial installation permit to install and operate a portable diesel engine generator for the mud pump	20.7	Unknown	CS 206.5	Air Quality	Issued 11/10/2014; Expires 11/10/2024
Cement Mix Plant Schlumberger Technology Corporation	Tuscarawas, OH Initial installation permit for a cement mix plant (Mechanical Bulk Cement Blending Terminal Operation): five 4,800 ft^3 raw cement material silos, two 4,500 ft^3 split compartment raw cement material silos, one 2,000 ft^3 split compartment silo for bulk bag, one additive hand add station consisting of four 47 ft^3 removable tertiary additive hoppers, two 1,000 ft^3 blended cement (Pre-Blend) silos and one 1,425 ft^3 residues storage silo that collects and filters the exhaust from the blended cement silos	19	Unknown	OH0030	Land Use Socioeconomics Air Quality	Issued 9/22/2014; Expires 5/2/2022
Cypress Groves Homes of Lake Village	Chicot, AR Housing development near Southeast corner of US Hwy 65 and Connerly	11.5	Unknown	MLV 53 Replacement Pipeline	Air Quality	Unknown

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Natural Gas Grain Dryer Construction Gavilon Grain LLC	Bolivar, MS Construct and operate a 46 MMBTU/hr natural gas grain dryer	23.5	Unknown	MS0280	Air Quality	Unknown
Mixed Use Development Callicut Farms	Lafayette, MS Construction of mixed use development for residential, retail and office use	21.5	Unknown	MS0110	Air Quality	Unknown
Office Construction FNC, Inc.	Lafayette, MS Clearing and construction of new 3-story office building with associated road, 370 parking spaces, sidewalk, and detention pond	17.1	Unknown	MS0110	Air Quality	Unknown
Rubbish site North Mississippi Recycling Solutions	Lafayette, MS Construction of facilities and disposal for Class 1 rubbish landfill	20.8	22.5	MS0110	Air Quality	Complete
Concrete Batch Plant Operations Mid-Way Materials	Benton, TN Increase material throughput of concrete batch plant operations at 128 Natchez Trace, Camden, TN	25.3	None	TN0210/TN0220	Air Quality	2016
Johnsonville Cogeneration Tennessee Valley Authority	Humphreys, TN Construct and operate a cogeneration site at the Johnsonville Fossil Plant at 535 Steam Plant Road, New Johnsonville, TN	20.8	Unknown	TN0210/TN0220	Air Quality	2017–2018
Lime Manufacturing Facility Carmeuse Lime and Stone, Inc.	Mason, KY Operate a lime manufacturing facility at 9222 Springdale Road, Maysville, KY	25.6	Unknown	CS 110	Air Quality	2016
Aluminum Recycling Facility Novelis Corp	Madison, KY Operate a secondary aluminum recycling facility at 302 Mayde Road, Berea, KY	10.1	Unknown	KY0170	Land Use Socioeconomics Air Quality	2016
Emergency Generator Verizon Wireless	Athens, OH 50 kW oil fired emergency electrical generator at 7825 McGur Road, Guysville, OH	14.1	Unknown	OH0110	Air Quality	2016

Table J-1

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Cumulative Action Name	Project Location (County, State) and Project Description	GIS Distance (miles)	Potential Area of Surface Disturbance (acres)	Applicable ACRP Facilities	Resources Potentially Affected	Anticipated Construction Date
Emergency Generator ALLTEL-Barlow	Washington, OH 50 kW oil fired emergency electrical generator at 392 Warrior Drive, Vincent, OH	19.1	Unknown	OH0110	Air Quality	2016
Emergency Generator New Cingular Wireless PCS	Noble, OH 50 kW oil fired emergency electrical generator at 49800 Tobacco Road, Sarahsville, OH	27.9	Unknown	CS 206.5	Air Quality	2016
Emergency Generator Owens Brockway Glass Containers	Muskingum, OH 150 kW diesel powered emergency generator at 1700 State St, Zanesville, OH	18.9	Unknown	CS 206.5	Air Quality	2016
Emergency Generators Casting Solutions	Muskingum, OH Two standby generators for use during power outages at 2345 Licking Road, Zanesville, OH	20.2	Unknown	CS 206.5	Air Quality	2016
Emergency Generator Level 3 Communications	Columbiana, OH 300 kW oil fueled emergency generator at 2151 Creek Rd	3.8	Unknown	CS 216.5	Air Quality	2016
Emergency Generator Celico Partnership dba Verizon Wireless	Columbiana, OH Install and operate 50 kW emergency generators at Steubenville Pike Rd and Mattix Rd, Lisbon, OH	15.7	Unknown	CS 216.5	Air Quality	2016
Emergency Generator New Cingular Wireless	Mahoning, OH 67 hp Oil Emergency Generator at 11781 South Ave, North Lima, OH	4.4	Unknown	CS 216.5	Land Use Socioeconomic Air Quality	2016
Emergency Generator New Cingular Wireless	Mahoning, OH 67 hp Oil Emergency Generator at 146 W Ohio Ave, Sebring, OH	22.6	Unknown	CS 216.5	Land Use Socioeconomics Air Quality	2016

a The exact locations of the wrinkle bend replacements are not known so we have conservatively assumed all resources would be affected.

b ACRP project components that involve abandonment activities with minor ground disturbance

Table J-2

Federally Listed Species Potentially Occurring in the UMTP Project Area in Ohio

Species	Federal Status [a]	Range or Habitat Requirements	Potential for Occurrence in Project Area	TGP's Proposed Effect Determination
Amphibians				
Eastern hellbender *Cryptobrachus alleganiensis*	SOC	Perennial streams of large size	May occur. The Project area is within the range of the eastern hellbender; however, no in-water work is proposed in perennial streams of sufficient size to provide suitable habitat.	This species is not currently federally listed as endangered or threatened under the ESA. TGP did not provide a determination of effects.
Insects				
American burying beetle *Nicrophorus americanus*	E	Species recorded in grasslands, old field shrubland, and hardwood forests. Soil characteristics important to the beetle's ability to bury carrion. Extremely xeric, saturated, or loose sandy soils are unsuitable.	May occur. The Project area does contain some suitable habitat. No individuals or populations found during 2015 surveys.	No effect.
Mammals				
Indiana bat *Myotis sodalis*	E	Hibernates in caves, maternity sites generally behind loose bark of dead or dying trees or in tree cavities.	May occur. Field data suggests that suitable roosting habitat occurs in the Project area.	May affect, but not likely to adversely affect. Applicable seasonal tree clearing windows will be adhered to.
Northern long-eared bat *Myotis septentrionalis*	T	May summer roost singly or in small colonies in caves, under loose bark, tree cavities, dead snags, and in human constructed structures. Roost trees may be as small as 4 inches diameter at breast height (dbh). Hibernation may occur in caves, houses, or other human made structures. Little is known about summer, migratory, and winter ecology of this species.	May occur. Field data suggests that suitable roosting habitat occurs in the Project area.	May affect, but not likely to adversely affect. Applicable seasonal tree clearing windows will be adhered to.
Mussels				
Clubshell *Pleurobema clava*	E	Small to medium rivers and streams. Mostly found deeply buried in sand and fine gravel in riffle/run situations in less than 1.5 feet of water. In Scioto County, the clubshell is known from the Scioto River.	Does not occur. The clubshell is not known to exist in the Ohio River. The Ohio River HDD is located 13.5 miles upstream of the confluence with the Scioto River. Project activities do not involve affecting the Scioto River.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.
Fanshell *Cyprogenia stegaria*	E	Medium to large streams with gravel substrates and a strong current, in both deep and shallow water.	May occur. USFWS occurrence data suggests that suitable habitat and individuals occur in vicinity of the Project area in the Ohio River.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.
Northern riffleshell *Epioblasma torulosa rangiana*	E	Requires swiftly moving water such as highly oxygenated riffles in smaller streams. In Scioto County, the northern riffleshell is known from the Scioto River and its tributaries.	Does not occur. The Ohio River HDD is located 13.5 miles upstream of the confluence with the Scioto River. Project activities do not involve affecting the Scioto River or its tributaries.	No effect.

Table J-2

Federally Listed Species Potentially Occurring in the UMTP Project Area in Ohio

Species	Federal Status [a]	Range or Habitat Requirements	Potential for Occurrence in Project Area	TGP's Proposed Effect Determination
Pink mucket *Lampsilis abrupta*	E	Found in large rivers with strong currents, rocky or boulder substrates, with depths up to about 3 feet, but also found in deeper waters with slower currents and sand and gravel substrates. Never in standing pools of water.	May occur. USFWS occurrence data suggests that suitable habitat and individuals occur in the vicinity of the Project area in the Ohio River.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.
Rabbitsfoot *Quadrula cylindrical cylindrical*	T	Small to medium rivers with moderate to swift currents. In smaller streams it inhabits bars or gravel and cobble close to fast currents. Found in depths up to 10 feet. In Scioto County, the rabbitsfoot is known from the Scioto River.	Does not occur. The rabbitsfoot is not known to exist in the Ohio River. The Ohio River HDD is located 13.5 miles upstream of the confluence with the Scioto River. Project activities do not involve affecting the Scioto River.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.
Rayed bean *Villosa fabalis*	E	Found in smaller headwater creeks to larger rivers. Substrates include gravel and sand. Often associated with vegetation in and adjacent to riffles and shoals, typically buried among the roots of the vegetation. In Scioto County, the rayed bean is known from the Scioto Brush Creek.	Does not occur. The rayed bean is not known to exist in the Ohio River. The Ohio River HDD is located 13.5 miles upstream of the confluence with the Scioto River, and the workspaces are located over 13 miles from the confluence of Scioto Brush Creek and Scioto River. Project activities do not involve affecting Scioto Brush Creek.	No effect.
Sheepnose mussel *Plethobasus cyphyus*	E	Large-river species associated with gravel/cobble substrates, but usually has been reported from dep water (>6.5 feet) with light to swift currents and mud, sand, or gravel bottoms. May occur in deep river runs.	May occur. USFWS occurrence data suggests that suitable habitat and individuals occur in the vicinity of the Project area in the Ohio River.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.
Snuffbox *Epioblasma triquetra*	E	Riffles of medium and large rivers with stony or sandy bottoms, in swift currents, usually deeply buried.	May occur. USFWS occurrence data suggests that suitable habitat and individuals occur in the vicinity of the Project area in the Ohio River.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts of the species and/or habitat.
Plants				
Running buffalo clover *Trifolium stoloniferum*	E	Mesic woodlands in partial to filtered sunlight where there is a pattern of moderate periodic disturbance for a prolonged period, such as mowing, trampling, or grazing. Often found in areas underlain with limestone.	May occur. The Project area does contain some suitable habitat for running buffalo clover, but no populations were identified during field surveys in 2015.	May affect, but not likely to adversely affect.
Small whorled pogonia *Isotria medeoloides*	T	Acidic soils in dry to mesic second-growth, deciduous or deciduous-coniferous forests. Frequently occurs on flats or slope bases near canopy breaks.	May occur. The Project area does contain some suitable habitat for small whorled pogonia, but no populations were identified during field surveys in 2015.	May affect, but not likely to adversely affect.
Virginia spiraea *Spiraea virginiana*	T	Periodically flood-scoured banks of high-gradient mountain streams, meander scrolls, point bars, natural levees, and braided features of lower reach streams, and occasionally near disturbed ROWs.	May occur. The Project area does contain some limited suitable habitat for Virginia spiraea, but no populations were identified during field surveys in 2015.	May affect, but not likely to adversely affect.

Table J-2

Federally Listed Species Potentially Occurring in the UMTP Project Area in Ohio

Species	Federal Status [a]	Range or Habitat Requirements	Potential for Occurrence in Project Area	TGP's Proposed Effect Determination
Reptiles				
Timber rattlesnake *Crotalus horridus horridus*	SOC	Restricted to un-glaciated Allegheny Plateau. Winters are spent in dens usually associated with high, dry ridges. They return to the same den annually.	May occur. The Project area does contain some suitable habitat for timber rattlesnake.	This species is not currently federally listed as endangered or threatened under the ESA. TGP did not provide a determination of effects.

a E = endangered; T = threatened; C = candidate; SOC = Species of Concern

Source of range and habitat information: USFWS (2013b)

Table J-3

Federally Listed Species Potentially Occurring in the UMTP Project Area in Kentucky

Species	Federal Status [a]	Range or Habitat Requirements	Potential for Occurrence in Project Area	TGP's Proposed Effect Determination
Fishes				
Diamond darter *Crystallaria cincotta*	E	Clean sand, gravel and cobble runs of small to medium rivers with moderate flow.	Does not occur. The Project area crosses critical habitat in the Green River in Green County, Kentucky but this crossing is associated with the already existing pipeline, and no new crossings through the Green River are proposed.	No effect.
Insects				
Tatum cave beetle *Pseudanopthalmus parvus*	C	Subterrestrial obligate.	Does not occur. The Project area does not include habitat known to be used by Tatum cave beetle.	No effect.
Mammals				
Gray bat *Myotis grisescens*	E	Winter roosts are in deep vertical caves with domed halls. Large summer colonies utilize caves that trap warm air. Maternity caves often have a stream flowing through them.	May occur. Field data suggests that suitable roosting habitat occurs in the Project area.	May affect, but not likely to adversely affect.
Indiana bat *Myotis sodalis*	E	Hibernates in caves, maternity sites generally behind loose bark of dead or dying trees or in tree cavities.	May occur. Field data suggests that suitable roosting habitat occurs in the Project area.	May affect, but not likely to adversely affect. Seasonal tree clearing windows will be adhered to and forest dwelling bat Conservation Memorandum of Agreement (CMOA) will be executed.
Northern long-eared bat *Myotis septentrionalis*	T	May summer roost singly or in small colonies in caves, under loose bark, tree cavities, dead snags, and in human constructed structures. Roost trees may be as small as 4 inches dbh. Hibernation may occur in caves, houses, or other human made structures. Little is known about summer, migratory, and winter ecology of this species.	May occur. Field data suggests that suitable roosting habitat occurs in the Project area.	May affect, but not likely to adversely affect. Seasonal tree clearing windows will be adhered to and forest dwelling bat CMOA will be executed.
Virginia Big-eared Bat (*Corynorhinus townsendii virginianus*)	E	Caves typically in limestone karst regions dominated by mature hardwood forests of hickory, beech, maple, and hemlock.	May occur. Field data suggests that suitable foraging habitat occurs in the Project area.	May affect, but not likely to adversely affect.
Mussels				
Clubshell *Pleurobema clava*	E	Small to medium rivers and streams. Mostly found deeply buried in sand and fine gravel in riffle/run situations in less than 1.5 feet of water. In Allen and Taylor counties, the clubshell mussel is known from the Green River.	Unlikely to occur. No suitable habitat exists within the Project area.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.

Table J-3

Federally Listed Species Potentially Occurring in the UMTP Project Area in Kentucky

Species	Federal Status [a]	Range or Habitat Requirements	Potential for Occurrence in Project Area	TGP's Proposed Effect Determination
Fanshell *Cyprogenia stegaria*	E	Medium to large streams with gravel substrates and a strong current, in both deep and shallow water.	May occur. USFWS occurrence data suggests that suitable habitat and individuals occur in vicinity of the Project area in the Rolling Fork River.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.
Pink mucket *Lampsilis abrupta*	E	Found in large rivers with strong currents, rocky or boulder substrates, with depths up to about 3 feet, but also found in deeper waters with slower currents and sand and gravel substrates. Never in standing pools of water.	Unlikely to occur. No suitable habitat exists within the Project area.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.
Rabbitsfoot *Quadrula cylindrical cylindrical*	T	Small to medium rivers with moderate to swift currents. In smaller streams it inhabits bars or gravel and cobble close to fast currents. Found in depths up to 10 feet. In Allen and Taylor counties, the rabbitsfoot mussel is known from the Green River.	Unlikely to occur. The Project area crosses critical habitat in the Green River in Green County, Kentucky but this crossing is associated with the already existing pipeline, and no new crossings through the Green River are proposed..	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.
Ring pink *Obovaria retusa*	E	Medium to large rivers, gravel and sand bars are preferred. Most historic occurrences have been inundated. In Allen and Taylor counties, the ring pink mussle is known from the Green River.	Unlikely to occur. No suitable habitat exists within the Project area.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.
Rough pigtoe *Pleurobema plenum*	E	Medium to large rivers (65 feet wide or greater) in sand, gravel, and cobble substrates in shoals. In Allen and Taylor coutnies, the rough pigtoe mussel is known from the Green River.	Unlikely to occur. No suitable habitat exists within the Project area.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.
Sheepnose mussel *Plethobasus cyphyus*	E	Large-river species associated with gravel/cobble substrates, but usually has been reported from dep water (>6.5 feet) with light to swift currents and mud, sand, or gravel bottoms. May occur in deep river runs. In Allen and Taylor counties, the sheepnose mussel is known from the Green River.	Unlikely to occur. No suitable habitat exists within the Project area.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.
Snuffbox *Epioblasma triquetra*	E	Riffles of medium and large rivers with stony or sandy bottoms, in swift currents, usually deeply buried. In Allen and Taylor coutnies, the snuffbox mussel is known from the Green River. In Marion County, the snuffbox mussel is known from the Rolling Fork River.	May occur. USFWS occurrence data suggests that suitable habitat and individuals occur in the vicinity of the Project area in the Rolling Fork River.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts of the species and/or habitat.
Spectaclecase *Cumberlandia monodonta*	E	Large rivers. Inhabits riverine microhabitats that are sheltered from the main force of current. Substrates from mud and sand to gravel, cobble, and boulders in relatively shallow rivers and shoals with slow to swift current. In Allen and Taylor counties, the spectaclecase mussel is known from the Green River.	Unlikely to occur. No suitable habitat exists within the Project area.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts of the species and/or habitat.

Table J-3

Federally Listed Species Potentially Occurring in the UMTP Project Area in Kentucky

Species	Federal Status [a]	Range or Habitat Requirements	Potential for Occurrence in Project Area	TGP's Proposed Effect Determination
Plants				
Running buffalo clover *Trifolium stoloniferum*	E	Mesic woodlands in partial to filtered sunlight where there is a pattern of moderate periodic disturbance for a prolonged period, such as mowing, trampling, or grazing. Often found in areas underlain with limestone.	May occur. The UMTP Project contains some suitable habitat for running buffalo clover, but no populations were identified during field surveys in 2015.	May affect, but not likely to adversely affect.
Short's bladderpod *Physaria gobosa*	E	Dry limestone cliffs, barrens, cedar glades, steep wooded slopes, and talus areas.	May occur. The Project area does contain some suitable habitat for Short's bladderpod. Surveys were proposed for spring 2016.	Opinion of effect pending assessment of remaining project sites.
Shrimp				
Kentucky cave shrimp *Palaemonias ganteri*	E	Found in caves in pools with silty bottoms. Changes specific localities as a function of water levels and seasonal sediment deposition.	Does not occur. The Project area does not include habitat known to be used by Kentucky cave shrimp.	No effect.

a E = endangered; T = threatened; C = candidate; SOC = Species of Concern

Source of range and habitat information: KSNPC (2013)

Table J-4

Federally Listed Species Potentially Occurring in the UMTP Project Area in Tennessee

Species	Federal Status [a]	Range or Habitat Requirements	Potential for Occurrence in Project Area	TGP's Proposed Effect Determination
Fishes				
Pygmy madtom *Noturus stanauli*	E	In Tennessee, it is known from two short stream reaches in the lower Duck River in Hickman and Humphries counties and the middle Clinch River in Hancock County. Both are rivers in the Tennessee River system.	Does not occur. The UMTP Project area does not include habitat known to be used by the pygmy madtom. The Project area crosses the Duck River, but this crossing is associated with the already existing pipeline, and no new crossings through the Duck River are proposed.	No effect.
Mammals				
Gray bat *Myotis grisescens*	E	Winter roosts are in deep vertical caves with domed halls. Large summer colonies utilize caves that trap warm air. Maternity caves often have a stream flowing through them.	May occur. Field data suggests that suitable foraging habitat occurs in the UMTP Project area over open water habitats such as the Duck, Buffalo, and Tennessee Rivers.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species foraging habitat.
Indiana bat *Myotis sodalis*	E	Hibernates in caves, maternity sites generally behind loose bark of dead or dying trees or in tree cavities.	May occur. Field data suggests that suitable roosting habitat occurs in the UMTP Project area.	May affect, but not likely to adversely affect. Seasonal tree clearing windows will be adhered to and forest dwelling bat CMOA will be executed.
Northern long-eared bat *Myotis septentrionalis*	T	May summer roost singly or in small colonies in caves, under loose bark, tree cavities, dead snags, and in human constructed structures. Roost trees may be as small as 4 inches dbh. Hibernation may occur in caves, houses, or other human made structures. Little is known about summer, migratory, and winter ecology of this species.	May occur. Field data suggests that suitable roosting habitat occurs in the UMTP Project area.	May affect, but not likely to adversely affect. Seasonal tree clearing windows will be adhered to and forest dwelling bat CMOA will be executed.
Mussels				
Clubshell *Pleurobema clava*	E	Small to medium rivers and streams. Mostly found deeply buried in sand and fine gravel in riffle/run situations in less than 1.5 feet of water. In Perry and Decatur counties, the clubshell mussel is known from the Tennessee River.	May occur. USFWS occurrence data suggests that suitable habitat and individuals occur in the vicinity of the UMTP Project area in the Tennessee River.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.
Cracking pearly mussel *Hemistena lata*	E	Prefers gravel riffles of medium-sizes streams, and mud and sand bottoms in slower-moving waters. It is currently known to occur in two tributaries in the upper Tennessee River system in the eastern part of the state of Tennessee.	Does not occur. The UMTP Project area is not proximal to the tributaries in the upper Tennessee River and does not include habitat known to be used by cracking pearly mussel.	No effect.
Fanshell *Cyprogenia stegaria*	E	Medium to large streams with gravel substrates and a strong current, in both deep and shallow water. In Decatur County, the fanshell is known from the Tennessee River.	May occur. USFWS occurrence data suggests that suitable habitat and individuals occur in vicinity of the Project area in the Tennessee River.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.

Table J-4

Federally Listed Species Potentially Occurring in the UMTP Project Area in Tennessee

Species	Federal Status [a]	Range or Habitat Requirements	Potential for Occurrence in Project Area	TGP's Proposed Effect Determination
Orangefoot pimpleback *Plethobasus cooperianus*	E	Found in medium to large rivers in sand, gravel, and cobble substrates in riffles and shoals in deep water and steady currents as well as some shallower shoals and riffles.	May occur. USFWS occurrence data suggests that suitable habitat occurs in the vicinity of the UMTP Project area in the Duck River in Perry County and Tennessee River in Decatur County.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.
Pink mucket *Lampsilis abrupta*	E	Found in large rivers with strong currents, rocky or boulder substrates, with depths up to about 3 feet, but also found in deeper waters with slower currents and sand and gravel substrates. Never in standing pools of water. In Decatur County, the pink mucket is known from the Tennessee River.	May occur. USFWS occurrence data suggests that suitable habitat and individuals occur in the vicinity of the UMTP Project area in the Tennessee River.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.
Rabbitsfoot *Quadrula cylindrical cylindrical*	T	Small to medium rivers with moderate to swift currents. In smaller streams it inhabits bars or gravel and cobble close to fast currents. Found in depths up to 10 feet.	May occur. USFWS occurrence data suggests that suitable habitat and individuals occur in the vicinity of the UMTP Project area in the Tennessee River. The UTMP Project crosses critical habitat in the Duck River, but this crossing is associated with the already existing pipeline, and no new crossings through the Duck River are proposed.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.
Ring pink *Obovaria retusa*	E	Medium to large rivers, gravel and sand bars are preferred. Most historic occurrences have been inundated. In Simpson County, the ring pink mussel is known froom the Red River and Lower Cumberland River watersheds.	May occur. USFWS occurrence data suggests that suitable habitat and individuals occur in the vicinity of the UMTP Project area in the Tennessee River.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts to the species and/or habitat.
Slabside pearlymussel *Pleurobema plenum*	E	Occurs in large rivers, in moderate to high gradient riffle systems. General at depths < 3 feet, moderate to swift currents, and substrates from coarse sand to heterogeneous assemblages of larger sized particles.	Does not occur. The UMTP Project area does not include habitat known to be used by slabside pearlymussel.	No effect.
Spectaclecase *Cumberlandia monodonta*	E	Large rivers. Inhabits riverine microhabitats that are sheltered from the main force of current. Substrates from mud and sand to gravel, cobble, and boulders in relatively shallow rivers and shoals with slow to swift current.	May occur. USFWS occurrence data suggests that suitable habitat and individuals occur in vicinity of the Project area in the Tennessee River.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts of the species and/or habitat.
White wartyback *Plethobasus cicatricosus*	E	Inhabits shoals and riffles in large rivers like the Tennessee River. The white wartyback may occur downstream of the Tennessee River in Perry and Decatur counties.	May occur. USFWS occurrence data suggests that suitable habitat and individuals occur in the vicinity of the UMTP Project area in the Tennessee River.	May affect, but not likely to adversely affect. HDD of waterbodies will avoid impacts of the species and/or habitat.
Plants				

Table J-4

Federally Listed Species Potentially Occurring in the UMTP Project Area in Tennessee

Species	Federal Status [a]	Range or Habitat Requirements	Potential for Occurrence in Project Area	TGP's Proposed Effect Determination
Price's potato-bean *Apios priceana*	T	Open, rock, wooded slopes and floodplains. Sites are usually under mixed hardwoods or in associated forest clearings, often where bluffs or ravine slopes meet creek or river bottoms.	May occur. Surveys conducted in suitable habitat during 2014 did not identify the Price's potato-bean within UMTP Project areas.	Opinion of effect on remaining project sites is pending.
Short's bladderpod *Physaria gobosa*	E	Dry limestone cliffs, barrens, cedar glades, steep wooded slopes, and talus areas.	May occur. The Project area contains some suitable habitat for Short's bladderpod, but no individuals or populations were identified during field surveys in 2015. Surveys were proposed for spring 2016.	May affect, but not likely to adversely affect.

a E = endangered; T = threatened; C = candidate; SOC = Species of Concern

Source of range and habitat information: USFWS (2013c)

Table J-5

Federally Listed Species Potentially Occurring in the UMTP Project Area in Mississippi

Species	Federal Status [a]	Range or Habitat Requirements	Potential for Occurrence in Project Area	TGP's Proposed Effect Determination
Birds				
Interior Least tern *Sterna antillarum*	E	Seacoasts, beaches, bays, estuaries, lagoons, lakes, and rivers. Rests and loafs on sandy beaches, mudflats, and salt-pond dikes. Nests usually in shallow depressions on level ground on sandy or gravelly beaches and banks of rivers or lakes, typically in areas with sparse or no vegetation.	Unlikely to occur. The Project area does not include habitat known to be used by interior least tern.	May affect, but not likely to adversely affect.
Wood stork *Mycteria Americana*	E	Typical foraging sites include freshwater marshes, swales, ponds, hardwood and cypress swamps, narrow tidal creeks or shallow tidal pools, and artificial wetlands (such as stock ponds; shallow, seasonally flooded, roadside or agricultural ditches; and impoundments).	May occur. The Project area does contain some suitable habitat for non-breeding wood stork.	May affect, but not likely to adversely affect.
Fishes				
Pallid sturgeon *Scaphirhynchus albus*	E	Occupies large, turbid, free-flowing rivers and tributaries with strong currents over firm gravel or sandy substrates.	Does not occur. The pallid sturgeon is found in the lower Mississippi River. No in-stream work is proposed as part of the project and no workspace, new MLV, off-ROW tap relocations, new build, or new pump stations are located within 0.5 mile of the Mississippi River.	No effect.
Mammals				
Indiana bat *Myotis sodalis*	E	Hibernates in caves, maternity sites generally behind loose bark of dead or dying trees or in tree cavities.	May occur. Field data suggests that suitable habitat occurs in the UMTP Project area.	May affect, but not likely to adversely affect. Seasonal tree clearing windows will be adhered to and forest dwelling bat CMOA will be executed.
Northern long-eared bat *Myotis septentrionalis*	T	Summer roost sites for reproductive bat females include exfoliating bark of dead trees that retain large, thick slabs of peeling bark, or trees with cavities. Primary roosts usually receive direct sunlight for more than half the day. In general, roost trees occur within canopy gaps in a forest, in a fence line, or along a wooded edge. Habitats include riparian zones, bottomland and floodplain habitats, wooded wetlands, and upland communities. Forage habitat typically includes semi-open to closed (open understory) forested habitats, forest edges, and riparian areas where insects thrive.	May occur. Field data suggests that suitable roosting habitat occurs in the Project area.	May affect, but not likely to adversely affect. Seasonal tree clearing windows will be adhered to.
Mussels				

Table J-5

Federally Listed Species Potentially Occurring in the UMTP Project Area in Mississippi

Species	Federal Status [a]	Range or Habitat Requirements	Potential for Occurrence in Project Area	TGP's Proposed Effect Determination
Fat pocketbook mussel *Potamilus capax*	E	Found in sand, mud and fine gravel substrates and flowing water. Found in large rivers in slow-flowing water (often near bank) in mud or sand.	Does not occur. The fat pocketbook mussel is found in the Mississippi River and associated tributaries. No in-stream work is proposed as part of the project and no workspace, new MLV, off-ROW tap relocations, new build, or new pump stations are located within 0.5 mile of the Mississippi River.	No effect.
Rabbitsfoot *Quadrula cylindrical cylindrical*	T	Small to medium rivers with moderate to swift currents. In smaller streams it inhabits bars or gravel and cobble close to fast currents. Found in depths up to 10 feet.	Does not occur. No in-stream work is proposed as part of the project and no workspace, new MLV, off-ROW tap relocations, new build, or new pump stations are located within 0.5 mile of rivers likely to have rabbitsfoot mussel.	No effect.
Sheepnose mussel *Plethobasus cyphyus*	E	Large-river species associated with gravel/cobble substrates, but usually has been reported from dep water (>6.5 feet) with light to swift currents and mud, sand, or gravel bottoms. May occur in deep river runs.	Does not occur. No in-stream work is proposed as part of the project and no workspace, new MLV, off-ROW tap relocations, new build, or new pump stations are located within 0.5 mile of rivers likely to have sheepnose mussel.	No effect.
Plants				
Pondberry *Lindera melissifolia*	E	Occurs in seasonally flooded wetlands such as floodplain/bottomland hardwood forests and forested swales, on the bottoms and edges of shallow seasonal pools in old dune fields, along the margins of ponds and depressions in pinelands, around the edges of sinkholes in coastal areas with karst topography, and along borders of Sphagnum bogs.	Does not occur. No suitable habitat for the pondberry exists within the Project area.	May affect, but not likely to adversely affect.

a E = endangered; T = threatened; C = candidate; SOC = Species of Concern

Source of range and habitat information: USFWS (2014d [for bats] and 2013d)

Table J-6

Federally Listed Species Potentially Occurring in the UMTP Project Area in Arkansas

Species	Federal Status [a]	Range or Habitat Requirements	Potential for Occurrence in Project Area	TGP's Proposed Effect Determination
Birds				
Interior Least tern *Sterna antillarum*	E	Seacoasts, beaches, bays, estuaries, lagoons, lakes, and rivers. Rests and loafs on sandy beaches, mudflats, and salt-pond dikes. Nests usually in shallow depressions on level ground on sandy or gravelly beaches and banks of rivers or lakes, typically in areas with sparse or no vegetation.	Unlikely to occur. The UMTP Project area does not include habitat known to be used by interior least tern. No in-stream work is proposed and no workspace or new MLV is located within 0.5 mile of the Mississippi River.	May affect, but not likely to adversely affect.
Piping plover *Charadrius melodus*	T	Sandy upper beaches and sparsely vegetated shores and islands of shallow lakes, ponds, rivers, and impoundments.	Unlikely to occur. The UMTP Project area does not include habitat know to be used by piping plover. No in-stream work is proposed and no workspace or new MLV is located within a river.	May affect, but not likely to adversely affect.
Fishes				
Pallid sturgeon *Scaphirhynchus albus*	E	Occupies large, turbid, free-flowing rivers and tributaries with strong currents over firm gravel or sandy substrates.	Does not occur. In Arkansas, pallid sturgeon is restricted to the Mississippi River. No in-stream work is proposed and no workspace or new MLV is located within 0.5 mile of the Mississippi River.	No effect.
Mammals				
Northern long-eared bat *Myotis septentrionalis*	T	During the summer, northern long-eared bats typically roost singly or in colonies in a wide variety of forested habitats. Roosts may be in cavities or crevices or underneath loose bark of both live trees and snags greater than 3 inches dbh. Northern long-eared bats have also been documented roosting in man-made structures (e.g., buildings, barns, etc.) during the summer. Northern long-eared bats forage for insects in upland and lowland woodlots and tree-lined corridors. During the winter, northern long-eared bats predominantly hibernate in caves and abandoned mine portals.	Unlikely to occur. The UMTP Project area does not include habitat known to be used by northern long-eared bat.	No effect.
Plants				
Pondberry *Lindera melissifolia*	E	Occurs in seasonally flooded wetlands such as floodplain/bottomland hardwood forests and forested swales, on the bottoms and edges of shallow seasonal pools in old dune fields, along the margins of ponds and depressions in pinelands, around the edges of sinkholes in coastal areas with karst topography, and along borders of Sphagnum bogs.	Does not occur. No suitable habitat for the pondberry exists within the Project area.	No effect

Table J-6

Federally Listed Species Potentially Occurring in the UMTP Project Area in Arkansas

Species	Federal Status [a]	Range or Habitat Requirements	Potential for Occurrence in Project Area	TGP's Proposed Effect Determination

a E = endangered; T = threatened; C = candidate; SOC = Species of Concern
Source of range and habitat information: USFWS (2013e)

Table J-7

Federally Listed Species Potentially Occurring in the UMTP Project Area in Louisiana

Species	Federal Status [a]	Range or Habitat Requirements	Potential for Occurrence in Project Area	TGP's Proposed Effect Determination
Birds				
Interior Least tern *Sterna antillarum*	E	Seacoasts, beaches, bays, estuaries, lagoons, lakes, and rivers. Rests and loafs on sandy beaches, mudflats, and salt-pond dikes. Nests usually in shallow depressions on level ground on sandy or gravelly beaches and banks of rivers or lakes, typically in areas with sparse or no vegetation.	Unlikely to occur. The Project area does not include habitat known to be used by interior least tern.	May affect, but not likely to adversely affect.
Piping plover *Charadrius melodus*	T	Sandy upper beaches and sparsely vegetated shores and islands of shallow lakes, ponds, rivers, and impoundments.	Unlikely to occur. The UMTP Project area does not include habitat know to be used by piping plover. No in-stream work is proposed and no workspace or new MLV is located within a river.	May affect, but not likely to adversely affect.
Red-cockaded woodpecker *Charadrius melodus*	E	Found in old growth pine forests nesting in pine 60 years old or older and foraging in pines 30 years old or older.	May occur. Field data suggests that suitable habitat occurs in the vicinity of the Project area.	Opinion of effect pending assessment of project sites. Presence/Absence surveys were to be conducted Spring 2016.
Rufa Red knot [b] *Calidris canutus rufa*	T	Found in coastal wetlands and intertidal marine habitats.	Unlikely to occur. The Project area does not include coastal wetlands or intertidal marine habitats.	No effect.
Fishes				
Pallid sturgeon *Scaphirhynchus albus*	E	Occupies large, turbid, free-flowing rivers and tributaries with strong currents over firm gravel or sandy substrates.	May occur. USFWS occurrence data suggests that suitable habitat occurs in the vicinity of the Project area. No in-stream work is proposed as part of the project and no workspaces are located within 0.5 mile of the Mississippi River.	No effect.
Mammals				

Table J-7

Federally Listed Species Potentially Occurring in the UMTP Project Area in Louisiana

Species	Federal Status [a]	Range or Habitat Requirements	Potential for Occurrence in Project Area	TGP's Proposed Effect Determination
Northern long-eared bat *Myotis septentrionalis*	T	Found in mixed pine/hardwood with intermittent streams. Roost alone and in small colonies. Hibernate in caves and abandoned mines.	May occur. USFWS occurrence data suggests that suitable habitat and individuals occur in the vicinity of the UMTP Project area.	May affect, but not likely to adversely affect. Seasonal tree clearing windows will be adhered to.
Mussels				
Pink mucket *Lampsilis abrupta*	E	Found in waters with strong currents, rocky or boulder substrates, with depths up to 1 meter, but is also found in deeper water with slower currents and sand and gravel substrates.	May occur. USFWS occurrence data suggests that suitable habitat and individuals occur in the vicinity of the UMTP Project area.	No effect.
Rabbitsfoot *Quadrula cylindrical cylindrical*	T	Found in rivers and streams with moderate to swift currents, gravel bottoms, and clear water.	May occur. USFWS occurrence data suggests that suitable habitat and individuals occur in the vicinity of the UMTP Project area.	No effect.
Plants				
Earth fruit *Geocarpon minimum*	T	A small, succulent annual that is found within thinly vegetated sandstone glades and saline prairies. In Louisiana, habitat is characterized by very thin soils that are high in sodium and magnesium where woody plants are nearly absent.	Unlikely to occur. The Project area does not include saline prairies.	No effect.
Reptiles				
Louisiana pine snake *Pituophis ruthveni*	C	Found in open longleaf pine uplands with loose sandy soil.	May occur. The Project area contains some areas of open longleaf pine uplands.	May affect, but not likely to adversely affect.

a E = endangered; T = threatened; C = candidate; SOC = Species of Concern

b IPaC listed under special conditions for wind-related projects.

Sources of range and habitat information: USFWS (2008b and 2014c), Martin and Lester (1990), NatureServe (2014)

Table J-8

Federally Listed Species Potentially Occurring in the UMTP Project Area in Texas

Species	Federal Status [a]	Range or Habitat Requirements	Potential for Occurrence in Project Area	TGP's Proposed Effect Determination
Birds				
Interior Least tern [b] *Sterna antillarum*	E	Found on seacoasts, beaches, bays, estuaries, lagoons, lakes, and rivers. Nests on sandy or gravelly beaches and banks of rivers or lakes, rarely on flat rooftops of buildings.	Unlikely to occur. The Project area does not include coastal areas or beaches.	No effect.
Piping plover *Charadrius melodus*	T	Winter resident along the Texas Gulf Coast; found on beaches and bayside mud or salt flats.	Unlikely to occur. The Project area does not include beaches or bayside salt flats.	No effect.
Red-cockaded woodpecker *Charadrius melodus*	E	Found in old growth pine forests nesting in pine 60 years old or older and foraging in pines 30 years old or older.	May occur. NDD data suggests that species occurs in the vicinity of the proposed Project.	May affect. Presence/Absence surveys were to be conducted Spring 2016.
Rufa Red knot [b] *Calidris canutus rufa*	T	Found in coastal wetlands and intertidal marine habitats.	Unlikely to occur. The Project area does not include coastal wetlands or intertidal marine habitats.	No effect.
Mammals				
West Indian manatee *Trichechus manatus*	E	Found in Gulf and bay systems; opportunistic aquatic herbivore.	Does not occur. The Project area does not include coastal waters.	No effect.
Plants				
Navasota ladies' - tresses *Spiranthes parksii*	E	Occurs primarily in seasonally moist soils along open wooded creeks, drainages, and intermittent tributaries of the Brazos and Navasota Rivers in east-central Texas. Thought to require small-scale, patchy natural disturbances that provide canopy openings necessary to maintain habitat.	Unlikely to occur. No plants were found during species specific surveys in 2015.	No effect.
Texas trailing phlox *Phlox nivalis ssp. texensis*	E	Grows on sandy soils in fire-maintained open pine woodlands.	May occur. NDD data suggests that species occurs in the vicinity of the proposed Project. Presence/Absence surveys were conducted in Spring 2015. No populations were observed.	May affect, not likely to adversely affect.
Reptiles				
Green sea turtle *Chelonia mydas*	T	Gulf and bay systems; found in shallow water sea grass beds, open water between feeding and nesting areas, and barrier island beaches.	Does not occur. The Project area does not include coastal waters.	No effect.
Hawksbill sea turtle *Eretmochelys imbricate*	E	Gulf and bay systems; warm shallow waters especially in rocky marine environments such as coral reefs and jetties; juveniles found in floating mats of Sargassum sp.	Does not occur. The Project area does not include coastal waters.	No effect.
Kemp's ridley sea turtle *Lepidochelys kempii*	E	Gulf and bay systems; adults stay within the shallow waters of the Gulf of Mexico.	Does not occur. The Project area does not include coastal waters.	No effect.

Table J-8

Federally Listed Species Potentially Occurring in the UMTP Project Area in Texas

Species	Federal Status [a]	Range or Habitat Requirements	Potential for Occurrence in Project Area	TGP's Proposed Effect Determination
Leatherback sea turtle *Dermochelys coriacea*	E	Gulf and bay systems; widest ranging open water reptile.	Does not occur. The Project area does not include coastal waters.	No effect.
Loggerhead sea turtle *Caretta caretta*	T	Gulf and bay systems; found in open water and near accumulations of floating mats of Sargassum sp.	Does not occur. The Project area does not include coastal waters.	No effect.
Louisiana pine snake *Pituophis ruthveni*	C	Found in open longleaf pine uplands with loose sandy soil.	May occur. The Project area contains some areas of open longleaf pine uplands.	May affect, but not likely to adversely affect.

a E = endangered; T = threatened; C = candidate; SOC = Species of Concern

b IPaC listed under special conditions for wind projects.

Sources of range and habitat information: USFWS (2014c), Texas Parks and Wildlife Department (2014a, 2014b, and 2014c), National Oceanic and Atmospheric Administration (2014), Campbell (2003)

Appendix K

Permits, Approvals, and Consultations for the UMTP Project

Appendix K

Permits, Approvals, and Consultations for the UMTP Project

Agency	Permit/Approval/Consultation	Status
Federal		
U.S. Army Corps of Engineers [a] Huntington District Louisville District Nashville District Memphis District Vicksburg District Fort Worth District Galveston District	Section 10 of the Rivers and Harbors Act	PCNs submitted All districts have preliminarily determined that UMTP Project meets the eligibility criteria for NWP 12 NWP12 permit issued by Nashville and Memphis Districts (May 2015)
	Section 404 of the Clean Water Act- Individual or Nationwide Permit	PCNs submitted All districts have preliminarily determined that UMTP Project meets the eligibility criteria for NWP 12 NWP12 permit issued by Nashville and Memphis Districts (May 2015) Revised PCNs provided to Louisville and Huntington districts November 11, 2015 [c]
	Levee Crossing (the number of levees crossed is not known at this time)	Developed prior to construction
U.S. Forest Service Kisatchie National Forest	Special Use Permit for construction area outside of existing permanent ROW (LA0210), if necessary	Pre-application meeting held; working with Kisatchie National Forest on construction disturbance area
U.S. Fish and Wildlife Service [b] Ohio Field Office Kentucky Field Office Tennessee Field Office Mississippi Field Office Arkansas Field Office Louisiana Field Office Texas Field Office	Section 7, Endangered Species Act and Fish & Wildlife Coordination Act	Pre-application meeting held; Project Coordination Report submitted Updated reports submitted in November 2015
Advisory Council on Historic Preservation	National Historic Preservation Act	Process initiated by Lead Federal Agency (COE)
EPA Region 6	NPDES hydrostatic test water discharge-if statewide general permit is not applicable to NGL pipelines	Prior to Construction
Tennessee Valley Authority	Section 26(a) waterbody crossing permit	Final permit received 4/7/2015 Review concurrent with Tennessee Aquatic Resource Alteration Permit
Ohio		
Ohio Environmental Protection Agency	Section 401 Water Quality Certification and Isolated Wetlands Permit	Pre-application meeting held; application requires 100 percent survey
	Hydrostatic Test Water Discharge General Permit (OHH000001)	Pre-application meeting held; application requires 100 percent survey
	Minor New Source Review Air Permits Application for Permit to Install/Operate Tuscarawas NGL Storage Facility (Air Quality Permits)	CS Applications submitted; NGL Storage Facility application in progress
Ohio Department of Natural Resources	Letter of Permission for Blasting in Waters of the State (if required)	Developed prior to construction, if necessary
	Water Withdrawal Facility Registration (>100,000 gallons per day)	Developed prior to construction

Appendix K

Permits, Approvals, and Consultations for the UMTP Project

Agency	Permit/Approval/Consultation	Status
	State Protected Species Consultations	Pre-application meeting held; application is under development
Ohio SHPO	National Historic Preservation Act (NHPA) Section 106	Cultural Resources Survey Report submitted 2/26/2015; Concurrence received 9/2/2015; Addendum Survey Reports submitted 10/27/2015 and 11/23/2015
Ohio County Permits		
Scioto County	Floodplain Permit	Developed prior to construction
Athens County	Floodplain Permit	Developed prior to construction
Tuscarawas County	Floodplain Permit	Developed prior to construction
Kentucky		
Kentucky Department of Environmental Protection	Hydrostatic Test Water Discharge Permit	Developed prior to construction
	Authorization for Temporary Water Withdrawal (Kentucky Division of Water)	Developed prior to construction
	Floodplain Construction Permit/Permit to Construct Across or Along a Stream	Developed prior to construction
	Section 401 Water Quality Certification (Kentucky Division of Water)	Concurrent with 404 permitting Pre-application meeting held; application requires 100 percent survey
	National Historic Preservation Act Section 106	Pre-application meeting held; Phase 1 report submitted and concurrence received
Kentucky SHPO [b]	National Historic Preservation Act Section 106	Pre-application meeting held; Phase 1 report submitted and concurrence received
Kentucky County Permits	No County level environmental permits anticipated at this time	
Tennessee		
Tennessee Department of Environment and Conservation	Section 401 Water Quality Certification (Reviewed concurrently with Aquatic Resource Alteration Permit)	Final permit received 4/7/2015
	General NPDES Permit for Discharges of Hydrostatic Test Water (TNG670000)	Developed prior to construction
	Water Withdrawal Registration (annual registration required)	Submit after withdrawal takes place
Tennessee Wildlife Resources Agency	State Protected Species Consultation	Submitted July 9, 2015
Tennessee SHPO [b]	National Historic Preservation Act Section 106	Pre-application meeting held; Phase 1 report submitted and concurrence received
Tennessee County Permits		
Dickson County	Floodplain permit	Developed prior to construction
Cheatham County	Local land-disturbing permit; floodplain permit	Developed prior to construction
Sumner County	Utility land disturbance permit; SWPPP	Developed prior to construction
Mississippi		
Mississippi Department of Environmental Quality	Section 401 Water Quality Certification	Concurrent with 404 permitting
	Hydrostatic Test Water Discharge Permit	Developed prior to construction
	Hydrostatic Test Water Withdrawal Permit	Developed prior to construction

Appendix K

Permits, Approvals, and Consultations for the UMTP Project

Agency	Permit/Approval/Consultation	Status
Mississippi Department of Archives and History	National Historic Preservation Act Section 106	Pre-application meeting held; Phase 1 report submitted and concurrence received
Mississippi County Permits	No County level environmental permits anticipated at this time	
Arkansas		
Arkansas Department of Environmental Quality	Section 401 Water Quality Certification	Pre-application meeting held; concurrent with 404 permitting
	Hydrostatic Test Water Discharge Permit (ARG6700000)	Developed prior to construction
	Short Term Activity Authorization	Developed prior to construction
Arkansas Natural Resource Commission	Water Withdrawal Registration (annual registration required)	Submit after withdrawal takes place
Arkansas SHPO [b]	National Historic Preservation Act Section 106	Phase 1 report submitted and concurrence received
Levee District Crossing Permits (the number of districts crossed and number of levees crossed is not known at this time)	Levee crossing permit(s)	Developed prior to construction
Arkansas County Permits	No County level environmental permits anticipated at this time	
Louisiana		
Louisiana Department of Environmental Quality	Section 401 Water Quality Certification	Concurrent with 404 permitting
	Hydrostatic Test Water Discharge Permit	Developed prior to construction
Louisiana Office of Cultural Development, Division of Historic Preservation and Division of Archaeology [b]	National Historic Preservation Act Section 106	Pre-application meeting held; Phase 1 report submitted and under review
Louisiana Parish Permits	No Parish level environmental permits anticipated at this time	
Texas		
Railroad Commission of Texas	Section 401, CWA, Water Quality Certification	Pre-application meeting held; concurrent with 404 permitting
	Application for Permit to Operate a Pipeline in Texas (form T4)	Developed prior to construction
	Construction Notification (form PS-48)	Developed prior to construction
	Hydrostatic test permit	Developed prior to construction
Texas Commission on Environmental Quality	Water rights permit (Water Division)	Developed prior to construction
Texas Parks and Wildlife Department	Threatened and Endangered Species Clearance	Pre-application meeting held; report submitted October 7, 2015 and accepted November 9, 2015
	Marl, Sand, Gravel, Shell, or Mudshell Permit	Developed prior to construction
Texas SHPO [b]	National Historic Preservation Act Section 106	Draft Phase 1 report submitted and concurrence received Final report submitted November 9, 2015

a Jurisdictional areas within each district of the UMTP Project that are subject to review to support the NEPA process

b Entire Project within the state or region is subject to review as part of the NEPA process

c TGP updated applications to reflect UMTP Project changes.

Appendix L

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APPENDIX L – REFERENCES

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