Office of Energy Projects

February 2017

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DRAFT ENVIRONMENTAL IMPACT STATEMENT

FOR

Columbia Gas Transmission, LLC – Mountaineer XPress Project
Columbia Gulf Transmission, LLC – Gulf XPress Project

Volume I

Docket Nos. CP16-357-000 and CP16-361-000

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

Cooperating Agencies:

U.S. Environmental Protection Agency

U.S. Army Corps of Engineers

West Virginia Division of Natural Resources

West Virginia Department of Environmental Protection

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas 4
Columbia Gas Transmission, LLC
Mountaineer XPress Project
Docket No. CP16-357-000
Columbia Gulf Transmission, LLC
Gulf XPress Project
Docket No. CP16-361-000

TO THE PARTY ADDRESSED:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared a draft environmental impact statement (EIS) for the Mountaineer XPress Project (MXP), proposed by Columbia Gas Transmission, LLC (Columbia Gas), and the Gulf XPress Project (GXP), proposed by Columbia Gulf Transmission, LLC (Columbia Gulf), in the above-referenced dockets. Columbia Gas requests authorization to construct and operate a total of 170.7 miles of natural gas transmission pipeline, new compressor stations, and other appurtenant facilities, and to modify one existing compressor station and two pending compressor stations, all located in West Virginia. The MXP would provide about 2,700,000 dekatherms per day (Dth/d) of available capacity for transport to multiple Midwest, Northeast, and Mid-Atlantic markets across Columbia Pipeline Group's system, including the Columbia Gulf Leach interconnect with Columbia Gulf. Columbia Gulf requests authorization to construct and operate compressor stations and to upgrade an approved compressor station and one existing meter station in Kentucky, Tennessee, and Mississippi. The GXP would provide about 860,000 Dth/d of natural gas delivery to markets in the Gulf Coast region.

The draft EIS assesses the potential environmental effects of the construction and operation of the MXP and GXP in accordance with the requirements of the National Environmental Policy Act (NEPA). The FERC staff concludes that approval of the proposed projects would result in some adverse and significant environmental impacts. However, if the projects are constructed and operated in accordance with applicable laws and regulations, the mitigation measures discussed in this EIS, and our recommendations, these impacts would be reduced to acceptable levels.

The U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE), West Virginia Division of Natural Resources (WVDNR), and West Virginia Department of Environmental Protection (WVDEP) participated as cooperating agencies in the preparation of the EIS. Cooperating agencies have jurisdiction by law or special

expertise with respect to resources potentially affected by the proposal and participate in the NEPA analysis. The USACE will adopt and use the EIS to comply with the requirements of NEPA before issuing permits for the projects under section 404 of the Clean Water Act, which governs the discharge of dredged or fill material into waters of the United States (including wetlands). Although the cooperating agencies provided input to the conclusions and recommendations presented in the draft EIS, the agencies will present their own conclusions and recommendations in their respective records of decision (where applicable) for the projects.

The draft EIS addresses the potential environmental effects of the construction and operation in West Virginia of the following MXP facilities:

- about 164.3 miles of new 36-inch-diameter natural gas pipeline from Marshall County to Cabell County;
- about 5.9 miles of new 24-inch-diameter natural gas pipeline in Doddridge County;
- three new compressor stations in Doddridge, Calhoun, and Jackson Counties;
- two new regulating stations in Ripley and Cabell Counties;
- about 296 feet of new, 10-inch-diameter natural gas pipeline at the Ripley Regulator Station to tie Columbia Gas' existing X59M1 pipeline into the MXP-100 pipeline in Jackson County;
- an approximately 0.4-mile-long replacement segment of 30-inch-diameter natural gas pipeline in Cabell County;
- upgrades to one existing compressor station (Wayne County) and two compressor stations (Marshall and Kanawha Counties) either approved or pending under separate FERC proceedings; and
- related facilities in various West Virginia counties.

The draft EIS also addresses the potential environmental effects of the construction and operation of the following GXP facilities:

- seven new compressor stations in Kentucky (Rowan, Garrard, and Metcalfe Counties), Tennessee (Davidson and Wayne Counties), and Mississippi (Union and Granada Counties);
- upgrades to one approved compressor station in Carter County, Kentucky; and
- upgrades at one existing meter station in Boyd County, Kentucky.

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

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

Any person wishing to comment on the draft EIS may do so. To ensure consideration of your comments on the proposal in the final EIS, it is important that the Commission receive your comments on or before **April 24, 2017**.

For your convenience, there are four methods you can use to submit your comments to the Commission. The Commission will provide equal consideration to all comments received, whether filed in written form or provided verbally. The Commission encourages electronic filing of comments and has expert staff available to assist you at (202) 502-8258 or efiling@ferc.gov. Please carefully follow these instructions so that your comments are properly recorded.

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

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

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

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

4) In lieu of sending written or electronic comments, the Commission invites you to attend one of the public comment sessions its staff will conduct in the project areas to receive comments on the draft EIS. **The sessions are scheduled as shown below.**

Date and Time	Location
Monday, March 20, 2017 5:00 – 9:00 p.m.	Sleepy Hollow Golf & Country Club 3780 Sleepy Hollow Drive Hurricane, WV 25526 (304) 757-9416
Tuesday, March 21, 2017 5:00 – 9:00 p.m.	Ripley High School 2 School Street Ripley, WV 25271 (304) 372-7355
Wednesday, March 22, 2017 5:00 – 9:00 p.m.	Doddridge County Park Meeting Facility 1252 Snowbird Road West Union, WV 26456 (304) 873-1663
Thursday, March 23, 2017 5:00 – 9:00 p.m.	New Martinsville City Hall 195 Main Street New Martinsville, WV 26155 (304) 455-9120
Tuesday, March 28, 2017 5:00 – 9:00 p.m.	Cane Ridge High School 12848 Old Hickory Boulevard Antioch, TN 37013 (615) 687-4000

The primary goal of these comment sessions is to provide the public with another method for identifying specific environmental issues and concerns with the draft EIS. Individual verbal comments will be taken on a one-on-one basis with a court reporter. This format is designed to receive the maximum amount of verbal comments in a convenient way during the timeframe allotted.

Each comment session is scheduled from 5:00 p.m. to 9:00 p.m. (local time). There will not be a formal presentation by Commission staff when the session opens. If you wish to speak, the Commission staff will hand out numbers in the order of your arrival; distribution of numbers will be discontinued at 8:00 p.m. in order to ensure all comments are received by the session closing time. However, if no additional numbers have been handed out and all individuals who wish to provide comments have had an opportunity to do so, staff may conclude the session at 8:00 p.m., or after the last comment is taken.

Your verbal comments will be recorded by the court reporter (with FERC staff or representative present) and become part of the public record for this proceeding. Transcripts will be publicly available on FERC's eLibrary system (see below for instructions on using eLibrary). If a significant number of people are interested in providing verbal comments in the one-on-one settings, a time limit of 3 to 5 minutes may be implemented for each commentor.

It is important to note that verbal comments hold the same weight as written or electronically submitted comments. Although there will not be a formal presentation, Commission staff will be available throughout the comment session to answer your questions about the FERC environmental review process.

Any person seeking to become a party to the proceeding must file a motion to intervene pursuant to Rule 214 of the Commission's Rules of Practice and Procedures (18 CFR 385.214).[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 which no other party can adequately represent. **Simply filing environmental comments will not give you intervenor status, but you do not need intervenor status to have your comments considered.**

Questions?

Additional information about the projects is available from the Commission's Office of External Affairs, at **(866) 208-FERC**, or on the FERC website (www.ferc.gov) using the eLibrary link. Click on the eLibrary link, click on "General Search," and enter the docket number excluding the last three digits in the Docket Number field (i.e., CP16-357 and CP16-361). 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

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

the texts of formal documents issued by the Commission, such as orders, notices, and rulemakings.

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

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ACRONYMS AND ABBREVIATIONS

µg/m3	micrograms per cubic meter
3PCM	third-party compliance monitoring
ACHP	Advisory Council on Historic Preservation
AEO	annual energy outlook
AMM	Avoidance and Minimization Measures
APE	area of potential effect
AQCR	air quality control region
ATWS	additional temporary workspace
BA	biological assessment
BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
BGEPA	Bald and Golden Eagle Protection Act
BLS	Bureau of Labor Statistics
BMP	best management practice
BTEX	benzene, toluene, ethylbenzene, and xylene
CAA	Clean Air Act
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 equivalents
Columbia Gas	Columbia Gas Transmission, LLC
Columbia Gulf	Columbia Gulf Transmission, LLC
Commission	Federal Energy Regulatory Commission
Contingency Plan	Horizontal Directional Drill Contingency Plan
CPG	Columbia Pipeline Group
CSR	Code of State Rules
CWA	Clean Water Act
CZMA	Coastal Zone Management Act of 1972
dBA	A-weighted decibels
DBNF	Daniel Boone National Forest
DHS	U.S. Department of Homeland Security
Director of OEP	Director of the Office of Energy Projects
Dominion	Dominion Transmission Inc.
Dth/d	dekatherms per day
E&SC Plan	Erosion and Sediment Control Plan
ECS	Environmental Construction Standards
EFH	essential fish habitat
EI	Environmental Inspector

ACRONYMS AND ABBREVIATIONS

EIA	Energy Information Administration
EIS	Environmental Impact Statement
EM&CP	Environmental Management and Construction Plan
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act of 2005
ESA	Endangered Species Act of 1973
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FR	Federal Register
g	gravity (when discussing seismic hazard mapping)
GHG	greenhouse gas
GIS	geographic information system
gpm	gallons per minute
GWP	global warming potential
GXP	Gulf XPress Project
GXP NOI	*Notice of Intent to Prepare an Environmental Impact Statement for the Planned Gulf XPress Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meeting*
HAP	hazardous air pollutants
HCA	high-consequence areas
HDD	horizontal directional drilling
hp	horsepower
HQW	high-quality waters
HUC	Hydrologic Unit Code
I-77	Interstate Highway 77
IBA	Important Bird Area
INGAA	Interstate Natural Gas Association of America
IPaC	Information Planning and Conservation System
ISO	International Standards Organization
KAR	Kentucky Administrative Regulations
KDEP	Kentucky Department of Environmental Protection
KDFWR	Kentucky Department of Fish and Wildlife Resources
LAA	likely to be adversely affected
lb/hr	pounds per hour
Ldn	day-night sound level
Leq	equivalent sound level
LEX	Leach XPress Project
LUST	Leaking Underground Storage Tank
MAC	Mississippi Administrative Code

Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MAOP	maximum allowable operating pressure
MarkWest	MarkWest Energy Partners
MBTA	Migratory Bird Treaty Act
MBTA MOU	*Memorandum of Understanding Between the Federal Energy Regulatory Commission and the U.S. Department of the Interior United States Fish and Wildlife Service Regarding Implementation of Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds"*
MDEQ	Mississippi Department of Environmental Quality
MDOT	Mississippi Department of Transportation
MDWFP	Mississippi Department of Wildlife, Fish, and Parks
Memorandum	*Memorandum of Understanding on Natural Gas Transportation Facilities*
MLRA	Major Land Resource Areas
MLV	mainline valve
MP	milepost
MSA	Metropolitan Statistical Area
MSHCP	Multi-Species Habitat Conservation Plan
MXP	Mountaineer XPress Project
MXP NOI	*Notice of Intent to Prepare an Environmental Impact Statement for the Planned Mountaineer XPress Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meetings*
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NE	no effect
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NGA	Natural Gas Act
NHP	Natural Heritage Program
NHPA	National Historic Preservation Act
NLAA	not likely to be adversely affected
NLEB	northern long-eared bat
NMSZ	The New Madrid Seismic Zone
NO_2	nitrogen dioxide
NOAA Fisheries	National Oceanic and Atmospheric Administration's National Marine Fisheries Service
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places

NRI	Nationwide Rivers Inventory
NSA	noise-sensitive area
NSPS	New Source Performance Standards
NSR	New Source Review
NWI	National Wetlands Inventory
O_3	ozone
PADEP	Pennsylvania Department of Environmental Protection
pCi/L	picocuries per liter
PEM	palustrine emergent wetlands
PERT	Program Evaluation Review Technique
PF	pre-filing
PFO	palustrine forested wetlands
PGA	peak ground acceleration
PHMSA	Pipeline and Hazardous Materials Safety Administration
Plan	Upland Erosion Control, Revegetation, and Maintenance Plan
PM	particulate matter
PM10	particulate matter with a diameter less than 10 microns
PM2.5	particulate matter with a diameter less than 2.5 microns
POR	Point of Receipt
Procedures	Wetland and Waterbody Construction and Mitigation Procedures
PSD	Prevention of Significant Deterioration
PSS	palustrine scrub-shrub wetlands
PTE	potential-to-emit
PUB	palustrine unconsolidated bottom
PWS	public water supply
RHA	Rivers and Harbors Act
RV	recreational vehicle
SCADA	supervisory control and data acquisition
Secretary	Secretary of the Commission
SER	significant emission rate
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SR	State Route
SSA	sole source aquifer
SSURGO	Soil Survey Geographic
Tcf	trillion cubic feet
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
TETCO	Texas Eastern Transmission, LP

TGP	Tennessee Gas Pipeline Company
the Applicants	Columbia Gas Transmission, LLC and Columbia Gulf Transmission, LLC (collectively)
the Companies	Columbia Gas Transmission, LLC and Columbia Gulf Transmission, LLC (collectively)
tpy	tons per year
TSS	total suspended solids
TWS	temporary workspace
U.S. 50	U.S. Highway 50
UDP	Unanticipated Discovery Plan
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USUSDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USGCRP	United States Global Change Research Program
USGS	U.S. Geological Survey
VOCs	volatile organic compounds
WBX	WB XPress Project
WEG	wind erodibility group
WHPA	wellhead protection areas
WMA	Wildlife Management Area
WVBPH	West Virginia Bureau for Public Health
WVCSR	West Virginia Code of State Regulations
WVDEP	West Virginia Department of Environmental Protection
WVDHHR	West Virginia Department of Health and Human Resources
WVDNR	West Virginia Division of Natural Resources
WVDOT	West Virginia Department of Transportation
WVGES	West Virginia Geological and Economic Survey
ZCC	Zones of Critical Concern
ZPC	Zones of Peripheral Concern

EXECUTIVE SUMMARY

On April 29, 2016, Columbia Gas Transmission, LLC (Columbia Gas), an indirect wholly-owned subsidiary of Columbia Pipeline Group, filed an application with the Federal Energy Regulatory Commission (Commission or FERC) under sections 7(c) and 7(b) of the Natural Gas Act (NGA) as amended. Columbia Gas is seeking a Certificate of Public Convenience and Necessity (Certificate) to construct, operate, and maintain a new interstate natural gas pipeline and ancillary facilities in West Virginia. Columbia Gas' application was assigned Docket No. CP16-357-000. Also on April 29, 2016, Columbia Gulf Transmission, LLC (Columbia Gulf), an indirect wholly-owned subsidiary of Columbia Pipeline Group, filed an application with FERC under the NGA seeking a Certificate to construct, operate, and maintain new and upgraded natural gas ancillary facilities in Kentucky, Tennessee, and Mississippi. Columbia Gulf's application was assigned Docket No. CP16-361-000. We[1] issued a Notice of Application for each project on May 13, 2016, and the notices appeared in the *Federal Register* (FR) on May 20, 2016.

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

FERC staff prepared a single EIS for the two projects because we are completing the environmental review for the two projects within the same general timeframe and because they are being proposed by the same applicant (Columbia Pipeline Group). Also, our consideration of company-proposed construction techniques and mitigation measures is facilitated by a combined analysis. However, any Certificate(s) the Commission may issue for these projects would be individual and separate for each project.

The U.S. Environmental Protection Agency, U.S. Army Corps of Engineers (USACE), West Virginia Department of Environmental Protection, and West Virginia Division of Natural Resources (WVDNR) are participating as cooperating agencies in the preparation of this EIS because they have jurisdiction by law or have special expertise with respect to environmental impacts associated with the proposals.

PROPOSED ACTION

Columbia Gas proposes to construct and operate the Mountaineer XPress Project (MXP) in West Virginia, and Columbia Gulf proposes to construct and operate the Gulf XPress Project (GXP) in Kentucky, Tennessee, and Mississippi. According to Columbia Gas, the primary purpose

[1] The pronouns "we," "us," and "our" refer to the environmental staff of the FERC's Office of Energy Projects.

of the MXP is to add pipeline infrastructure to support the increased transportation demand for natural gas in the Utica and Marcellus basins by increasing the capacity of Columbia Gas' system by up to 2,700,000 dekatherms per day. According to Columbia Gulf, the purpose of the GXP is to expand the capacity of Columbia Gulf's existing system to allow for an additional 860,000 dekatherms per day of natural gas delivery to high-demand markets in the Gulf Coast region.

The MXP would include the following facilities in West Virginia:

- about 164.3 miles of new 36-inch-diameter natural gas pipeline (MXP-100);
- about 5.9 miles of new 24-inch-diameter natural gas pipeline (MXP-200);
- about 296 feet of new 10-inch-diameter natural gas pipeline at an existing regulator station to connect Columbia Gas' existing system to the MXP;
- three new compressor stations and two new regulator stations;
- additional compression at one existing compressor station and two new compressor stations approved/pending under separate proceedings;
- replacement of a 0.4-mile-segment of 30-inch-diameter natural gas pipeline on Columbia Gas' existing system; and
- other appurtenant facilities;

The GXP would include the following facilities:

- seven new compressor stations in Kentucky, Tennessee, and Mississippi;
- additional compression and/or improvements at one approved compressor station under separate proceedings in Kentucky; and
- additional compression and/or improvements at one existing meter station in Kentucky.

PUBLIC INVOLVEMENT

On September 16, 2015, FERC staff began its pre-application review of the MXP and established a pre-filing (PF) docket number (PF15-31-000) to place information related to the planned MXP into the public record. Prior to entering PF, Columbia Gas began initial outreach activities with stakeholders via notification letters in April 2015. Columbia Gas began making contact with governmental stakeholders and tribal representatives in August 2015. Between October 5 and 13, 2015, after entering into PF, Columbia Gas hosted six informal open house meetings in Wetzel, Doddridge, Ritchie, Jackson, and Putnam Counties, West Virginia.

On November 18, 2015, FERC issued a *Notice of Intent to Prepare an Environmental Impact Statement for the Planned Mountaineer XPress Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meetings* (MXP NOI). This notice was published in the FR on December 1, 2015, and mailed to more than 1,300 interested parties, including federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; Native American Tribes; affected property owners; other interested parties; and local libraries and newspapers. The notice established a 30-day public

comment period for the submission of comments, concerns, and issues related to the environmental aspects of the MXP.

Between December 7 and 10, 2015, we conducted four public scoping meetings in New Martinsville, West Union, Ripley, and South Charleston, West Virginia. The scoping meetings provided an opportunity for agencies, stakeholders, and the general public to learn more about the MXP and participate in the environmental analysis by commenting on the issues to be addressed in the EIS. On December 10, 2015, we also conducted a meeting in Charleston, West Virginia, for cooperating agencies to discuss coordination of agency review, permit requirements and status, and specific resource concerns to be addressed in the EIS. On October 11, 2016, and subsequent to its official application filing, Columbia Gas incorporated several route modifications into its proposed MXP-100 and MXP-200 pipeline routes. Thus, on October 21, 2016, the Commission mailed a copy of the MXP NOI along with an informational cover letter to 31 newly affected landowners and opened a limited scoping period for these route modifications.

On June 2, 2016, the Commission issued a *Notice of Intent to Prepare an Environmental Impact Statement for the Proposed Gulf XPress Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meeting*. This notice was published in the FR on June 9, 2016, and mailed to more than 960 interested parties, including federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; Native American tribes; affected property owners; other interested parties; and local libraries and newspapers. The notice established a July 5, 2016, closing date for a public comment period for the submission of comments, concerns, and issues related to the environmental aspects of the GXP. On June 21, 2016, we held a public scoping meeting in Antioch, Tennessee in close proximity to the proposed Cane Ridge Compressor Station. The scoping meeting provided an opportunity for the public to learn more about the proposed GXP and to provide comments on environmental issues to be addressed in the EIS.

Substantive environmental issues identified through this public review process are addressed in this EIS. The transcripts of the public scoping meetings and all written comments are part of FERC's public record for each project and are available for viewing in the Commission's eLibrary at www.ferc.gov using the appropriate docket number.

PROJECT IMPACTS AND MITIGATION

In chapter 3 of the EIS, we summarize the evaluation of alternatives to the projects, including the no-action alternative, system alternatives, major pipeline route alternatives, minor pipeline route variations, and GXP compressor station site alternatives for the Cane Ridge facility. In chapter 4, we evaluated the potential impacts of construction and operation of the projects on geology; soils; water resources; wetlands; vegetation; wildlife and wildlife habitat; threatened, endangered, and other special status species; land use, special interest areas, and visual resources; socioeconomics; cultural resources; air quality and noise; reliability and safety; and cumulative impacts. Where necessary, we recommend additional mitigation measures to minimize or avoid these impacts. Chapter 5 of the EIS presents our conclusions and a compilation of our recommended mitigation measures.

Geology

The MXP and GXP effects to geology would be highly localized and limited primarily to the period of construction.

For the MXP, these potential impacts would occur in areas of shallow bedrock, where blasting may be required, or where construction occurs on steep slopes that would be highly susceptible to landslides. Construction on steep slopes would require contouring of the slope for safe construction practices and to accommodate heavy equipment. Columbia Gas would implement permanent drainage controls on steep slopes, or other landslide-prone areas, to help stabilize the construction work areas. Columbia Gas would also implement its Blasting Plan and Environmental Construction Standards (ECS) to minimize the potential impacts from construction on steep slopes and blasting. Overall, impacts from the construction and operation of the MXP on topography and existing geological conditions is anticipated to be minor and temporary.

The GXP impacts on geology would occur in areas of karst terrain or areas with shallow bedrock where blasting may be required. Where karst terrain may be a potential hazard, Columbia Gulf would construct foundations that are supported by competent bedrock to mitigate the risk of foundation disturbance due to seismic activity or sinkhole development. To minimize the potential impacts from blasting, Columbia Gulf would implement its ECS and Blasting Plan. Overall, impacts on topography and existing geological conditions from the construction and operation of the GXP are anticipated to be minor and temporary. To further reduce impacts on steep slopes, we are recommending that Columbia Gas prepare both a Landslide Hazard Assessment and a Landslide Mitigation Plan.

Soils

Construction activities such as clearing, grading, trenching, backfilling, and movement of heavy construction equipment would cause direct impacts on soil resources in the MXP and GXP work areas. Direct impacts could include erosion, compaction, rutting, and reduction of soil quality by mixing topsoil with subsoil or bringing excess rocks to the surface. These soil impacts could also slow the revegetation process in the disturbed areas and disrupt surface and subsurface drainage systems.

The construction of MXP aboveground facilities would result in approximately 41 acres of permanent impacts on soils. Columbia Gas would use areas within existing fenced facilities or previously disturbed areas adjacent to the facilities for the majority of the modifications and upgrades. Most of the soil impacts at existing aboveground facilities are expected to be minor and temporary. Approximately 30 acres of soil at the Sherwood, White Oak, and Mount Olive Compressor Stations would be permanently converted from agricultural, forest, and open land use to developed uses, including permanent access roads. Permanent access roads are necessary to safely operate and maintain the MXP facilities.

Preparation of the 41 MXP contractor yards would consist of minor grading and leveling. Once construction is complete, these temporary facilities would be restored to pre-construction conditions or in accordance with landowner agreements. Soil impacts are expected to be minor and temporary due to the minor grading activities to level the areas. Unless specified in landowner

agreements, any area where aggregate is placed over geotextile fabric (e.g., roadway aprons) would be returned to its original condition during cleanup activities, and all materials would be removed.

For the GXP, construction of aboveground facilities and the associated permanent access roads would result in approximately 82 acres of permanent impacts on soils. Permanent access roads are necessary for the safe operation of the GXP facilities.

The degree to which soils would be directly affected by construction and operation of GXP facilities would vary depending on the nature of the activities and whether the soils are located in designated temporary workspaces (TWS) or the operational footprint of GXP facilities. The subsurface profile of soils overlain by permanent facilities may be altered by the addition of surface fill material to increase ground elevation, addition of aggregate to provide a suitable foundation surface, or mixing with a stabilizer to increase strength and cohesion. Deep excavations and drillings, including those required for pile installation, could disrupt soil profiles. In TWS areas, soil profiles may remain undisturbed beneath an aggregate overlay.

To minimize impacts on soils during the construction of GXP facilities, Columbia Gulf would implement mitigation and would follow the best management practices (BMPs) identified in the GXP ECS. After construction is complete, the TWS would be returned to pre-construction conditions or in accordance with landowner agreements. Soil impacts are expected to be minor and temporary within the TWS due to the minor grading activities performed to level work areas. There would also be placement of geotextile fabric followed by gravel, all of which would be removed upon completion of construction on the GXP facilities.

During MXP and GXP operation, minimal impacts on soil resources are expected beyond occasional ground inspections of the pipeline rights-of-way and the areas occupied by aboveground facilities. Any impacts on soil resources associated with standard operations would be minor and infrequent. Potential impacts from maintenance of the MXP and GXP would include soil displacement, compaction, and erosion caused by machinery necessary to maintain or repair any portions of the pipelines or aboveground facilities. Impacts would be avoided or minimized by implementation of each ECS, as applicable to operation.

Water Resources

Two primary activities could result in adverse impacts on groundwater resources: accidental spills of hazardous liquids used during facility construction or operations, and blasting to fracture rock in the pipeline trench or for construction of aboveground facility foundations. Secondary activities (work area clearing and grading, trenching, and trench dewatering) typically result in temporary and localized impact.

Columbia Gas would use standard industry practices for construction of the MXP facilities. Clearing, grading, trenching, dewatering, and blasting activities associated with pipeline, compressor, regulator, and tie-in facilities construction could each temporarily alter overland flow and groundwater recharge or could result in minor fluctuations in groundwater levels and/or increased turbidity. Excavation associated with compressor facilities would be fewer than 6 feet deep, and pipeline trench depths would be typically less than 10 feet. While these activities may encounter surficial groundwaters (i.e., the “water table”), the pipeline would not be expected to

substantially alter the flow or quality of shallow subsurface water. Further, construction would occur well above the depth of regional aquifers. In addition, near-surface soil compaction caused by heavy construction vehicles could reduce the soil's ability to absorb water. Columbia Gas would implement measures from both its ECS and Spill Prevention, Control, and Countermeasure (SPCC) Plan to limit potential impacts on groundwater. For these reasons, we do not expect the construction of the MXP to substantially impact groundwater resources.

Columbia Gas has agreed to perform pre- and post-construction monitoring for well yield and water quality for private wells within 150 feet of the proposed construction workspace if requested by the landowner. If testing results indicate any significant differences in water quality between initial testing and post-construction as a result of MXP construction activities, Columbia Gas would compensate the landowner for repairs, installation of a new well, or other options as agreed upon with the landowner. Columbia Gas would implement a landowner complaint resolution process to document and track landowner problems and their resolution.

For the GXP, construction activities also are not likely to impact groundwater resources because construction would involve shallow, temporary, and localized excavation. Temporary erosion and sediment control measures would be installed following initial ground disturbance in accordance with Columbia Gulf's ECS to minimize erosion during trenching operations and construction activities.

After construction is completed, both Columbia Gas and Columbia Gulf (the Companies) would grade construction work areas to match pre-construction contours and drainage patterns. All areas disturbed by construction would be restored to their original contours, as practicable, and revegetated (if not within areas covered by buildings, concrete, asphalt, or aggregate), including topsoil replacement (where applicable) in accordance with the relevant ECS or landowner agreements. Permanent erosion control measures would be installed in accordance with each Companies' ECS. Vegetation restoration and periodic mowing of the pipeline right-of-way would help to control overland flow and restore groundwater recharge.

The greatest threat posed to groundwater resources would be a hazardous material spill or leak into groundwater supplies. We have reviewed both Companies' ECS and SPCC Plans and conclude that they adequately address strategies and methods to prevent or limit such contamination should a spill occur. We do not anticipate any significant, long-term impacts on aquifers or groundwater supplies from construction or operation of the projects given the relatively shallow excavation depths required for construction.

No long-term impacts on surface water quality or quantity are anticipated as a result of the MXP. Columbia Gas would not significantly or permanently affect any designated water uses; it would bury the pipeline beneath the bed of all waterbodies, implement erosion controls, and restore the streambanks and streambed contours as close as practical to pre-construction conditions. Virtually all flowing streams (including those containing sensitive mussel species) would be crossed using a dry crossing method. This would largely avoid or limit impacts on water quality and aquatic species, even when crossing waterbodies identified as impaired. Columbia Gas also would revegetate disturbed areas, and implement the measures contained in its ECS and SPCC Plan to avoid contamination from spills of fuels and other hazardous materials. Further, we are recommending that Columbia Gas prepare a waterbody crossing restoration plan for all

intermediate and major waterbodies using natural design techniques. We are also recommending that Columbia Gas develop hydrostatic test water withdrawal mitigation measures to protect downstream flow and instream habitat. Operation of the MXP would not impact surface waters, unless maintenance activities involving pipe excavation and repair in or near streams are required in the future. If maintenance activities were required, Columbia Gas would employ protective measures similar to those proposed for use during construction.

Only minor impacts on ephemeral channels and impoundments/stocked ponds are anticipated as a result of the construction and operation of the new GXP compressor stations. Through consultation with the USACE, Columbia Gulf would determine the jurisdictional status of water features at its compressor station sites, and would avoid or mitigate impacts as required by permit conditions. Columbia Gulf would implement BMPs, as specified in its ECS, and would revegetate temporary work areas not encumbered by permanent facilities after construction. During GXP station operations, very limited volumes of fuels, lubricants, and other hazardous materials would be present. Preventive measures outlined in Columbia Gulf's ECS and SPCC Plan would be implemented and would be adequate to reduce this concern to less-than-significant levels. During maintenance activities, Columbia Gulf would employ protective measures similar to those proposed for use during construction.

Wetlands

The MXP would result in temporary and permanent impacts on wetlands. Construction of the MXP would temporarily affect about 8 acres of wetlands. The majority of MXP construction impacts are to palustrine emergent wetlands (almost 7 acres), which would recover quickly following right-of-way restoration (typically within 1 to 3 years). No permanent impacts are anticipated on palustrine emergent wetlands within the pipeline easement. Long-term temporary and permanent impacts would occur within palustrine scrub-shrub wetlands (about 0.3 acre) and palustrine forested wetlands (about 0.6 acre). Trees in forested wetlands would be removed from the permanent right-of-way, and revegetation could take years. Columbia Gas would maintain a 30-foot-wide corridor in palustrine forested wetlands, with selective removal of trees within 15 feet of the pipeline, resulting in only 0.2 acre of permanent impacts on palustrine forested wetlands for the MXP. The 0.2 acre would, however, convert to palustrine emergent or scrub-shrub wetlands and not result in a loss of wetlands. Less than 0.1 acre of palustrine emergent wetlands would be permanently altered at the White Oak Compressor Station site.

Columbia Gas would mitigate for unavoidable wetland impacts by implementing the procedures specified in its ECS, and by complying with the conditions of its pending section 404 and 401 permits. In accordance with a MXP-specific wetland restoration plan and its ECS, Columbia Gas would conduct routine wetland monitoring for a minimum of 3 years (or until revegetation is deemed successful). Where revegetation is not successful at the end of 3 years, Columbia Gas would develop and implement remedial revegetation plans, in consultation with a professional wetland ecologist, to actively revegetate any wetland and continue revegetation efforts. Conversion of palustrine forested and palustrine scrub-shrub wetlands would require a USACE-approved form of mitigation that satisfies the requirements of the CWA.

About 0.12 acre of wetland impacts from the construction and operation of the GXP would occur, including one wetland at the Leach C Meter Station, one wetland at the Morehead

Compressor Station, and three wetlands at the New Albany Compressor Station. We expect that wetland impacts would be considered by the USACE under its Nationwide Permit Program; if so, compensatory mitigation would not be required.

Based on the types and amounts of wetlands that would be impacted and the Companies' measures to avoid, minimize, and mitigate wetland impacts (as described in their construction and restoration plans) as well as compliance with USACE section 404 and state permit requirements, we conclude that impacts on wetlands would be effectively minimized or mitigated.

Vegetation

Construction impacts on vegetation are classified based on the duration and significance of impacts. Temporary impacts generally occur during construction with vegetation returning to pre-construction conditions almost immediately after construction. Short-term impacts are those which require up to 3 years to return to pre-construction conditions. Long-term impacts require more than 3 years to revegetate, but conditions would return to their pre-construction state during the life of the project. Permanent impacts are those that modify vegetation resources to the extent that they would not return to pre-construction conditions during the life of the project.

Construction of the MXP would impact about 3,276[2] acres of vegetated lands, including about 2,328 acres of forest and about 650 acres of agricultural land. The primary impact from project construction and operation would be on forested lands. Due to the prevalence of forested habitats within the project area, the ability to co-locate the MXP pipeline adjacent to existing rights-of-way, and eventual regrowth of prior forested areas outside of the permanent right-of-way, we conclude that the permanent conversion of upland forested lands would result in a significant impact. Columbia Gas would minimize forested impacts by co-locating the proposed workspace with other existing rights-of-way in certain areas (approximately 13.9 percent of the proposed alignment) to reduce the amount of additional clearing required, and by reducing the pipeline construction right-of-way width to 100 feet in interior forest areas, where possible. Impacts on forested and non-forested vegetation types would be further mitigated through adherence to the measures described in Columbia Gas' ECS.

Interior forest impacts were assessed by identifying Core Forest Areas based on the acreage of contiguous habitat. MXP construction would result in about 2,254 acres of Core Forest Areas impact. Permanent impacts on Core Forest Areas, for operation of facilities, would total about 829 acres. Interior forest tracks would not be affected by GXP construction and operation. We are recommending that Columbia Gas consult with the WVDNR to identify further mitigation measures to reduce impacts to forested areas.

The removal of existing vegetation and disturbance of soils during MXP construction would create conditions conducive to the spread and establishment of noxious and invasive weeds, particularly where new corridors are established in previously vegetated areas. The risk of invasive species introduction decreases once revegetation of native species is successful; although, mowing during project operation could introduce invasive species. To limit the

[2] Total acres of vegetation impacted by MXP represents total project impacts minus developed land and open water impacts.

potential spread of invasive species, we are recommending that Columbia Gas develop a noxious and invasive weed management plan in consultation with appropriate agencies. This plan would identify locations where invasive species are present and would require Columbia Gas to develop appropriate treatment options for each location.

Construction of the GXP would result in impacts on about 184[3] acres of vegetated lands, including about 149 acres of agricultural land, 22 acres of upland forested land, and 13 acres of open land. The primary impact from construction and operation would be on agriculture lands. Impacts would be mitigated through adherence to the measures described in Columbia Gulf's ECS.

Columbia Gulf would minimize vegetation removal to the extent necessary to construct the project, and either burn, chip, or haul cleared vegetation to a commercial disposal facility. Additionally, Columbia Gulf would implement the measures in its ECS (e.g., temporary and permanent seeding, mulch application, erosion control blanket installation), which would promote the establishment of desirable plant species and deter the spread of unwanted plant species. Based on these measures, we conclude that the potential spread of noxious or invasive weeds would be avoided or effectively mitigated.

Wildlife

The MXP and GXP could have both direct and indirect impacts on wildlife species and their habitats, including the displacement of wildlife, potential individual mortality, and reduction in habitat. Forest fragmentation would increase in certain locations due to clearing, thus reducing the amount of habitat available for interior forest species (i.e., movement and dispersal corridors). The effect to species that rely on open land habitats would be short-term, and vegetation in these areas would likely recover within 1 to 3 years after construction. Cleared scrub-shrub vegetation would likely require several years to regain its woody composition; however, we expect species that rely on shrub or edge habitats to move into the abundant similar habitat available in the project area. Species that rely on forested lands, which could take decades to return to pre-construction condition, would also move into nearby available forested habitat. This would not result in a significant impact for general wildlife, but could have greater impacts on species that rely on undisturbed interior forest.

A variety of migratory bird species are associated with habitats that would be affected by the MXP. Columbia Gas has consulted with the U.S. Fish and Wildlife Service (USFWS) and WVDNR to take appropriate steps, such as implementation of the ECS, to avoid and minimize the potential for the unintentional take of migratory birds during construction and operation. Columbia Gas would attempt to complete vegetation clearing in forested areas before the nesting season begins in April; however, limited vegetation clearing activities may continue into May, with some risk of affecting active nests of migratory birds.

The West Virginia *2015 State Wildlife Action Plan* identifies certain migratory bird species that should be the focus of conservation efforts. Species that are determined to have the greatest need for conservation efforts in the state are assigned Priority 1 status. Eight Priority 1 bird species

[3] Total acres of vegetation impacted by GXP represents total project impacts minus residential, developed, and open water land use types.

were noted as being observed in the MXP area. The cerulean warbler was specifically identified as a Priority 1 species of special concern in the MXP area due to its need for undisturbed, unfragmented interior forest habitat. We have concluded that MXP impacts on cerulean warbler habitat would be significant, although we do not expect any adverse impacts on individual warblers or their nests. The measures proposed by Columbia Gas in addition to the implementation of a Migratory Bird Plan (prepared in cooperation with USFWS and WVDNR) could help reduce impacts on migratory birds. We are recommending that Columbia Gas continue to consult with the WVDNR and USFWS to further reduce impacts, particularly on the large Core Forest Areas preferred by the cerulean warbler.

For the GXP, Columbia Gulf would implement tree-clearing timing restrictions that would protect migratory birds and habitat as well as protected bat species. No bald eagle nests or eagles were identified during site surveys in the vicinity of the GXP compressor station sites in Kentucky, Tennessee, and Mississippi. Based on the results of biological field surveys conducted by Columbia Gulf and agency consultations, we believe that construction and operation of the GXP would be in compliance with National Bald Eagle Management Guidelines and would not affect the bald eagle.

The MXP and GXP would cross freshwater waterbodies, including perennial, intermittent, and ephemeral streams. The MXP and GXP would result in minor impacts on aquatic resources, but these impacts would be adequately mitigated through adherence to the measures described in the Companies' ECS, timing of construction activities, implementation of instream blasting plans, as well as the conditions and requirements of water resource agencies with jurisdiction over resources affected by the projects.

Overall, general wildlife resources would not be significantly impacted due to construction and operation of MXP and GXP aboveground facilities based on the small amount of habitat disturbed, the criteria considered when siting the compressor stations, the amount of similar adjacent habitat available for use, and the proposed clearing windows for avoidance of the migratory bird nesting season. In addition, the Companies would minimize impacts to the extent possible through adherence to their respective ECSs and in consideration of any recommendations provided by wildlife management agencies. Based on the presence of suitable adjacent habitat available for use and given the impact avoidance, minimization, and mitigation measures proposed by the Companies, as well as our recommendations, we conclude that the construction and operation of the MXP and GXP would not have a significant adverse effect to most wildlife and aquatic species.

Threatened, Endangered, and Other Special Status Species

To comply with section 7 of the Endangered Species Act of 1973 (ESA), we consulted either directly or indirectly with the USFWS and state resource agencies regarding the presence of federally listed, proposed for listing, or state-listed species in the MXP and GXP areas. Based on these consultations, we identified 13 federally listed or proposed species as potentially occurring in the MXP area and 31 federally listed or proposed species as potentially occurring in the GXP area.

The MXP could potentially affect special status bats, the diamond darter, and special status mussel species. We determined that suitable habitat for the Indiana bat and the northern long-

eared bat is present within all counties affected by the MXP. In those areas covered by the USFWS-approved Multi-Species Habitat Conservation Plan (MSHCP), Columbia Gas would implement the applicable Avoidance and Minimization Measure (AMM) for these species, including prohibiting clearing activities during certain times of year to protect maternity colonies. In non-covered MSHCP lands, Columbia Gas would prepare a Myotid Bat Conservation Plan. No known roosting habitat for the Virginia big-eared bat is within 6 miles of the project area, and no AMMs would be required.

To avoid disturbance of the diamond darter population known to exist in the Elk River, Columbia Gas would not perform instream work at the Elk River Compressor Station site. No direct impacts are anticipated on this species, and applicable AMMs for this species (as identified in the MSHCP) would be implemented by Columbia Gas. For any activity within 100 feet of the Elk River with potential effects, Columbia Gas would include special procedures within its Environmental Management and Construction Plan. Based on these measures and the fact that the project would not directly impact the Elk River, we concluded that the project impacts are not likely to adversely affect the diamond darter and will seek concurrence on this determination from USFWS.

With USFWS and WVDNR approval, Columbia Gas conducted initial surveys for protected mussel species in 2015 and 2016. In consultation with the USFWS and WVDNR, Columbia Gas will perform additional surveys in 2017. If presence is identified during surveys, Columbia Gas and the USFWS will determine the appropriate AMMs to be implemented outside of MSHCP-covered lands. It is anticipated that the AMMs for mussels located outside of MSHCP lands would be consistent with the requirements of the MSHCP. Columbia Gas anticipates completing the remaining mussel surveys in late spring 2017. To ensure compliance with the ESA we are recommending that Columbia Gas file updated information on consultation with the USFWS regarding stream crossing locations and construction methodologies were federally protected mussels may be present.

For GXP facilities in Kentucky, the existing Leach C Meter and Grayson Compressor Stations, and the Morehead, Paint Lick, and Goodluck Compressor Station sites occur in counties with the potential for gray bats, Indiana bats, and the northern long-eared bat. Virginia big-eared bats potentially could occur in the vicinity of the existing Grayson and proposed Morehead compressor stations. General biological surveys conducted in June 2015 at the project sites identified suitable habitat for Indiana bats and the northern long-eared bat. No hibernacula or roost caves were identified for the gray bat at any of the project locations. No suitable habitat was identified at project locations for the Virginia big-eared bat and federally listed mussels (northern riffleshell, pink mucket, running buffalo clover, or Short's bladderpod). No instream work is proposed for any of the GXP sites in Kentucky, and Columbia Gulf would implement all required and non-mandatory mitigation measures. In addition, to minimize indirect impacts on streams in the vicinity of the project, Columbia Gulf would implement measures in its ECS, which meet BMPs for erosion and sediment control in Kentucky. In correspondences dated February 16 and May 24, 2016, the USFWS Kentucky Ecological Services Field Office concurred that the project is consistent with the MSHCP, and the requirements of section 7 of the ESA have been fulfilled for the project. The federally endangered snuffbox, however, was not included in Columbia Gulf's November 25, 2015 project-specific request for concurrence from the USFWS Kentucky Ecological Services Field Office, nor was this species referenced in the February 16, 2016 response

from USFWS, in which it provided effect determinations for federally listed species. We have independently assessed the habitat needs for this mussel species along with the habitat in and around the proposed Grayson Compressor Station, and concluded that required habitat for the snuffbox is not present. Accordingly, we conclude that the GXP would have no effect on the snuffbox mussel. However, the MSHCP contains an administrative requirement that the USFWS must concur with or provide an effects determination for this species. We (or Columbia Gulf, as our non-federal representative) will request that the USFWS provide such concurrence prior to construction.

For GXP facilities in Tennessee, project sites occur in counties with the potential for gray bats, Indiana bats, and the northern long-eared bat. General biological surveys conducted in June 2015 at the project sites identified suitable habitat for Indiana bats and the northern long-eared. There is no winter habitat at either compressor station site in Tennessee, and the project is not within any known swarming habitat buffers around a hibernaculum. No hibernacula or roost caves were identified for the gray bat at either of the project sites in Tennessee.

We received comments from the public regarding the potential for the Nashville crayfish to occur in the vicinity of the Cane Ridge Compressor Station. In a letter response to Columbia Gulf dated February 15, 2016, the USFWS Ecological Services Tennessee Field Office stated that project activities are consistent with the USFWS-approved MSHCP and the resulting programmatic Section 7 consultation. The USFWS stated in their review that although they do not anticipate the Nashville crayfish to occur at the Cane Ridge Compressor Station site, due to the proximity of the site to Mill Creek where there are known occurrences, they recommend strict sediment and contaminant runoff prevention measures should be in place during construction and operation of the facility. The USFWS concurred that mitigation measures required in the MSHCP are sufficient for covering potential impacts on the Nashville crayfish, Indiana bat, and northern long-eared bat. Additionally, the USFWS concurred that the project facilities in Tennessee would have no adverse impacts on the Baker Station cave beetle, gray bat, Price's potato bean, spotfin chub, rare freshwater mussels, or bald eagle and migratory birds.

For GXP facilities in Mississippi, in a letter to Columbia Gulf dated June 18, 2015, the USFWS Ecological Services Mississippi Field Office indicated that the Indiana bat, northern long-eared bat, and Price's potato bean could occur in project vicinities in Mississippi. General biological surveys conducted in June 2015 at the project sites identified suitable summer habitat for the northern long-eared bat at both compressor station sites. There is no winter habitat at either of the sites for this species, and no known hibernacula in counties where the project is located. Suitable habitat for Price's potato bean was not identified at either of the project sites. Project activities would be consistent with the MSHCP, and Columbia Gulf would implement the mitigation measures required in the MSHCP for the northern long-eared bat and Indiana bat. A letter dated December 9, 2015, from USFWS Ecological Services Mississippi Field Office provided concurrence with Columbia Gulf's findings and determined that no further consultation would be required.

Although a number of other candidate, state-listed, or special concern species were identified as potentially present in the GXP areas, none were detected during surveys, and we do not expect any adverse effects given Columbia Gulf's proposed measures and our recommendations. Based on implementation of these measures and our recommendations, we

conclude that impacts on special-status species would be adequately avoided or minimized during construction and operation of the GXP.

Land Use, Special Interest Areas, and Visual Resources

Land use-related impacts associated with the MXP would include the disturbance of existing uses within the rights-of-way during construction and maintenance of new permanent rights-of-way for operation of the pipelines. Additional land would be disturbed by construction of the aboveground facilities, and land within the facility footprints would be permanently retained for operation. The primary land use types impacted would be forested, agricultural land, and open lands. In forested areas, trees and shrubs would be removed from the construction work areas, and the maintained portion of the rights-of-way would be permanently converted to a non-forested condition. Impacts on agricultural lands would be short-term and limited to the growing season concurrent with construction. Following construction, agricultural practices within the pipeline rights-of-way would be allowed to resume. Impacts on open land areas would be temporary and short-term, and would be minimized by the implementation of Columbia Gas' ECS. Open land areas within the temporary and permanent rights-of-way are expected to revert back to their pre-construction land use after completion of construction. However, some activities, such as the building of new commercial or residential structures, would be prohibited on the permanent rights-of-way.

Columbia Gas' proposed construction work areas would be located within 50 feet of 49 houses. To address impacts on residences, Columbia Gas developed site-specific construction plans for each of the residences. These plans identify the mitigation measures to be implemented by Columbia Gas to promote safe and efficient installation of the pipelines with minimal impacts on landowners. If any damages to residential property result from construction, Columbia Gas would repair the damaged property or provide appropriate compensation to the landowner.

In general, MXP impacts on recreational and special interest areas would be temporary and limited to the period of active construction. These impacts would be minimized by implementation of Columbia Gas' ECS.

The primary visual effects of constructing the MXP facilities would include the removal of existing vegetation and the storage of machinery and tools. After construction, disturbed areas would be revegetated in accordance with Columbia Gas' ECS. There would be a permanent change in the visual appearance to forested lands within the permanent easement, because they would be maintained in an herbaceous state for pipeline surveillance and operations purposes. The new aboveground structures would result in a permanent visual impact throughout the operational life of the project. The impacts on visual resources from each individual facility would depend on the pre-construction condition and the visibility from the surrounding area.

Land use-related impacts associated with the GXP would include temporary and permanent disturbance at new and existing aboveground facilities. Once construction is complete, land within the facility footprints would be permanently retained for operation. The primary land use types impacted during construction would be agricultural, forested, and open land. Areas used for TWS at each facility would be restored and maintained as open land or allowed to revert to pre-construction land use cover. No permanent impacts would occur as a result of the modifications

at the existing stations, as the facility footprints would not be expanded. There are no houses located within 50 feet of either the temporary or permanent workspace of any of the facilities.

GXP facilities would be constructed within 0.25 mile of two publicly owned lands, the Daniel Boone National Forest and the Malmaison Wildlife Management Area. The Moorehead Compressor Station would not affect the recreational use or experience of the Daniel Boone National Forest. The Holcomb Compressor Station could result in temporary and permanent visual impacts on the Malmaison Wildlife Management Area; however, the presence of forested areas between the compressor station site and the wildlife management area would provide visual screening.

The new aboveground facilities would result in a permanent visual impact throughout the operational life of the MXP and GXP. The Companies have designed aboveground facilities to preserve existing tree buffers within purchased parcels to the extent practicable. To further mitigate visual impacts, the Companies would install perimeter fences and directionally controlled lighting.

Socioeconomics

Construction of the MXP and GXP would temporarily increase the population in the general vicinity of the project. No significant impacts on the local housing markets are expected from this temporary population increase. Existing public services are adequate to meet the anticipated needs of the construction and operational workforce for the MXP and GXP.

Staging and delivery of construction personnel, equipment, and materials to project sites may temporarily impact the transportation system in the project area, but no long-term impacts are anticipated. The Companies would implement appropriate measures and notifications to minimize these impacts on residents or businesses along these local roads. Further, we are recommending that Columbia Gas prepare a final traffic management plan to address measures for implementing detours on public roadways, timing shifts and worker commutes to avoid heavy traffic periods, and measure to restore roadways damaged during project-related activities.

Columbia Gas would compensate landowners for the acquisition of new property for aboveground facilities and for easements, including compensation for construction-related damages and for damages associated with residential properties, crops, pasture, and timber. Construction of the MXP and GXP would result in minor beneficial socioeconomic impacts due to increases in construction jobs, payroll taxes, purchases made by the workforce, and expenses associated with the acquisition of material goods and equipment. Operation of the MXP and GXP would have a minor to moderate positive effect to the local governments' tax revenues due to the increase in property taxes that would be collected from Columbia Gas and Columbia Gulf.

Construction and operation of the MXP and GXP would not cause impacts that are expected to adversely affect the health or welfare of the population living in the project areas. The MXP and GXP are not anticipated to cause disproportionately high and adverse environmental or socioeconomic effects to any minority or low-income populations.

Overall, we conclude that the MXP and GXP would not have a significant adverse effect to the socioeconomic conditions of the MXP and GXP areas.

Cultural Resources

Columbia Gas completed cultural resources surveys for all of the accessible project areas. To date, of 55 archaeological sites identified, only 3 are eligible or recommended as potentially eligible for the National Register of Historic Places (NRHP). Columbia Gas would avoid all three sites. Of 167 architectural resources identified, 1 is listed on the NRHP and the remaining 166 are recommended as not eligible for the NRHP. Columbia Gas has recommended that the project would have no adverse effect to the listed property. The State Historic Preservation Office (SHPO) has requested additional information for 44 of the architectural resources. The SHPO also recommended minor modifications to any subsequent draft reports and addenda. The architectural resources have been identified within the modified project areas and will be included in addenda Phase I reports submitted to the SHPO for review. Columbia Gas has not yet submitted a revised draft architectural resources report. Portions of the project still require survey; therefore, compliance with section 106 of the National Historic Preservation Act is not complete. Once cultural resources surveys and evaluations are complete, a treatment plan would be prepared if any historic properties would be adversely affected by the MXP.

Columbia Gulf has completed cultural resources surveys for the GXP and did not document any historic (NRHP-eligible or listed) properties. The FERC and SHPOs agree for Tennessee, Mississippi, and Kentucky.

Air Quality and Noise

Air quality impacts associated with construction of the MXP and GXP would include short-term construction impacts and long-term operational impacts from aboveground facilities.

Pipeline construction activities move through an area relatively quickly, and therefore construction emissions associated with the MXP pipeline would be intermittent and short-term. Similarly, emissions from the construction of the new and modified compressor stations would be intermittent and short-term. Particulate emissions would be spread over a relatively large area, and the dust control measures described in Columbia Gas' Fugitive Dust Control Plan would help decrease these emissions. Once construction activities in an area are completed, fugitive dust and construction equipment emissions would subside, and the impact on air quality due to construction would go away completely. Further, construction emissions are not estimated to exceed the General Conformity thresholds in areas of degraded air quality. Therefore, we conclude that the MXP's construction-related impacts would not result in a significant impact on local or regional air quality.

Emissions generated during operation of the pipeline portion of the MXP would be minimal, limited to those from maintenance vehicles and equipment, and fugitive emissions. Columbia Gas submitted applications for construction and operation of each compressor station to the West Virginia Department of Environmental Protection. All new compressor stations associated with the MXP would require Title V permits for operation. The existing compressor stations would be required to update their Title V permits to include any changes. The White Oak, Lone Oak, Mount Olive, Elk River, and Sherwood Compressor Stations would be minor sources with respect to New Source Review and would not be subject to Prevention of Significant Deterioration (PSD) permitting. The Ceredo Compressor Station is a PSD major source, but the

changes proposed at this station are below the significant emission rate thresholds. All combustion turbines would use SoLoNO$_X$ technology to reduce nitrogen oxide emissions. The emergency engines would meet all New Source Performance Standard JJJJ emission limits. Minimization of other pollutant emissions would be achieved with the use of natural gas fuel. Modeled impacts at the MXP compressor stations were all below applicable National Ambient Air Quality Standard standards. As with pipeline operations, any emissions resulting from operation of MXP's compressor stations would not have significant impacts on local or regional air quality. Increases in emissions during the operating phase of the MXP would be minimal and would not have significant impacts on local or regional air quality.

For the GXP, Columbia Gulf submitted applications for the construction and operation of each compressor station to the appropriate state agencies. All compressor stations associated with the GXP would require Title V permits for operation. The GXP compressor stations would also be minor sources with respect to New Source Review and would not be subject to PSD permitting. All combustion turbines would use the SoLoNO$_X$ technology to reduce nitrogen oxide emissions. The emergency engines would meet all New Source Performance Standard JJJJ emission limits. Minimization of other pollutant emissions would be achieved with the use of natural gas fuel. Modeled impacts from the GXP compressor stations were all below applicable standards. Emissions resulting from operation of GXP's compressor stations would not have significant impacts on local or regional air quality.

Regarding noise, noise would be generated during construction of the MXP pipelines and MXP and GXP aboveground facilities.

For MXP construction, noise-sensitive areas (NSAs) near the construction areas may experience an increase in perceptible noise, but the effect would be temporary and local. Noise mitigation measures during construction would include the use of sound-muffling devices on engines and the installation of barriers between construction activity and NSAs. Generally, nighttime noise would not increase during construction, with the exception of horizontal directional drill (HDD) activity. Proposed mitigation would reduce noise levels from HDD activity. Based on modeled noise levels, mitigation measures proposed, our recommendation regarding noise from HDDs, and the temporary nature of construction, we conclude that the MXP would not result in significant noise impacts on residents and the surrounding communities during construction with one exception. The HDD entry point location activities associated with the Kanawha River Crossing at NSA #1 requires additional mitigation measures to reduce the noise impacts at NSA #1. Alternatively, to mitigate noise impact on this NSA, Columbia Gas has indicated it may offer compensation or the option of temporary relocation during nighttime HDD activities. However, we find this mitigation measure to be unreasonable for drilling operations that require more than 1 week to complete, and thus we are recommending that Columbia Gas prepare a drilling noise mitigation plan to reduce the projected noise level.

Noise impacts also would result from operation of the MXP. Based on the analyses conducted, mitigation measures proposed, and our recommendations, we conclude that operation of MXP would not result in significant noise impacts on residents and the surrounding communities. Operation of the Columbia Gas' compressor and regulator stations would not exceed thresholds, with the exception of the existing Ceredo Station; however, the proposed modifications to the Ceredo Station would result in a reduction of noise levels at the NSAs. Noise

from planned or unplanned blowdown events could exceed the noise criteria but would be infrequent and of relatively short duration.

Construction equipment for the GXP would be operated on an as-needed basis. NSAs near the GXP construction areas may experience an increase in perceptible noise, but the effect would be temporary and local. Noise mitigation measures during construction would include the use of sound-muffling devices on engines and the installation of barriers between construction activity and NSAs. Generally, nighttime noise would not increase during construction. The GXP does not have any planned HDD drilling operations. Based on modeled noise levels, mitigation measures proposed, and the temporary nature of construction, we conclude that the GXP would not result in significant noise impacts on residents and the surrounding communities during construction.

Operation of the Columbia Gulf's GXP compressor and meter stations would not exceed our criterion, and we are recommending noise surveys for these stations to ensure this conclusion. Noise from planned or unplanned blowdown events could exceed the noise criteria but would be infrequent and of relative short duration.

Based on modeled noise levels, mitigation measures proposed, our recommendations, and the temporary nature of construction, we conclude that construction and operation of the MXP and GXP would not result in significant noise impacts on residents or the surrounding communities.

Reliability and Safety

The MXP pipelines and MXP and GXP aboveground facilities would be designed, constructed, operated, and maintained to meet U.S. Department of Transportation Minimum Federal Safety Standards in title 49 of the Code of Federal Regulations, Part 192 (49 CFR 192) and other applicable federal and state regulations. These regulations include specifications for material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion. Each compressor station would be enclosed within a chain-linked fence and equipped with security cameras, an alarm system, ventilating equipment, automatic shutdown systems, and relief valves.

Safety standards specified in 49 CFR 192 also require that each operator establish and maintain liaison with appropriate fire, law enforcement, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency, and to coordinate mutual assistance in responding to emergencies. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. Columbia Gas would utilize the emergency procedures contained in its *Emergency Operating Procedures Manual*, which requires communication with emergency responders on an annual basis. Local contact phone numbers, external contact information, equipment or resources available for mobilization, and any specific procedures to be followed for the MXP would be incorporated into the *Emergency Operating Procedures Manual* prior to commencement of pipeline operations.

Based on the Companies' compliance with federal design and safety standards and their implementation of safety measures, we conclude that constructing and operating the MXP and GXP facilities would not significantly impact public safety.

Cumulative Impacts

We analyzed past, present, and reasonably foreseeable projects or actions that occur within the same geographic scope as the MXP or GXP and whose construction, operation, and/or restoration will take place within all or part of the temporal scope of the MXP or GXP. The MXP or GXP, combined with one or more of these other projects, could contribute to a cumulative impact on resources that would be affected by the construction and/or operation of the MXP and GXP. These projects include FERC-jurisdictional natural gas pipelines; non-jurisdictional facilities associated with the MXP and GXP facilities, other natural gas facilities that are not under the Commission's jurisdiction; and other actions including electric transmission projects, transportation projects, and residential and commercial developments.

The majority of cumulative impacts would be temporary and minor when considered in combination with past, present, and reasonably foreseeable activities. Minor or negligible cumulative impacts could occur on geological resources, soils, water resources, land use, visual resources, air quality, and noise. However, some long-term cumulative impacts would occur on upland forested vegetation and associated wildlife habitats. Some short- and long-term cumulative benefits to the communities in and around the MXP and GXP project areas would be realized through jobs, wages, purchases of goods and materials, and annual property taxes paid by the Companies.

ALTERNATIVES

We evaluated the no-action alternative, system alternatives, MXP pipeline major route alternatives, minor pipeline route variations, and alternative locations for the proposed GXP Cane Ridge Compressor Station. While the no-action alternative would eliminate the short- and long-term environmental impacts identified in the EIS, the stated objectives of the Companies' proposals would not be met.

We compared each alternative to the proposed action using three key criteria:

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

For the purpose of analyzing system alternatives, we evaluated potential impacts associated with using other gas suppliers to transport an equivalent volume of gas to meet the MXP purpose and need and provide firm transportation service to Columbia Gas' TCO Pool, as well as more southerly markets accessible from Columbia Gulf's pipeline. None of the other pipeline systems in the vicinity of the MXP have the capacity to transport the large volumes of gas that would be carried by the MXP, and none of the existing systems would be able to expand their facilities within the schedule required by the MXP's shippers. Because other pipeline carriers in the MXP area would be required to construct new pipeline segments and other appurtenances to reach the

receipt and delivery points required by MXP, we do not consider the use of other existing pipeline systems to be a viable alternative to the MXP. Therefore, these alternatives were eliminated from further analysis.

We considered two alternatives for the GXP involving using Columbia Gulf's existing system to meet the purpose and need of the GXP: a loop-intensive alternative that would include modifications to an existing facility and seven new pipeline looping sections, and a separate alternative that involved a combination of looping and horsepower increases at five existing compressor stations. We do not consider the looping and addition of compression at Columbia Gulf's existing compressor stations to be preferable to or provide a significant environmental advantage over the GXP. Therefore, they were eliminated from further analysis.

We analyzed two major pipeline route alternatives to the MXP, one that involved looping/upgrades to existing Columbia Gas pipeline systems and one that included modifications to an approved Columbia Gas project currently under construction (the Leach XPress Project; Docket No. CP15-514). The alternatives reviewed were determined to be not environmentally preferable to the proposed action due to the additional length of pipe that would be required and the corresponding additional impacts on the environment. Additionally, the constructability issues associated with all of the major pipeline route alternatives and the potential impacts on an increased number of landowners make the alternatives less viable and preferable than the MXP. The MXP, as proposed, is preferable to any of the major route alternatives we considered.

During pre-filing, we considered three significant route variations (Maxwell Ridge, Sherwood Lateral, and Hurricane Creek) and 21 minor route variations associated with the MXP corridor. The route variations were either identified as areas that required further evaluation in comments received during the project scoping period or resulted from landowner requests during Columbia Gas' public outreach. Columbia Gas adopted all three route variations in its application. Additionally, after Columbia Gas filed its application on April 29, 2016, it adopted and incorporated 20 additional route variations and 28 minor modifications into the proposed MXP pipeline route. These changes resulted from the identification of sensitive environmental resources during the 2016 environmental field surveys, address landowner concerns and design changes in order to avoid crossing certain parcels and landmarks, and to minimize or avoid constructing in areas with constructability constraints. We are also recommending that Columbia Gas evaluate potential route variations as requested by landowners on four properties prior to the end of the draft EIS comment period.

Columbia Gas proposes to construct three new compressor stations, and Columbia Gulf proposes to construct seven new compressor stations. We received public comments regarding alternative locations for the Cane Ridge Compressor Station; therefore, we reviewed two alternative sites for the Cane Ridge Compressor Station. We did not find a substantial environmental advantage over the proposed site.

MAJOR CONCLUSIONS

We determined that construction and operation of the MXP and GXP would result in some adverse environmental impacts, but impacts would be reduced to less-than-significant levels with the implementation of the Companies' proposed and our recommended mitigation measures, with

one exception. The MXP's impacts on upland interior forest habitat and large Core Forest Areas (including habitat for the cerulean warbler) would be significant. These determinations are based on a review of the information provided by the Companies and further developed from data requests, site visits, scoping, literature research, alternative analysis, and contacts with federal, state, and local agencies as well as Native American tribes and individual members of the public.

Although many factors were considered in these determinations, the principal reasons are:

- The Companies would minimize impacts on natural and cultural resources during construction and operation of the projects by implementing, as required, their respective *ECS, E&SCPs, SPCC Plan, Blasting Plan, HDD Contingency Plan, Wetland Mitigation Plan, Invasive Species Management Plan, Visual Screening Plan, Site-specific Residential Construction Plans, Fugitive Dust Control Plan, and Public Awareness Program.*
- FERC staff would complete the process of complying with section 7 of the ESA prior to construction.
- FERC staff would complete consultation under section 106 of the National Historic Preservation Act.
- The Companies would comply with all applicable U.S. Department of Transportation safety standards for transportation of natural gas by pipeline.
- The Companies would comply with all applicable air and noise regulatory requirements during construction and operation of the projects.
- An environmental inspection program would be implemented to ensure compliance with the mitigation measures that become conditions of the FERC's authorization.

In addition, we recommend 40 project-specific mitigation measures that the Companies should implement to further reduce the environmental impacts that would otherwise result from construction and operation of the projects. We conclude that these measures are necessary to either augment the environmental record for the projects or to reduce adverse impacts associated with the projects; and, in part, we are basing our conclusion on the successful implementation of these measures. Therefore, we recommend that these mitigation measures be attached as conditions to any authorization issued by the Commission. These recommended mitigation measures are presented in section 5.2 of the draft EIS.

1.0 INTRODUCTION

On April 29, 2016, Columbia Gas Transmission, LLC (Columbia Gas), an indirect, wholly owned subsidiary of Columbia Pipeline Group (CPG)[4], filed an application with the Federal Energy Regulatory Commission (Commission or FERC) under sections 7(b) and 7(c) of the Natural Gas Act (NGA), as amended. Columbia Gas is seeking authorization and a Certificate of Public Convenience and Necessity (Certificate) to construct, install, replace, own, operate, and maintain a new interstate natural gas pipeline and ancillary facilities in West Virginia. Columbia Gas' application was assigned Docket No. CP16-357-000. Also on April 29, 2016, Columbia Gulf Transmission, LLC (Columbia Gulf), an indirect, wholly owned subsidiary of CPG, filed an application with FERC under the NGA seeking a Certificate to construct, install, own, operate, and maintain new and upgraded natural gas ancillary facilities in Kentucky, Tennessee, and Mississippi. Columbia Gulf's application was assigned Docket No. CP16-361-000. We[5] issued a Notice of Application for each project on May 13, 2016, and the notices appeared in the *Federal Register* (FR) on May 20, 2016.

Columbia Gas' proposal, referred to in this EIS as the Mountaineer XPress Project (MXP), would involve the construction and operation in West Virginia of the following:

- about 164.3 miles of new 36-inch-diameter natural gas pipeline from Marshall County to Cabell County;
- about 5.9 miles of new 24-inch-diameter natural gas pipeline in Doddridge County;
- three new compressor stations in Doddridge, Calhoun, and Jackson Counties;
- two new regulating stations in Ripley and Cabell Counties;
- installation of about 296 feet of new, 10-inch-diameter natural gas pipeline at the Ripley Regulator Station to tie Columbia Gas' existing X59M1 pipeline into the MXP-100 pipeline; and
- related facilities in various West Virginia counties.

Additionally, Columbia Gas would replace a 0.4-mile-long segment of 30-inch-diameter natural gas pipeline on its existing system (Cabell County), add compression at one existing compressor station (Wayne County), and add compression at two compressor stations that are approved and pending for construction under separate FERC proceedings (Marshall and Kanawha Counties[6]).

4 On July 1, 2016, TransCanada Corporation acquired Columbia Pipeline Group, Inc.

5 The pronouns "we," "us," and "our" refer to the environmental staff of FERC's Office of Energy Projects.

6 The Lone Oak Compressor Station, in Marshall County, is an approved new Columbia Gas compressor station certificated by the Commission (January 19, 2017) under the Leach XPress Project (Docket No. CP15-514-000). The Elk River Compressor Station, in Kanawha County, is a pending new compressor station proposed by Columbia Gas under the WB XPress Project (Docket No. CP16-38-000).

Columbia Gulf's Gulf XPress Project (GXP) would involve the construction and operation of seven new compressor stations and upgrades at one existing meter station and one existing compressor station[7], spread across Kentucky (Carter, Boyd, Rowan, Garrard, and Metcalfe Counties), Tennessee (Davidson and Wayne Counties), and Mississippi (Union and Grenada Counties). The new and existing facilities would all be sited along Columbia Gulf's existing system (the 30-inch-diameter Mainlines 100 and 200, and the 36-inch-diameter Mainline 300). Both the MXP and the GXP are described in more detail in section 2.0, below.

We prepared this draft environmental impact statement (EIS) to assess the environmental impact associated with the construction and operation of the new facilities proposed by Columbia Gas and Columbia Gulf (collectively referred to as "the Companies"), in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, as amended. FERC staff prepared a single EIS for the two projects because GXP is interconnected with and dependent upon MXP (MXP would deliver a portion of its proposed volumes to an interconnection with Columbia Gulf in Leach, Kentucky, that is the primary receipt point for GXP), and because the environmental review for the two projects would have been conducted within the same general timeframe. Also, the project sponsors are affiliated companies (both Columbia Gas and Columbia Gulf are subsidiaries of CPG) and our consideration of company-proposed construction techniques and mitigation measures is facilitated by a combined analysis.

1.1 PROJECTS PURPOSE AND NEED

1.1.1 Mountaineer XPress Project

According to Columbia Gas, the primary purpose of the MXP is to provide up to 2.7 million dekatherms per day (Dth/d) of firm transportation service from receipt points in the Appalachian Basin to markets in the Midwest, Northeast, Mid-Atlantic, South, and Gulf Coast. The MXP would transport natural gas from receipt points in the towns of Oak Grove, Majorsville, Goodwin, Sherwood, and Stonewall, West Virginia and Clarington, Ohio; and Waynesburg, Pennsylvania to markets on the CPG system. The MXP would increase deliverability by approximately 1,800,000 Dth/d to Columbia Gas' TCO Pool[8], which serves multiple Midwest, Northeast, and Mid-Atlantic markets across CPG's system. The MXP would also add an additional 900,000 Dth/d of capacity to Columbia Gas' Leach Interconnect with Columbia Gulf's existing system, which serves markets in the South and Gulf Coast. Columbia Gas has executed eight precedent agreements for long-term transportation with shippers that, collectively, represents more than 96 percent of the MXP's proposed capacity. We received a comment during public scoping questioning if there was an "economic need" for the MXP. The Commission's role in reviewing the details of any project is to make a determination of public convenience and necessity. If such a determination is made in the affirmative, then "need" for the project is affirmed. All factors bearing on the public

[7] The Grayson Compressor Station, in Carter County, Kentucky, is a Columbia Gulf compressor station certificated by the Commission (January 19, 2017) under the RXP (CP15-539).

[8] The TCO Pool is the main pooling point on Columbia Gas' system. Specifically, the TCO Pool refers to Columbia Gas' highly liquid trading pool. Shippers may make deliveries into the TCO Pool, i.e., Columbia Gas' Interruptible Paper Pool, from any source delivered into Columbia Gas' system. The TCO Pool is a daily and monthly pricing point listed by S&P Global Platts as "Columbia Gas, Appalachia."

convenience and necessity are considered as part of the Commission's decision. However, determining project need is beyond the scope of the EIS.

1.1.2 Gulf XPress Project

According to Columbia Gulf, the purpose of the GXP is to expand the capacity of Columbia Gulf's existing system to allow for an additional 860,000 Dth/d of natural gas delivery to high-demand southern markets in Mississippi and Louisiana with deliveries to receipt points in Humphreys County, Mississippi, and Acadia, Evangeline, Lafayette, and Saint Mary Parishes, Louisiana. During the GXP scoping period, we received a comment questioning where Columbia Gulf would be shipping natural gas transported by the proposed facilities. Columbia Gulf has executed four precedent agreements for long-term transportation with shippers to the receipt points noted above. These precedent agreements collectively represent 100 percent of the GXP's proposed capacity.

1.2 PURPOSE AND SCOPE OF THE EIS

Our principal purposes for preparing an EIS are to:

- identify and assess the potential direct, indirect, and cumulative impacts on the natural and human environment that would result from the implementation of the proposed actions;
- identify and evaluate reasonable alternatives to the proposed actions that would avoid or substantially lessen any significant adverse effects to the environment;
- identify and recommend specific mitigation measures, as necessary, to avoid or minimize environmental effects; and
- encourage and facilitate involvement by the public and interested agencies in the environmental review process.

The topics addressed in this EIS include project alternatives; geology; soils; water resources; wetlands; vegetation; wildlife and aquatic resources; special status species; land use, recreation, special interest areas, and visual resources; socioeconomics; cultural resources; air quality and noise; reliability and safety; and cumulative impacts. This EIS describes the affected environment as it currently exists, discusses the environmental consequences of the proposed projects, and compares the projects' potential impact on that of the alternatives. This EIS also presents our conclusions and recommended mitigation measures.

Our description of the affected environment is based on a combination of data sources, including desktop resources such as scientific literature and regulatory agency reports, information from resource and permitting agencies, scoping comments, field data collected by the Companies, and our own site visits. Columbia Gas has field surveyed all of the pipeline facilities along the MXP route. Additionally, all proposed facilities associated with the GXP have been field surveyed.

The U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE), West Virginia Department of Environmental Protection (WVDEP), and West Virginia Division of Natural Resources (WVDNR) are "cooperating agencies" who participated in the

preparation of the EIS because they have jurisdiction by law or special expertise with respect to the environmental impacts associated with the proposals. The roles of FERC and the cooperating agencies in the project review processes are described in the sections below.

1.1.3 Federal Energy Regulatory Commission

FERC is the federal agency responsible for authorizing applications to construct and operate interstate natural gas pipeline facilities. As such, FERC is the lead federal agency for the preparation of this EIS in compliance with the requirements of NEPA (title 42 of the United States Code, sections 4321–4345 [42 USC 43221-4345]), the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (title 40 of the Code of Federal Regulations, parts 1500–1508 [40 CFR 1500-1508]), and FERC's regulations implementing NEPA (18 CFR 380).

As the lead federal agency for the projects, FERC is required to comply with section 7 of the Endangered Species Act of 1973 (ESA), the Magnuson-Stevens Fishery Conservation and Management Act[9], the Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 USC 668–668c), the Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703–712), section 106 of the National Historic Preservation Act (NHPA), and section 307 of the Coastal Zone Management Act of 1972.[10] Each of these statutes has been taken into account in the preparation of this EIS.

FERC will use the EIS to consider the environmental impacts that could result if it issues Columbia Gas and/or Columbia Gulf Certificates under section 7 of the NGA. FERC will also consider non-environmental issues in its review of the Columbia Gas and Columbia Gulf applications. Authorizations will be granted only if FERC Commission finds that the evidence produced on financing and rates; market demand; gas supply; existing facilities and services; environmental impacts; long-term feasibility; and other issues demonstrates that a project is required by the public convenience and necessity. The assessment of environmental impacts and mitigation development discussed herein are important factors in this determination.

1.1.4 U.S. Environmental Protection Agency

The EPA is an independent federal agency responsible for protecting human health and safeguarding the natural environment. The EPA has delegated water quality certification, under section 401 of the Clean Water Act (CWA), to the jurisdiction of individual state agencies. The EPA may assume section 401 authority if no state program exists, if the state program is not functioning adequately, or at the request of the state. The EPA also oversees the issuance of a

9 The Magnuson-Stevens Fishery Conservation and Management Act is the primary law governing marine fisheries management in U.S. federal waters for the purpose of ending and preventing overfishing in federally-managed fisheries, rebuild overfished stocks, increase long-term economic and social benefits from commercial and recreational fishing, and ensure a safe and sustainable supply of seafood. Neither the MXP nor the GXP involve construction or operation of project facilities in or near marine fisheries; therefore neither project would affect Essential Fish Habitat.

10 The Coastal Zone Management Act provides for the management of the nation's coastal resources by calling for the "effective management, beneficial use, protection, and development" of the nation's coastal zone. Neither the MXP nor the GXP involve construction or operation of project facilities in or near coastal zones; therefore, neither project would be subject to a Federal Consistency Determination.

National Pollutant Discharge Elimination System (NPDES) permit by the state agency, under section 402 of the CWA, for point-source discharge of water used for hydrostatic testing of pipelines into waterbodies. In addition, the EPA has the authority to review and veto USACE decisions on section 404 permits. The MXP is within EPA Region 3, and the GXP is within Region 4. Staff from each regional office participated in the NEPA review, and each region will evaluate its portion of the MXP and GXP for region-specific issues.

The EPA also has jurisdictional authority to regulate air pollution under the Clean Air Act of 1970, as amended in 1977 and 1990 (CAA) (42 USC 85), by developing and enforcing rules and regulations for all entities that emit pollutants into the air. Under this authority, the EPA has developed regulations for major sources of air pollution. The EPA has delegated authority to implement these regulations to state and local agencies, who are also allowed to develop their own regulations for non-major sources. The EPA also establishes general conformity applicability thresholds, with which a federal agency can determine whether a specific action requires a general conformity assessment.

In addition to its permitting responsibilities, the EPA is required under section 309 of the CAA to review and publicly comment on the environmental impacts of major federal actions, including actions that are the subject of draft and final EISs, and is responsible for implementing certain procedural provisions of NEPA (e.g., publishing the Notices of Availability of the draft and final EISs in the FR) to establish statutory timeframes for the environmental review process.

1.1.5 U.S. Army Corps of Engineers

The USACE has jurisdictional authority pursuant to section 404 of the CWA (33 USC 1344), which governs the discharge of dredged or fill material into waters of the United States (including wetlands). Because the USACE must comply with the requirements of NEPA before issuing permits under this statute, it has elected to participate as a cooperating agency in the preparation of this EIS. The USACE would adopt the EIS per 40 CFR 1506.3 if, after an independent review of the document, it concludes that its comments and suggestions have been satisfied. The MXP crosses both the Huntington and Pittsburgh Districts of the USACE Great Lakes and Ohio River Division. The GXP is within the Louisville and Nashville Districts of the Great Lakes and Ohio River Division and the Vicksburg District of the Mississippi Valley Division. Staff from each USACE district office participated in the NEPA review, and each district will evaluate its portion of the MXP and GXP for district-specific USACE authorizations, as applicable.

As an element of its review, the USACE must consider whether the proposed projects represent the least environmentally damaging practicable alternative pursuant to the CWA section 404(b)(1) guidelines. The term “practicable” means available and capable of being done after taking into consideration cost, existing technology, and logistics, in light of the overall purposes of both projects.

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

Based on its participation as a cooperating agency and its consideration of the final EIS (including responses to public comments), the USACE would issue a Record of Decision to formally document its decision on each of the proposed actions, including section 404(b)(1) analyses and required environmental mitigation commitments.

1.2.1 West Virginia Department of Environmental Protection

The WVDEP is the state agency responsible for implementing and enforcing West Virginia's environmental regulations with respect to managing the state's air, land, and water resources. The WVDEP has authority (through delegation from the EPA) for section 401 of the CWA Water Quality Certification. Additionally, the WVDEP reviews and approves all applications for NPDES permits. The WVDEP has agreed to be a cooperating agency in order to lend its experiences and insight with environmental impacts relative to this type of activity and provide recommendations on assessment, minimization, and mitigation of potential environmental impacts.

1.2.2 West Virginia Division of Natural Resources

The statutory mission of the WVDNR is to provide and administer a long-range comprehensive program for the exploration, conservation, development, protection, enjoyment, and use of the natural resources of the State of West Virginia. The WVDNR is composed of Wildlife Resources, State Parks and Forests, and Law Enforcement Sections and the Office of Lands and Streams.

The Wildlife Resources Section is responsible for management of the state's wildlife resources. The primary objective of the Wildlife Resources Section is to maintain and perpetuate fish and wildlife at levels compatible with the available habitat while providing maximum opportunities for recreation, research, and education. The Wildlife Resources Section comprises the Game Management, Fisheries, Wildlife Diversity, Technical Support, and Environmental Coordination Units.

Currently, the Wildlife Resources Section Game Management Unit conducts management activities on 105 Wildlife Management Areas and 8 State Forests totaling more than 1.4 million acres. Impacts on property managed by the Wildlife Resources Section may be subject to review by the U.S. Fish and Wildlife Service (USFWS) for concurrence under the authority established in 50 CFR 80.

Fisheries management programs consist of efforts focused on warmwater species (e.g., walleye and channel catfish), and coldwater species (e.g., trout), that are stocked in rivers, lakes, reservoirs, and streams throughout the state. Research, stocking, public access development, regulations, and outreach combined with habitat protection, improvement, and restoration form the foundation of management of the state's fishery resources.

The Wildlife Diversity and Natural Heritage Program is responsible for those species listed by the federal government as threatened or endangered; and nongame wildlife, nongame fish, mussels, birds, and their habitats. It also administers outreach programs and provides vital assessment information.

The Environmental Coordination Unit reviews numerous projects that potentially impact wildlife, fisheries, and their respective habitats. Primary concerns are road construction, stream alteration, hydropower projects, power line rights-of-way, gas line construction, oil/gas well sites, surface mines, and other construction projects.

The State Parks and Forests Section promotes conservation by preserving and protecting natural areas of unique or exceptional scenic, scientific, cultural, archaeological, or historical significance and provides outdoor recreational opportunities. The system is composed of 35 parks, 7 forests, 5 wildlife management areas, the Greenbrier River Trail, and the North Bend Rail Trail.

The Office of Lands and Streams preserves, protects, and enhances the state's title to its recreation lands. The Office of Lands and Streams holds title to the beds of the state's rivers, creeks, and streams totaling some 34,000 miles across about 5,000 named waterways in the state. It grants right-of-entry letters to governmental agencies, companies, and individuals to conduct construction activities in the state's rivers, creeks, and streams as well as right-of-way licenses for pipelines, underground or underwater cables, and overhead power and telephone lines crossing the state's waterways.

1.3 PUBLIC REVIEW AND COMMENT

1.3.1 Mountaineer XPress Project

On August 26, 2015, Columbia Gas filed a request with FERC to use the Commission's pre-filing (PF) review process for the MXP. At that time, Columbia Gas was in the preliminary design stage of the project, and no formal application had been filed with FERC. On September 16, 2015, FERC granted Columbia Gas' request and established a PF docket number (PF15-31-000) to place information related to the planned project into the public record. The purpose of the PF review process is to encourage the early involvement of interested stakeholders, facilitate interagency cooperation, and identify and resolve issues before a formal application is filed with FERC.

Prior to entering PF, Columbia Gas began initial outreach activities with stakeholders via notification letters in April 2015. Columbia Gas began contacting governmental stakeholders and tribal representatives in August 2015. Between October 5 and 13, 2015, after entering into PF, Columbia Gas hosted six informal open house meetings along the planned MXP pipeline route. The purpose of the open houses was to provide affected landowners, elected and agency officials, and the general public with information about the project and to give them an opportunity to ask questions and express their concerns. We participated in the open houses to provide information regarding the Commission's environmental review process to interested stakeholders and to listen to comments about the pipeline project and potential alternatives. We also conducted site visits of various portions of the planned MXP pipeline route.

In conjunction with the PF review process, Columbia Gas implemented a Stakeholder Outreach Plan to identify stakeholders, share information regarding the project, seek input on environmental and other issues, and provide opportunities for public comment. As part of this plan, Columbia Gas established a website with information about the MXP, provided a toll-free

project information line, and identified a point of contact to answer questions and provide information.

On November 18, 2015, the Commission issued a *Notice of Intent to Prepare an Environmental Impact Statement for the Planned Mountaineer XPress Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meetings* (MXP NOI). The notice was published in the FR on December 1, 2015, and mailed to more than 1,300 interested parties, including federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; Native American tribes; affected property owners; other interested parties; and local libraries and newspapers. The notice briefly described the project and the EIS process, provided a preliminary list of issues we identified, invited written comments on the environmental issues that should be addressed in the EIS, listed the date and location of public scoping meetings to be held in the project area, and established a December 17, 2015, closing date for receipt of environmental scoping comments.

In early December 2015, we held four public scoping meetings in the MXP area. The meetings were held in West Virginia in New Martinsville (December 7), West Union (December 8), Ripley (December 9), and South Charleston (December 10). The scoping meetings provided an opportunity for the public to learn more about the MXP and to provide comments on environmental issues to be addressed in the EIS. A combined total of 24 individuals provided oral comments at the scoping meetings. Transcripts of the meetings, as well as written comment letters, were entered into the public record and are available for viewing on FERC's eLibrary website (www.ferc.gov).[11] Excluding representatives of CPG, FERC staff, and FERC's third-party contractor staff, about 19 people attended the meeting in New Martinsville, 15 in West Union, 92 in Ripley, and 40 in South Charleston.

In total, 45 written comments were received during the scoping process for the MXP and placed in the public record for this project.[12] Of the combined comments received for the project, over half dealt with non-environmental issues such as general project support or opposition, or non-project-related issues such as requests for new public water utilities service in the project area. Although we recognize that these statements are of interest to the commenters, they are beyond the scope of this EIS.

The majority of comments on specific environmental concerns were about the impacts on future use of land (i.e., for future developments or hunting), recreational areas, wetlands, tree clearing, emissions from the operation of compressor stations, and plausible system alternatives. Table 1.3-1 summarizes the environmental issues and concerns identified during scoping for the

11 Using the "eLibrary" link, select "General Search" from the eLibrary menu and enter the docket number excluding the last three digits in the "Docket Number" field (i.e., PF15-31 or CP16-357). Be sure to select an appropriate date range.

12 The Commission uses various means to collect public comments, including written comments submitted via the U.S. Postal Service, oral and written comments collected at public scoping and comment meetings, and comments submitted electronically via FERC Online at www.ferc.gov. It is important to note that comments submitted by any of these means carry equal weight; i.e., written comments submitted on paper are given the same consideration as oral comments collected at a public meeting.

MXP. Table 1.3-1 also includes comments received after the formal scoping period ended on December 17, 2015, including relevant environmental comments raised by individuals requesting to be intervenors in the Commission's MXP proceeding.[13]

Table 1.3-1
Issues Identified and Comments Received During the 2015 and 2016 Public Scoping Process for the Mountaineer XPress Project

Issue/Concern	EIS Section Addressing Comment
Geology	
Safety of mining land beneath pipeline	4.1.4.6.1
Impacts from karst topography	4.1.4.7.1
Soils	
Potential for erosion; impacts on soil stability and soil integrity	4.2.2.1
Impacts of the pipeline traversing a Superfund site	4.2.10.1
Water Resources and Wetlands	
Protection of aquatic resources	4.6.4.1
Minimization of impacts on wetlands	4.4.2.1
Wildlife and Vegetation	
Impacts on old-growth interior forested areas	4.5.4.1
Land Use	
Loss of privacy around residences from clearing mature trees.	4.8.1.3
Impacts on recreational areas used for hunting	4.8.2.2.1
Socioeconomics	
Economic need for the project	1.1.1
Impacts on property values and local tax losses due to reduced property values	4.9.7
Air Quality and Noise	
Potential impacts on air quality from the operation of compressor stations	4.11.1.3.5
Potential noise impacts from construction activities and the operation of compressor stations	4.11.2.2
Health and Safety	
Risk of pipeline rupture near homes	4.12.2
Alternatives	
System alternatives with available capacity to meet the MXP's purpose and need	3.2.1
Minor alternative routes filed by landowners requesting consideration for variations contained within their properties	3.4

[13] FERC's *Notice of Application* for the MXP, issued on May 13, 2016, opened the 21-day period for interventions. To date, a total of 26 groups, individuals, and/or companies have requested intervenor status. Intervenors are official parties to the proceeding and have the right to receive copies of case-related Commission documents and filings by other intervenors. Likewise, each intervenor must provide a copy of its own filings to the Secretary and must send a copy of its filings to all other intervenors. Only intervenors have the right to seek rehearing of the Commission's decision.

On December 10, 2015, we also conducted an interagency meeting in Charleston, West Virginia, to discuss roles and responsibilities of participation as a cooperating agency, coordination of agency review, permit requirements and status, and specific resource concerns to be addressed in the EIS. The participating agencies included the USACE, West Virginia State Historic Preservation Office (SHPO), WVDNR, and WVDEP. A summary of the interagency scoping meeting is available for viewing on FERC's website.

On October 11, 2016, and subsequent to its official application filing, Columbia Gas incorporated several route modifications into its proposed MXP-100 and MXP-200 pipeline routes. Thus, on October 21, 2016, the Commission mailed a copy of the MXP NOI along with an informational cover letter to 31 newly affected landowners and opened a limited scoping period. The notice briefly described Columbia Gas' proposed modifications, invited written comments on the environmental issues regarding the route modifications that should be addressed in the EIS, and established a November 21, 2016, closing date for receipt of environmental scoping comments. No electronic nor written comments were received during the additional scoping period.

This draft EIS has been mailed to agencies, individuals, and organizations on the mailing list in appendix A and was filed with the EPA for issuance of a Notice of Availability in the FR.

1.3.2 Gulf XPress Project

On June 2, 2016, the Commission issued a *Notice of Intent to Prepare an Environmental Impact Statement for the Proposed Gulf XPress Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meeting* (GXP NOI). The notice was published in the FR on June 9, 2016, and mailed to more than 960 interested parties, including federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; Native American tribes; affected property owners; other interested parties; and local libraries and newspapers. The notice briefly described the project and the EIS process, provided a preliminary list of issues we identified, invited written comments on the environmental issues that should be addressed in the EIS, listed the date and location of a public scoping meeting to be held within the project area, and established a July 5, 2016 closing date for receipt of environmental scoping comments.

On June 21, 2016, we held a public scoping meeting at the Cane Ridge High School in Antioch, near Nashville, Tennessee, near the proposed site for one of the new GXP compressor stations. The scoping meeting provided an opportunity for the public to learn more about the proposed GXP and to provide comments on environmental issues to be addressed in this EIS. A total of 28 individuals provided oral comments during the scoping meeting. Transcripts of the meeting, as well as written comment letters, were entered into the public record and are available for viewing on FERC's eLibrary website (www.ferc.gov). Excluding representatives of CPG, FERC staff, and third-party contractor staff, about 145 people attended the public scoping meeting.

In total, 149 written comments were received during the scoping process and placed in the public record for the GXP. Approximately 30 percent dealt with non-environmental issues such as those described above in section 1.3.1. The majority of the remaining comments related to specific environmental concerns associated with the proposed Cane Ridge Compressor Station and

potential impacts on surrounding residences and the public due to noise and air emissions, and conflicting land use. Table 1.3-2 summarizes the environmental issues and concerns identified during the GXP scoping process. Table 1.3-2 also includes comments received after the formal scoping period ended on July 5, 2016, including relevant environmental comments raised by individuals requesting to be intervenors in the Commission's GXP proceeding.[14] Unless otherwise noted, the comments in table 1.3-2 are specific to the proposed Cane Ridge Compressor Station.

Table 1.3-2
Issues Identified and Comments Received during the Public Scoping Process for the Gulf XPress Project

Issue/ Concern	EIS Section Addressing Comment
General	
Future plans to expand the compressor station or the existing Columbia Gulf pipeline	2.8
Gas would be shipped overseas; not for domestic consumption	1.1.2
Concerns for impacts of the compressor station running 24 hours per day, 7 days per week	4.11.2.3.1 and 4.11.1.3.5
Soils	
Potential for soil contamination	4.2.10.2
Water Resources	
Potential for toxic runoff to surrounding properties and Mill Creek	4.3.2.4.2
Impacts on water quality and groundwater from spills of hazardous materials	4.2.10.2
Operating the compressor station would require huge amounts of water	4.3.2.8.2
Holcomb Compressor Station may impede flow of ephemeral drainage that crosses the site, negatively affecting upstream properties	4.3.2.4.2
Protected Species	
Impacts on the Nashville crayfish in Mill Creek	4.7.8.2
Restrictions on seasonal tree-cutting at the Kentucky compressor station facilities	4.6.3.2
Potential impacts from construction of the Kentucky compressor stations on threatened, endangered, and special-status species	4.7.3.2 and 4.7.11.2.1
Land Use	
Proximity of the Cane Ridge Compressor Station to dense suburban area; conflict between proposed use and existing land use zoning	3.6.2
Proximity of Cane Ridge Compressor Station to residential communities and schools	3.6.2
Adherence of the new facility to all applicable land use/zoning regulations	4.8.1.4.2
Concern with light pollution	4.8.3.2
Concern with nighttime lights and noise at Leach C Meter Station, and workers trespassing on private property	4.8.3.2 and 4.11.2.3.2
Impacts on user experience at nearby Mill Creek Greenway	4.8.2.2.2
Potential visual impacts at proposed compressor stations (Cane Ridge, Morehead, and Paint Lick)	4.8.3.2
Socioeconomics	
Impacts on home values and potential loss of all future developments in the Cane Ridge area	4.9.7

[14] FERC's *Notice of Application* for the GXP, issued on May 13, 2016, opened the 21-day period for interventions. To date, a total of 17 groups, individuals, and/or companies have requested intervenor status on the GXP.

Table 1.3-2 Issues Identified and Comments Received during the Public Scoping Process for the Gulf XPress Project	
Issue/ Concern	**EIS Section Addressing Comment**
Increase in property taxes	4.9.7
Compressor station would not provide jobs or revenue to the community	4.9.8.2
Potential increase in traffic congestion during construction of compressor station	4.9.5.2
Cultural Resources	
Concern for completion of tribal consultations for all proposed compressor stations	4.10.2.2
Concern that Clifton Junction Compressor Station would have a negative impact on the Trail of Tears National Historic Trail	4.10.1.2.1
Air Quality	
Quantify construction and operational air emissions	4.11.1.3.3 and 4.11.1.3.4
Assessment of health issues associated with radon and air quality	4.11.1.3.5
Concern with exposure to hazardous and toxic air pollutants and cancer-causing chemicals; effect to area residents' health	4.11.1.3.5
Assessment of increased health risks to sensitive groups (e.g., asthmatics)	4.11.1.3.5
Concern that the compressor station would emit odors; the neighborhood would smell/be impacted by gas odorant	4.11.1.3.5
Air quality impacts during operation of compressor station, specifically on residents living within 2 miles, the Henry Maxwell Elementary School students, and users of the Mill Creek Greenway	4.11.1.3.5
Noise	
Concern with compressor station construction noise at the Cane Ridge site.	4.11.2.2.1
Concern with noise pollution from compressor station operation and truck traffic; use of noise attenuation measures	4.11.2.3.2
Concern with intermittent loud noise; frequency and duration of blowdowns	4.11.2.3.2
Concern with citizen recourse if compressor station operational noise is louder than allowable threshold (55 decibels)	5.2 (condition #37)
Potential health-related impacts resulting from compressor station operation noise and vibrations	5.2 (condition #37)
Reliability and Safety	
Concern about station accident, risk of explosion, disaster	4.12.2
Concern with the age of the existing Columbia Gulf pipelines	4.12.2
Cumulative Impacts	
Analysis of cumulative impacts on air for the middle Tennessee region when combining the Cane Ridge Compressor Station with Kinder Morgan's station #563 at Joelton, TN	4.13.2.9.2
Alternatives	
Alternative sites for the Cane Ridge Compressor Station	3.6.2

1.4 NONJURISDICTIONAL FACILITIES

Under section 7 of the NGA, FERC is required to consider, as part of its decision to authorize interstate natural gas facilities, all factors bearing on the public convenience and necessity. Occasionally, proposed projects have associated facilities that do not come under the

jurisdiction of the Commission. As such, FERC has no authority or jurisdiction over the siting, permitting, licensing, construction, or operation of these facilities. These "non-jurisdictional" facilities may be integral to the need for the proposed facilities (e.g., a power plant at the end of a FERC-jurisdictional pipeline), or they may be merely associated as minor, non-integral components of the jurisdictional facilities that would be constructed and operated as a result of Certification of the proposed facilities. These facilities are addressed below.

1.4.1 Mountaineer XPress Project

Two non-jurisdictional facilities are associated with the MXP in Doddridge and Calhoun Counties, West Virginia. These facilities are the MarkWest Energy Partners (MarkWest) Pipeline Tie-in at milepost (MP) 50.5 (at the proposed Sherwood Compressor Station) and the Mon Power, FirstEnergy electric transmission line for service to the proposed White Oak Compressor Station at MP 81.9.

The MarkWest Pipeline would consist of an approximately 2.4-mile-long pipeline from the existing MarkWest Sherwood natural gas processing plant to the proposed Sherwood Compressor Station. The pipeline, which will be designed and constructed by MarkWest Energy Partners, L.P., is expected to be between 24 and 36 inches in diameter. The existing MarkWest Sherwood natural gas processing plant is in Doddridge County and is subject to federal and state permitting and maintenance requirements. Construction and operation of the new MarkWest Pipeline will also be subject to federal and West Virginia permits and clearances for the protection of water resources, threatened and endangered species, and other federal, state, and local regulations.

On the basis of similar pipelines, the MarkWest Pipeline is expected to require a 100-foot-wide construction right-of-way and 50-foot-wide permanent right-of-way between the gas processing plant and the MXP Sherwood Compressor Station. Based on this assumption, the MarkWest Pipeline would impact 29 acres during construction (not including additional temporary workspaces [ATWS] needed at waterbody crossings, etc.) and 14.5 acres for permanent operation.

The Mon Power, a First Energy Company, three-phase electric transmission line required to supply electricity to Columbia Gas' White Oak Compressor Station would require installation of approximately 1,400 feet of new three-phase power line, the conversion of approximately 7.5 miles of existing single phase to three-phase power line (with a portion being rerouted), the conversion of approximately 2.9 miles of existing two-phase to three-phase power line (with a portion being rerouted), and potential upgrades to an additional 2.6 miles of existing Mon Power three-phase power line. Because routing of this powerline has not been finalized, associated environmental impacts cannot be fully assessed at this time; however, several assumptions can be made. Any new powerlines would likely require a 30-foot-wide construction corridor. While waterbodies and wetlands would be spanned, large woody vegetation would be cut to ground level to avoid interfering with the new powerline. Impacts on vegetation, wildlife, and land use would be similar (although to a much less degree) to those discussed in section 4. Otherwise, impacts on geology, soils, and cultural resources would largely be limited to where new support structures would be located and would be expected to be minor and temporary. This non-jurisdictional electrical powerline would be a private project constructed under state and local jurisdiction. The federal government would have no financial or regulatory involvement.

Columbia Gas would also require electric service at its proposed Sherwood and Mount Olive Compressor Stations. At this time, we assume that service is available at the site property lines and that any disturbance associated with extending overhead power to the compressor buildings would be contained within the sites themselves. Further details regarding the above-mentioned non-jurisdictional facilities are included in section 4.13.1 and 4.13.2.

1.4.2 Gulf XPress Project

Three proposed non-jurisdictional facilities are associated with the proposed GXP, one in Kentucky and two in Tennessee. All three facilities would involve the extension of electric lines to deliver power to the GXP compressor stations. In Metcalfe County, Kentucky, the Tri County Electric Company would install approximately 380 feet of new electric line to serve the proposed Goodluck Compressor Station. The new electric line would commence at the Tri County Electric Company substation and end within the fenceline of the Goodluck Compressor Station. In Davidson County, Tennessee, the Nashville Electric Service would install approximately 200 feet of new electric line to the proposed Cane Ridge Compressor Station. In Wayne County, Tennessee, the Tennessee Valley Electric Cooperative would extend electric lines for approximately 3,500 feet from U.S. Highway 64/Tennessee State Route (SR) 15 to the proposed Clifton Junction site. Further details regarding the above-mentioned non-jurisdictional facilities are included in section 4.13.1 and 4.13.2.

1.5 PERMITS, APPROVALS, CONSULTATIONS, AND REGULATORY REQUIREMENTS

As the lead federal agency for reviewing the MXP and GXP, FERC is required to comply with section 7 of the ESA, the MBTA, the Rivers and Harbors Act (RHA), the CWA, the CAA, and section 106 of the NHPA. These and other statues have been taken into account in the preparation of this EIS.

Tables 1.5-1 and 1.5-2 list the major federal, state, and local permits, approvals, and consultations for construction and operation of the MXP and GXP, respectively. The tables also provide the dates or anticipated dates when Columbia Gas and Columbia Gulf commenced or anticipate commencing formal permit and consultation procedures. Columbia Gas and Columbia Gulf are responsible for all permits and approvals required to implement the proposed projects prior to construction, regardless of whether these permits and approvals appear in the tables. However, any state or local permits issued with respect to jurisdictional facilities must be consistent with the conditions of any authorization the Commission may issue. Although FERC encourages cooperation between applicants and state and local authorities, this does not mean that state and local agencies, through application of state and local laws, may prohibit or unreasonably delay the construction or operation of facilities approved by FERC. Any state or local permits issued with respect to jurisdictional facilities must be consistent with the conditions of any authorization issued by FERC.

Table 1.5-1
Major Permits, Approvals, and Consultations for the Mountaineer XPress Project

Agency	Permit/Approval/ Consultation	Status
Federal		
Federal Energy Regulatory Commission	Section 7(c) NGA, Certificate of Public Convenience and Necessity	Application filed April 29, 2016
U.S. Army Corps of Engineers Huntington District Pittsburgh District	Section 404, CWA Permit	Applications filed July 8, 2016 (Huntington District) July 8, 2016 (Pittsburgh District)
	Section 10 RHA Permit	Application filed July 8, 2016 (only applicable to Huntington District)
U.S. Environmental Protection Agency Region 3	Section 404, CWA	Consultation through the USACE process
	CAA	Delegated to WVDEP, Division of Air Quality
U.S. Fish and Wildlife Service – West Virginia Field Office	Section 7 ESA, MBTA, and BGEPA Consultation	Ongoing
U.S. Department of Agriculture Natural Resources Conservation Service	Farmland Protection Policy Act, Conservation Reserve Program, and Wetland Reserve Program	Ongoing
West Virginia		
West Virginia Division of Culture and History (SHPO)	Section 106 NHPA Consultation	Ongoing
West Virginia Department of Environmental Protection – Division of Air Quality	Air Permit – Title V Permit	Application submitted on April 29, 2016
West Virginia Department of Environmental Protection – Division of Water and Waste Management	Section 401, CWA	Application filed on July 8, 2016
	General Water Pollution Control Permit	Anticipated application date: 1st Quarter of 2017
	NPDES, Water Pollution Control Permit for Hydrostatic Testing	Anticipated application date: 1st Quarter of 2017
	Large Quantity Water User Registration	Anticipated application date: 1st Quarter of 2017
West Virginia Department of Natural Resources– Natural Heritage Program	Consultation	Consultations began July 2015; Ongoing
West Virginia Department of Natural Resources– Office of Land and Streams	Stream Activity Permit (Joint Application with the Public Lands Corporation)	Anticipated application date: 1st Quarter of 2017
Local		
All affected counties **a**/	Floodplain Ordinance Permit	Anticipated application date: July 2017

a Floodplain Ordinance Permits are only required in FEMA designated floodplains; therefore, they may not be required at all facilities.

Table 1.5-2
Major Permits, Approvals, and Consultations for the Gulf XPress Project

Agency	Permit/Approval/ Consultation	Status
Federal		
Federal Energy Regulatory Commission	Section 7(c) NGA, Certificate of Public Convenience and Necessity	Application filed April 29, 2016
U.S. Army Corps of Engineers Louisville District Nashville District Vicksburg District	Section 404, CWA Permit	Not applicable **a**/
U.S. Environmental Protection Agency Region 4	Section 404, CWA	Consultation through the USACE process
	CAA	Ongoing
U.S. Fish and Wildlife Service – Kentucky, Tennessee, and Mississippi Field Offices	Section 7 ESA, MBTA, and BGEPA Consultation	Consultation ongoing with Kentucky Field Office
U.S. Department of Agriculture Natural Resources Conservation Service	Farmland Protection Policy Act, Conservation Reserve Program, and Wetland Reserve Program	Ongoing
Kentucky		
Kentucky Department of Environmental Protection	Section 401, CWA	Not applicable **b**/
	Air Permit – Title V Permit	Application filed May 26, 2016
	General Permit No. KYR100000 for Stormwater Discharges	Anticipated application date: June 2017
	NPDES Permit for Hydrostatic Test Water Discharge	Anticipated application date: June 2017
	Erosion and Sediment Control – Stormwater Pollution Prevention Plan (SWPPP)	Anticipated application date: June 2017
Kentucky Heritage Council (SHPO)	Section 106 NHPA Consultation	Complete
Kentucky Department of Fish and Wildlife Resources	Natural Heritage/Protected Species Consultation	Initiated in July 2015
Tennessee		
Tennessee Department of Environment and Conservation	Section 401, CWA Permit	Not applicable **b**/
	Air Permit – Title V Permit	Application filed May 26, 2016
	Water Discharge General Permit	Anticipated application date: June 2017
	Construction Stormwater General Permit No. TNR 100000	Anticipated application date: June 2017
	SWPPP	Anticipated application date: June 2017
Tennessee Department of Environment and Conservation, Tennessee Historical Commission (SHPO)	Section 106 NHPA Consultation	Complete
Tennessee Department of Environment and Conservation, Natural Heritage Inventory Program	Natural Heritage/Protected Species Consultation	Complete

Table 1.5-2
Major Permits, Approvals, and Consultations for the Gulf XPress Project

Agency	Permit/Approval/ Consultation	Status
Mississippi		
Mississippi Department of Environment Quality	Section 401, CWA Permit	Not applicable **b**/
	Air Permit – Title V Permit	Application filed May 26, 2016
	Water Discharge General Permit	Anticipated application date: June 2017
	Construction Stormwater General Permit	Anticipated application date: June 2017
	SWPPP	Anticipated application date: June 2017
Mississippi Department of Archives and History (SHPO)	Section 106 NHPA Consultation	Complete
Mississippi Department of Wildlife, Fish, and Parks – Museum of Natural Science	Consultation	Complete
Local		
Carter County, Kentucky	Floodplain Permit	Anticipated submittal date: June 2017
Granada County, Mississippi	Floodplain Permit	Anticipated submittal date: June 2017

a Assumes automatic coverage under Nationwide 12 Permit.
b Assumes automatic coverage under Nationwide 12 Permit.

1.5.1 Endangered Species Act

Section 7 of the ESA, as amended, states that any project authorized, funded, or conducted by any federal agency (e.g., FERC) should not "…jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined… to be critical…" (16 USC section 1536(a)(2) (1988)). FERC, or Columbia Gas/Columbia Gulf as our non-federal representative, is required to consult with the USFWS and/or the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) to determine whether federally listed endangered or threatened species or designated critical habitat are found in the vicinity of the proposed projects. If FERC determines that such species or habitats may be impacted by the projects, FERC is required to prepare a biological assessment (BA) to identify the nature and extent of adverse impact, and to recommend measures to avoid or reduce potential impacts on habitat and/or species. If, however, FERC determines that no federally listed or proposed endangered or threatened species or their designated critical habitat would be impacted by the projects, no further action is necessary under the ESA. See section 4.7 for the status of our compliance with section 7 of the ESA.

1.5.2 Migratory Bird Treaty Act

Migratory birds are species that nest in the United States and Canada during the summer and then migrate south to the tropical regions of Mexico, Central and South America, and the Caribbean for the non-breeding season. Migratory birds are protected under the MBTA (16 USC 703–711; MBTA). Executive Order (EO) 13186 (66 FR 3853) directs federal agencies to, among other things, identify where unintentional take is likely to have a measurable negative effect on migratory bird populations. The goal is to work with the USFWS in avoiding or minimizing adverse impacts on migratory birds, with emphasis placed on species of concern, priority habitats, and key risk factors. Particular focus is given to addressing population-level impacts.

On March 30, 2011, the USFWS and the Commission entered into a *Memorandum of Understanding Between the Federal Energy Regulatory Commission and the U.S. Department of the Interior United States Fish and Wildlife Service Regarding Implementation of Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds"* (MBTA MOU) that focuses on avoiding or minimizing adverse impacts on migratory birds and strengthening migratory bird conservation through enhanced collaboration between the two agencies. See section 4.6.3 of this EIS for the status of our consultations regarding the MBTA.

1.5.3 Rivers and Harbors Act

The RHA pertains to activities in navigable waters as well as harbor and river improvements. Section 10 of the RHA prohibits the unauthorized obstruction or alteration of any navigable water of the United States. Construction of any structure or the accomplishment of any other work affecting course, location, condition, or physical capacity of waters of the United States must be authorized by the USACE. The Kanawha River (MP 146.6) is a section 10 navigable water that would be crossed using horizontal directional drilling (HDD). Although direct impacts would be avoided, Columbia Gas would still need to obtain a section 10 authorization from the USACE. Details regarding HDD crossings of waterbodies are included in section 2.4.4.2.

1.5.4 Clean Water Act

The CWA, as amended, regulates the discharges of pollutants into waters of the United States and regulates quality standards for surface waters. To enact this goal, both the EPA and the USACE have regulatory authority under this statute. The EPA has implemented pollution control programs including setting wastewater standards for industry and creating water quality standards for all contaminants in surface waters. Under the CWA, it is unlawful to discharge any pollutant from a point source into waters of the United States without a permit. The EPA operates the NPDES permit program that regulates discharges by industrial, municipal, and other facilities, if discharges directly enter surface waters. Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the United States and is under jurisdiction of the USACE. The status of NPDES and section 404 permitting requirements are further addressed in sections 4.3.1.1.1 (for MXP) and 4.3.2.4.2 (for GXP) of this EIS, respectively.

Section 401 of the CWA requires that a federal permit applicant who conducts any activity that may result in a discharge to waters of the United States must provide the federal regulatory agency with a section 401 certification. Section 401 certifications are made by the state in which

the discharge originates and declare that the discharge would comply with applicable provisions of the act, including the state water quality standards. The WVDEP Division of Water and Waste Management is the applicable regulatory authority delegated with section 401 certification for West Virginia. The Kentucky Department of Environmental Protection (KDEP), Tennessee Department of Environment and Conservation (TDEC), and Mississippi Department of Environment Quality (MDEQ) are the applicable regulatory authorities delegated with section 401 certification for Kentucky, Tennessee, and Mississippi, respectively.

1.5.5 Clean Air Act

The CAA defines the EPA's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone (O_3) layer. Under the CAA, the EPA sets limits on certain air pollutants and grants them the authority to limit emissions of air pollutants coming from sources such as industrial facilities. The EPA has delegated authority to implement these regulations to state and local agencies. The WVDEP Division of Air Quality, KDEP, TDEC and MDEQ are responsible for enforcement of air quality standards at a state level as well as enforcement of the State Implementation Plan (SIP) required under the CAA in their respective states.

The EPA issued a rule in 2010 finalizing greenhouse gas (GHG) reporting requirements for the petroleum and natural gas industry (40 CFR 98). West Virginia, Kentucky, Tennessee, and Mississippi have modified their SIPs to regulate GHGs and issue permits for GHGs for large and modified sources under the Prevention of Significant Deterioration (PSD) program. See section 4.11.1 of this EIS for additional information regarding the status of project compliance with the CAA and SIPs.

1.5.6 National Historic Preservation Act

Section 106 of the NHPA, as amended, requires FERC to take into account the effects of its undertakings on historic properties, and afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment. Historic properties include pre-contact or historic sites, districts, buildings, structures, objects, or properties of traditional religious or cultural importance listed in or eligible for listing in the National Register of Historic Places (NRHP). In accordance with the ACHP's regulations for implementing section 106, at 36 CFR 800.2(a)(3), FERC is using the services of Columbia Gas and Columbia Gulf and its consultants to prepare information, analyses, and recommendations. Section 4.10.4 of this EIS summarizes the status of our compliance with the NHPA.

2.0 DESCRIPTION OF THE PROPOSED ACTION

2.1 MOUNTAINEER XPRESS PROPOSED FACILITIES

Under the MXP, Columbia Gas proposes to construct and operate buried natural gas pipelines and related aboveground facilities in West Virginia. An overview map showing the MXP location is provided as figure 2.1-1. Detailed maps showing the proposed pipeline routes and aboveground facility locations are provided in appendix B-1. Details regarding construction procedures and different pipeline installation methodologies are discussed in section 2.4.

2.1.1 Pipeline Facilities

The MXP includes about 170.7 miles of pipeline composed of the following facilities, all in West Virginia:

- installation of approximately 164.3 miles of 36-inch-diameter natural gas transmission pipeline (MXP-100) located in Marshall, Wetzel, Tyler, Doddridge, Ritchie, Calhoun, Wirt, Roane, Jackson, Putnam, Mason, and Cabell Counties;
- installation of about 5.9 miles of 24-inch-diameter natural gas pipeline (MXP-200) in Doddridge County;
- installation of approximately 296 feet of new 10-inch-diameter natural gas pipeline at the Ripley Regulator Station to tie Columbia Gas' existing X59M1 pipeline into the MXP-100; and
- replacement of approximately 0.4 mile of 30-inch-diameter natural gas pipeline on segments of Columbia Gas' SM80 and SM80 Loop pipelines (approximately 0.2-mile continuous segments on each pipeline) with new 30-inch-diameter natural gas pipeline in Cabell County.

Most of the proposed pipelines (95.5 percent) would be constructed on privately owned land. Approximately 13.9 percent would be co-located with existing utilities.

According to Columbia Gas, the MXP-100 pipeline would provide an additional 2,700,000 Dth/d of available capacity for firm transportation service to Columbia Gas' TCO Pool for delivery to markets across CPG's system, including the Columbia Gulf Leach interconnect with Columbia Gulf (located in Leach, Kentucky). The MXP-100 pipeline would begin at a tie-in site (MP 0.0) with Columbia Gas' Leach XPress Project (LXP)[15] pipeline in Marshall County, West Virginia, and would end in Cabell County, West Virginia, at MP 163.9.

[15] On June 8, 2015, Columbia Gas filed its application under sections 7(b) and 7(c) of the NGA and part 157 of the Commission's regulations to construct, operate, and maintain certain interstate natural gas pipeline facilities in Ohio, Pennsylvania, and West Virginia. Columbia Gas' proposed facilities, referred to as the LXP, were assigned Docket No. CP15-514-000. We issued the final EIS for LXP and the RXP on September 1, 2016. The Commission issued Certificates and approved the LXP and RXP on January 19, 2017.

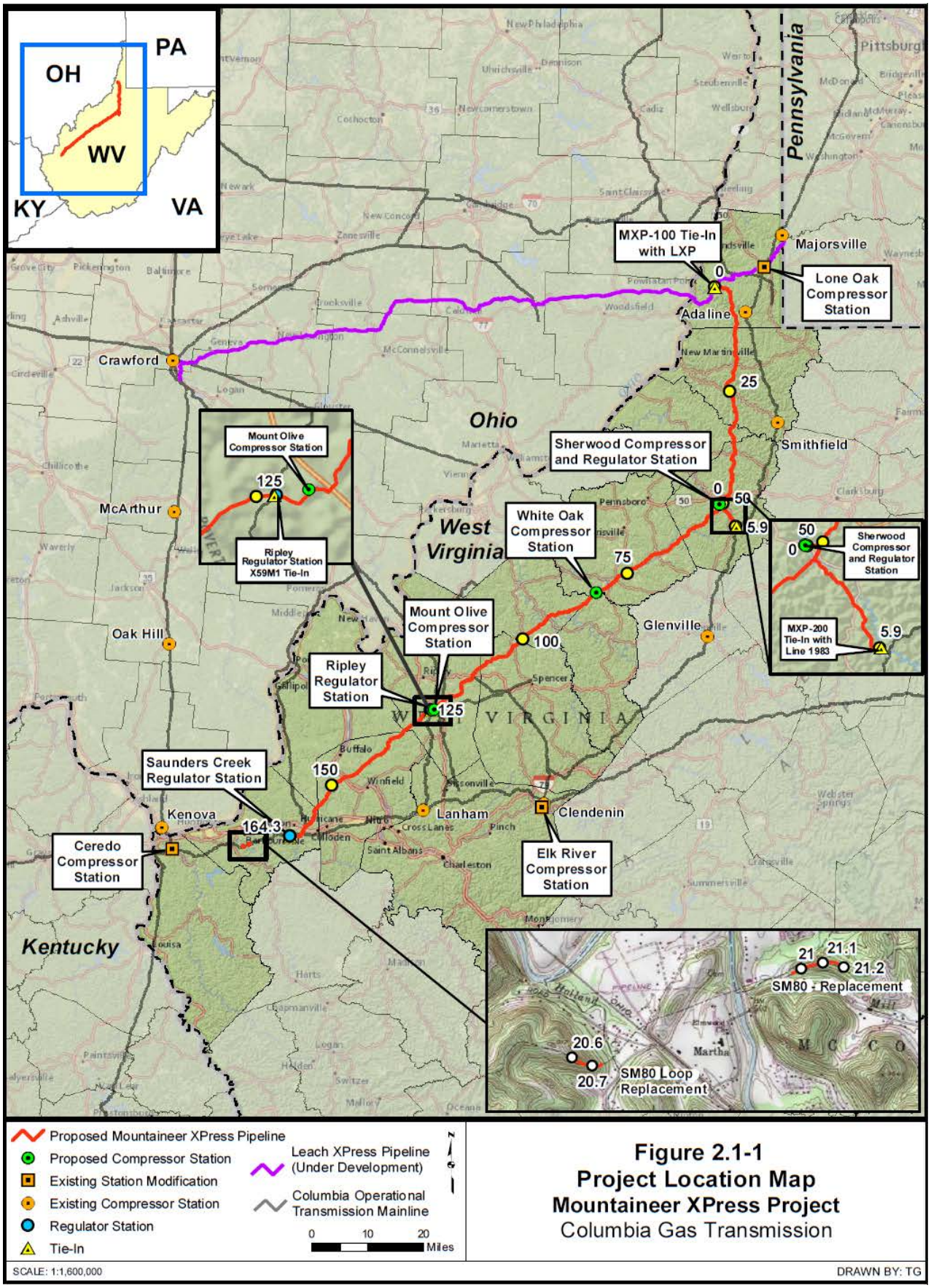


Figure 2.1-1
Project Location Map
Mountaineer XPress Project
Columbia Gas Transmission

The proposed MXP-200 line would connect the proposed MXP-100 line with Columbia Gas' existing Line 1983. Columbia Gas states that connecting the two transmission pipelines would give it greater flexibility in scheduled operation and maintenance activities and enable the option of delivering and/or receiving natural gas from Line 1983.

Pursuant to section 7(b) of the NGA, Columbia Gas would replace a 0.4-mile-long section of its SM80/SM80 Loop pipeline system to restore the maximum allowable operating pressure (MAOP) of these lines. The segments of pipeline to be replaced would be removed, and the replacement pipe would be installed in the original ditch and alignment. The replacement pipe, referred to as a class change replacement, would have a heavier wall thickness and would be used because of the increased number of residences/homes in these areas.

2.1.2 Aboveground Facilities

Columbia Gas proposes to modify facilities at one existing compressor station (Ceredo), one recently approved new compressor station (Lone Oak — approved as part of the LXP, FERC Docket No. CP15-514-000), and one new compressor station pending under a separate proceeding (WB XPress Project [WBX], FERC Docket No. CP16-38-000). In addition, Columbia Gas proposes to construct three new compressor stations, three new regulator stations, and other appurtenant facilities (see table 2.1-1).

Table 2.1-1
Proposed Aboveground Facilities for the Mountaineer XPress Project

Facility Name	Milepost	Horsepower	Diameter (inches)	County
New Aboveground Facilities				
MXP-100 Tie-in with LEX **a**/	0.0	N/A	36	Marshall
MXP-1 Valve Site	10.1	N/A	36	Marshall
MXP-2 Valve Site	20.3	N/A	36	Wetzel
MXP-3 Valve Site	29.4	N/A	36	Wetzel
MXP-4 Valve Site	38.2	N/A	36	Doddridge
Sherwood Compressor and Regulator Station (includes MXP-200 tie-in)	50.7	47,000	N/A	Doddridge
MXP-200 Tie-in with Line 1983	5.9	N/A	24	Doddridge
MXP-5 Valve Site	60.4	N/A	36	Doddridge
MXP-6 Valve Site	72.2	N/A	36	Ritchie
White Oak Compressor Station	82.2	44,800	N/A	Calhoun
MXP-7 Valve Site	96.5	N/A	36	Wirt
MXP-8 Valve Site	113.2	N/A	36	Jackson
Mount Olive Compressor Station	124.2	61,500	N/A	Jackson
Ripley Regulator Station	124.7	N/A	36	Jackson
MXP-9 Valve Site	134.6	N/A	36	Putnam
MXP-10 Valve Site	148.2	N/A	36	Putnam
Saunders Creek Regulator Station	164.3	N/A	36	Cabell
Modifications to Aboveground Facilities				
Lone Oak Compressor Station **b**/	N/A	15,900	N/A	Marshall
Ceredo Compressor Station	N/A	43,000	N/A	Wayne
Elk River Compressor Station **c**/	N/A	15,900	N/A	Kanawha

a LEX is the approved pipeline system operational name associated with the LXP (Docket No. CP15-514-000, Order issued Jan. 19, 2017).
b Approved Columbia Gas compressor station under the LXP (Docket No. CP15-514-000, Order issued Jan. 19, 2017).
c Pending compressor station proposed by Columbia Gas under the WBX (Docket No. CP16-38-000).

Proposed MXP modifications at the approved Lone Oak Compressor Station (LXP), and the pending Elk River Compressor Station (under the WBX) do not rely solely on the completion of either the LXP or the WBX. If these projects do not receive the required approval from FERC to proceed, Columbia Gas states it would alter the scope of the MXP, and potentially amend its application, to meet the purpose and need of the project by expansion of existing Columbia Gas facilities elsewhere. See section 3.0 for a discussion of alternative configurations.

2.1.2.1 Tie-in and Regulator Facilities

MXP-100 Tie-in: This new tie-in with the LXP pipeline, referred to as "LEX" would enable bi-directional flow and include a pig launcher/receiver to receive/deliver natural gas from Columbia Gas' proposed LEX pipeline.[16] This tie-in facility would be located at MP 0.0 in Marshall County.

MXP-200 Tie-in: This new tie-in with Line 1983 would enable bi-directional flow and include a pressure regulator and pig launcher/receiver to connect the proposed MXP-200 pipeline with Columbia Gas' existing Line 1983. This tie-in facility would be located at the end of MXP-200 pipeline (MP 5.9) on property owned by Columbia Gas in Doddridge County.

Saunders Creek Regulator Station: This new regulator station would include a pig launcher/receiver and associated equipment to deliver natural gas to Columbia Gas' existing SM80 and SM80 Loop pipelines. The tie-in and regulating station would be sited where the MXP-100 pipeline terminates at Columbia Gas' existing system (MP 164.3) in Cabell County.

2.1.2.2 New Compressor Stations

Sherwood Compressor and Regulator Station: This new compressor station would consist of four natural gas-fired compressor units totaling 47,000 International Standards Organization (ISO) horsepower (hp) and be constructed at the beginning of the MXP-200 pipeline (on the MXP-100 at MP 50.7). The station would also include three pig launcher/receivers and pressure regulation for interconnections with the MXP-100 and MXP-200 pipelines. Additionally, Columbia Gas proposes to connect at this facility with a planned non-jurisdictional pipeline to be constructed, owned, and operated by MarkWest. The Sherwood Compressor and Regulator Station and all associated equipment would be constructed on property purchased by Columbia Gas in Doddridge County.

White Oak Compressor Station: This new compressor station would include two natural gas-fired compressor units totaling 44,800 ISO hp to be constructed on the MXP-100 pipeline at MP 82.2. It also would include two pig launcher/receivers. The station and associated equipment would be constructed on property purchased by Columbia Gas in Calhoun County.

Mount Olive Compressor Station: This new compressor station would include three natural gas-fired compressor units totaling 61,500 ISO hp and be constructed on the MXP-100

[16] A pipeline "pig" is a device that internally cleans or inspects the pipeline. A pig launcher/receiver is an aboveground facility where pigs are inserted into or retrieved from the pipeline.

pipeline at MP 124.2. It also would include two pig launcher/receivers. The station and associated equipment would be constructed on property purchased by Columbia Gas in Jackson County.

2.1.2.3 Compressor Station Modifications

Lone Oak Compressor Station: Columba Gas proposes adding one 15,900 ISO-hp natural gas-fired compressor unit and other related equipment to its Lone Oak Compressor Station in Marshall County (associated with the approved LXP).

Ceredo Compressor Station: Columbia Gas is proposing to add two compressor units, one natural gas-fired unit (30,000 ISO hp) and one electric motor-driven unit (13,000 ISO hp) and other related equipment at its existing Ceredo Compressor Station in Wayne County.

Elk River Compressor Station: Columbia Gas would add one gas-fired compressor unit (approximately 15,900 ISO hp) and other related equipment to its pending Elk River Compressor Station in Kanawha County (associated with the proposed WBX).

2.2 GULF XPRESS PROJECT

The GXP would involve construction of seven new midpoint compressor stations on Columbia Gulf's system in Kentucky, Tennessee, and Mississippi. The existing system includes Columbia Gulf's existing 30-inch-diameter Mainline 100, existing 30-inch-diameter Mainline 200, and existing 36-inch-diameter Mainline 300. Columbia Gulf would also add compression and/or improvements at one recently certificated compressor station and one meter station on Columbia Gulf's system in Kentucky. One of these compressor stations is the Grayson Compressor Station recently certificated (January 19, 2017) as part of the Rayne XPress Expansion Project (RXP) under Docket No. CP15-539-000. We issued the Order for LXP and the RXP on January 19, 2017. Table 2.2-1 provides an overview of the proposed GXP facilities. An overview map showing the proposed GXP facility locations is provided as figure 2.2-1. Detailed maps showing the aboveground facility locations are provided in appendix B-2.

We received several comments questioning how the location of the proposed Cane Ridge Compressor Station was selected. Columbia Gulf utilized hydraulic modeling to determine the optimal location for each proposed compressor station. A hydraulic model uses a computer program to replicate the flow of gas through a pipeline system. The model reflects the current flow characteristics found on Columbia Gulf's pipeline system by considering factors such as pipeline elevation, pressure, and pipe characteristic (e.g., diameter). In order to transport a larger volume of gas between two points on the system, the model identifies the optimum locations where additional compression would be required to keep the larger volume flowing. To achieve a high level of hydraulic efficiency, the additional compressors must be installed within an approximate 1-mile radius of the locations identified (i.e., a 2-mile interval). The 2-mile interval along the system allows location-specific information to be considered in the decision of where to install new compression while still maintaining the level of hydraulic efficiency necessary to meet the proposed new flow requirements (in this case, transportation of an additional 2,700,000 Dth/d). Further information regarding our review of Columbia Gulf's hydraulic modeling for the Cane Ridge Compressor Station is available in section 3.6.2.

Table 2.2-1
Proposed Aboveground Facilities for the Gulf XPress Project

Facility Name	Horsepower	County
New Compressor Stations		
Kentucky		
Morehead Compressor Station	44,800	Rowan
Paint Lick Compressor Station	41,000	Garrard
Goodluck Compressor Station	31,800	Metcalfe
Tennessee		
Cane Ridge Compressor Station	41,000	Davidson
Clifton Junction Compressor Station	31,800	Wayne
Mississippi		
New Albany Compressor Station	31,800	Union
Holcomb Compressor Station	31,800	Grenada
Modifications to Existing Facilities		
Kentucky		
Grayson Compressor Station **a**/	15,900	Carter
Leach C Meter Station	N/A	Boyd
Total Horsepower	**269,900**	

a Columbia Gulf certificated compressor station under the RXP (Docket No. CP15-539-000).

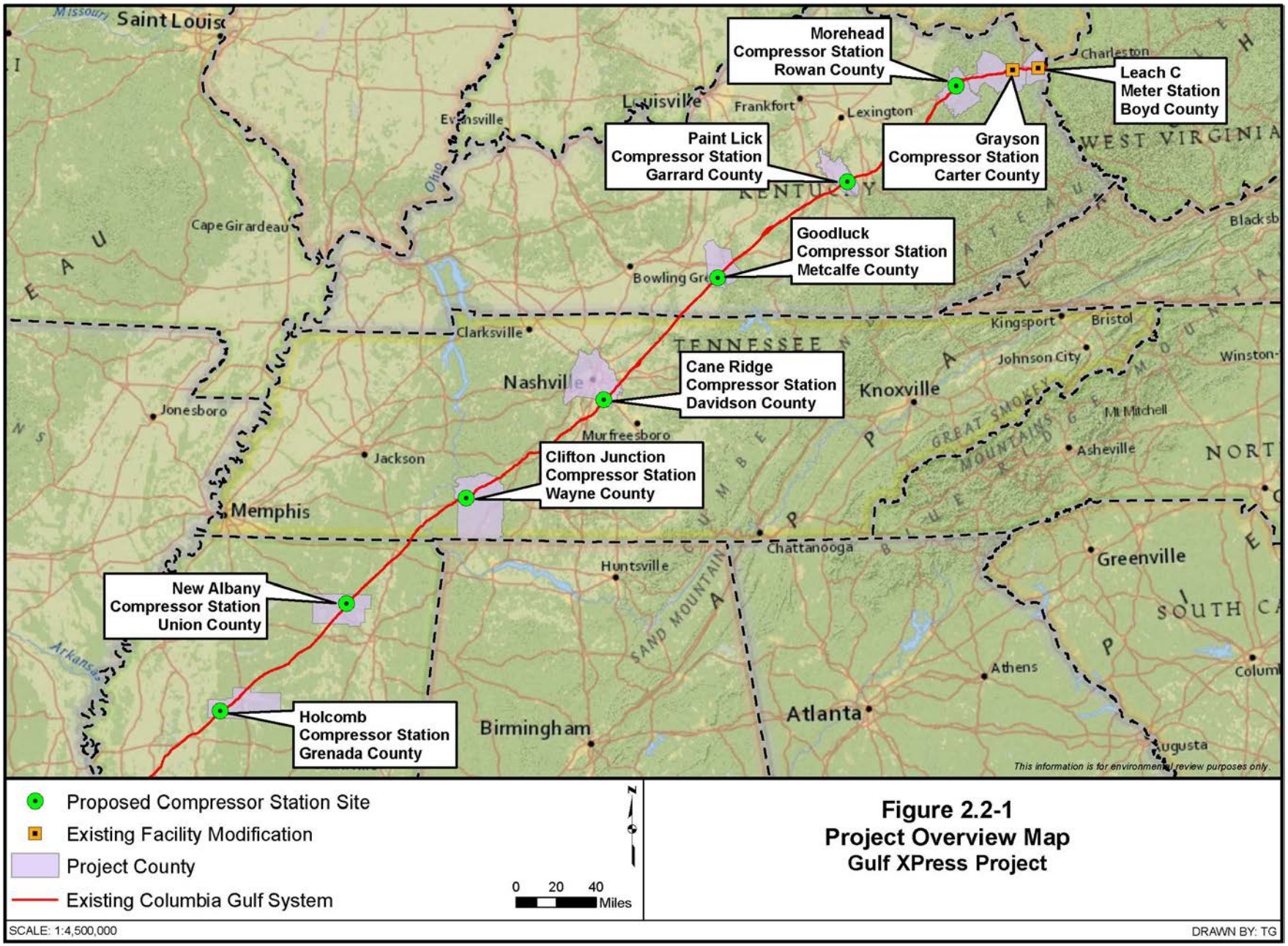


Figure 2.2-1
Project Overview Map
Gulf XPress Project

2.2.1 Aboveground Facilities

2.2.1.1 New Compressor Stations

Morehead Compressor Station: This new 44,800-hp station would be constructed on property owned by Columbia Gulf in Rowan County, Kentucky. The Morehead Compressor Station would include two Solar Turbines Titan 130E natural gas-fired turbine-driven compressors housed in one compressor building, filter/separators, gas cooling bays, and suction and discharge piping. The station would have bidirectional capabilities to compress gas north or south on Columbia Gulf's existing Mainline 200 and 300, and flow gas into the existing Mainline 100. All facilities would be fenced. A new paved permanent access road would extend 104 feet from Kentucky State Highway 377 (Cranston Road) to the fenced facility.

Paint Lick Compressor Station: This new 41,000-hp station would be constructed on property owned by Columbia Gulf in Garrard County, Kentucky. The Paint Lick Compressor Station would include two Solar Turbines Titan 130 natural gas-fired turbine-driven compressors housed in one compressor building, filter/separators, gas cooling bays, and suction and discharge piping. The station would have bidirectional capabilities to compress gas north and south on Lines 200 and 300 and flow gas into Line 100. All facilities would be fenced. A new paved permanent access road would extend 1,126 feet from Richmond Road to the fenced facility.

Goodluck Compressor Station: This new 31,800-hp compressor station would be constructed on property owned by Columbia Gulf in Metcalfe County, Kentucky. The Goodluck Compressor Station would include two Solar Turbines Mars 100 natural gas-fired turbine-driven compressors housed in one compressor building, filter/separators, gas cooling bays, and suction and discharge piping. The suction and discharge piping would extend roughly 350 feet west from the compressor station area, across property owned by Columbia Gulf, to tie into Columbia Gulf's existing system (Lines 100, 200, and 300). The station would compress gas south on Lines 200 and 300 and flow gas into Line 100. All facilities would be fenced. A new paved permanent access road would extend 183 feet from Earl Shives Road to the new fenced facility.

Cane Ridge Compressor Station: This new 41,000-hp compressor station would be constructed on property owned by Columbia Gulf in Davidson County, Tennessee. The Cane Ridge Compressor Station would include two Solar Turbines Titan 130 natural gas-fired turbine-driven compressors housed in one compressor building, filter/separators, gas cooling bays, and suction and discharge piping. The suction and discharge piping would extend roughly 870 feet southeast from the compressor station area, across property owned by Columbia Gulf, to tie into Columbia Gulf's existing system. Due to the length of the suction and discharge piping, an approximately 16-foot-wide by 700-foot-long permanent asphalt access road would parallel the suction and discharge piping to provide access to the mainline valve (MLV) pad located within the permanent easement for Columbia Gulf's existing system. The station would compress gas south on Lines 200 and 300 and flow gas into Line 100. All facilities would be fenced. A new paved permanent access road would extend for 192 feet from Barnes Road to the fenced facility.

Clifton Junction Compressor Station: This new 31,800-hp station would be constructed on property owned by Columbia Gulf in Wayne County, Tennessee. The Clifton Junction Compressor Station would include two Solar Turbines Mars 100 natural gas-fired turbine-driven

compressors housed in one compressor building, filter/separators, gas cooling bays, and suction and discharge piping. The suction and discharge piping would extend roughly 620 feet east and north from the compressor station area, across property owned by Columbia Gulf, to tie-into Columbia Gulf's existing system. The station would compress gas south on Lines 200 and 300 and flow gas into Line 100. All facilities would be fenced. A new paved permanent access road would extend 2,096 feet from U.S. Route 64 to the fenced facility.

New Albany Compressor Station: This new 31,800-hp station would be constructed on property owned by Columbia Gulf in Union County, Mississippi. The New Albany Compressor Station would include two Solar Turbines Mars 100 natural gas-fired turbine-driven compressors, filter/separators, gas cooling bays, and suction and discharge piping. The station would compress gas south on Lines 200 and 300 and flow gas into Line 100. All facilities would be fenced. A new paved permanent access road would extend for 64 feet from County Road 137 to the fenced facility.

Holcomb Compressor Station: This new 31,800-hp station would be constructed on property owned by Columbia Gulf in Grenada County, Mississippi. The Holcomb Compressor Station would include two Solar Turbines Mars 100 natural gas-fired turbine-driven compressors, filter/separators, gas cooling bays, and suction and discharge piping. The station would compress gas south on Lines 200 and 300 and flow gas into Line 100. All facilities would be fenced. A new paved permanent access road would extend 463 feet from Ferguson Road to the fenced facility.

At each new compressor station, Columbia Gulf would install two new 30-inch MLVs on Lines 100 and 200, and one new 36-inch MLV on Line 300. The MLVs would be located inside the fenced boundary of each compressor station site.

2.2.1.2 Modifications to Existing Aboveground Facilities

Grayson Compressor Station: Columbia Gulf proposes to add a 15,900-hp compressor to the recently approved 36,400-hp Grayson Compressor Station in Carter County, Kentucky, as part of Columbia Gulf's RXP. The upgrade would include one Solar Turbines Mars 100 natural gas-fired turbine-driven compressor and associated piping within the existing compressor building. A majority of the workspace would be within the fenceline of the existing facility; however, Columbia Gulf proposes to use some temporary workspace (TWS) outside the facility fenceline on land owned by Columbia Gulf that would be disturbed during the initial construction of the station. The facility would be accessed via an access road associated with the RXP that would extend from Beckwith Branch Road.

Leach C Meter Station: Columbia Gulf proposes to upgrade flow control capabilities at the existing Leach C Meter Station in Boyd County, Kentucky to accommodate an increase in capacity on Line 300. The existing flow control building would be demolished and replaced with a new flow control building. Piping and instrumentation upgrades would occur as necessary within the existing facility fenceline. TWS would be required outside the existing facility fenceline. The site is accessed via an existing access road that extends 420 feet to Bethel Lane, which connects to Dog Fork Laurel Road.

2.3 LAND REQUIREMENTS

2.3.1 Mountaineer XPress Project

Construction of the MXP would require disturbance within existing facilities, existing permanent rights-of-way, TWS, ATWS, pipe yards, staging areas, and temporary access roads. New permanent rights-of-way and access roads would be required for the pipelines and new aboveground facilities. All of these areas are collectively referred to as the construction work area. Land requirements for construction and operation of the MXP are summarized in table 2.3-1. Construction activities would require about 3,590 total acres. Of the temporary construction acreage, operational activities would retain about 1,075 acres, including 3.3 acres of existing rights-of-way, 1,027 acres of proposed new permanent pipeline rights-of-way, 32 acres within existing fenced facilities (including the Lone Oak, Ceredo, and Elk River Compressor Stations associated with the LXP and the WBX, respectively), and 41 acres of new proposed aboveground facilities (including permanent facility access roads) that would be retained for operational activities. Approximately 2,515 acres of TWS, ATWS, staging areas, and access roads would be used temporarily during construction and would revert to preconstruction conditions and use. Appendix F identifies access roads for the MXP. The MLVs would be sited within the 50-foot-wide permanent pipeline easement as much as possible; however, several MLVs would require a permanent footprint that would extend slightly beyond the 50-foot-wide permanent pipeline easement (discussed further in section 2.3.1.2).

The temporary access roads would be either newly constructed, existing roads requiring improvements, or existing roads used in their present condition. Improvements may include widening, grading, addition of gravel, replacement/installation of culverts with crushed-stone fill, and removal of overhanging vegetation. Overall, the MXP would require 283 access roads; 56 new roads (41 during construction, 15 for permanent use), 195 existing roads requiring modification (189 during construction, 7 for permanent use), and 32 existing roads used as-is. New road construction would total about 5.5 miles, primarily the result of temporary access along the MXP-100. Columbia Gas would minimize impacts by installing and maintaining erosion control devices and removing mud from paved road surfaces.

Table 2.3-1
Land Requirements for the Mountaineer XPress Project a/

Project Facility	Land Affected During Construction (acres)	Land Affected During Operation (acres)
New Pipeline Facilities		
Pipeline Right-of-Way		
MXP-100 b/	2,460.3	996.8
MXP-200 c/	60.3 d/	30.5 d/
X59M1 Line e/	0.0 e/	0.0 e/
Pipeline Right-of-Way Subtotal	2,520.6	1,027.3
Additional Temporary Workspace		
MXP-100	188.0	0.0
MXP-200	2.9	0.0
ATWS Subtotal	190.9	0.0

Table 2.3-1
Land Requirements for the Mountaineer XPress Project a/

Project Facility	Land Affected During Construction (acres)	Land Affected During Operation (acres)
Access Roads		
MXP-100 Existing Private Roads with Upgrades	212.0	1.3
MXP-100 Existing Private Roads No Upgrades	22.4	0.0
MXP-100 New Private Roads to be Constructed	11.1	0.1
MXP-200 Existing Private Roads with Upgrades	23.2	0.0
MXP-200 Existing Private Roads No Upgrades	2.4	0.0
MXP-200 New Private Roads to be Constructed	0.7	0.0
Access Roads Subtotal	271.8	1.4
Contractor/Pipe Yards and Staging Areas		
Spread 1 (MP 0.0 to MP 18.3)	50.7	0.0
Spread 2 (MP 18.3 to MP 38.2)	46.0	0.0
Spread 3 (MP 38.2 to 51.6 and MXP-200)	45.3	0.0
Spread 4 (MP 51.6 to MP 73.8)	103.0	0.0
Spread 5 (MP 73.8 to MP 94.1)	36.0	0.0
Spread 6a (MP 94.1 to MP 113.2)	25.1	0.0
Spread 6b (MP 113.2 to MP 124.4)	35.1	0.0
Spread 7 (MP 124.4 to MP 147.4)	61.3	0.0
Spread 8 (MP 147.4 to MP 164.3)	68.3	0.0
Contractor/Pipe Yards and Staging Areas Subtotal	470.7	0.0
Replacement Pipeline Facilities f/		
Pipeline Right-of-Way		
SM80 Line	2.8	1.9 **g/**
SM80 Loop Line	2.3	1.4 **g/**
Replacement Pipeline Right-of-Way Subtotal	5.1	3.3 **g/**
Additional Temporary Workspace		
SM80 Line	1.1	0.0
SM80 Loop Line	0.8	0.0
ATWS Subtotal	1.9	0.0
Access Roads		
SM80 Existing Private Road with Upgrades	0.3	0.3
SM80 Existing Private Road No Upgrades	0.0	0.0
SM80 New Roads to be Constructed	0.0	0.0
SM80 Loop Existing Private Road with Upgrades	1.8	1.8
SM80 Loop Existing Private Road No Upgrades	0.0	0.0
SM80 Loop New Roads to be Constructed	0.3	0.0
Access Roads Subtotal	2.8	2.1
Total for All Pipeline Facilities	**3,463.3**	**1,034.1**
New Aboveground Facilities h/, i/		
Compressor Stations (including new permanent access roads at facility)		
Sherwood Compressor and Regulator Station	29.7	11.8

Table 2.3-1
Land Requirements for the Mountaineer XPress Project a/

Project Facility	Land Affected During Construction (acres)	Land Affected During Operation (acres)
White Oak Compressor Station	16.6	8.7
Mount Olive Compressor Station	31.3	9.2
New Compressor Stations Subtotal	77.7	29.7
Mainline Valves (MLV) h/		
MLV-1	1.5	1.6
MLV-2	0.2	0.3
MLV-3	<0.1	0.2
MLV-4	0.0	0.1
MLV-5	0.0	0.2
MLV-6	0.1	0.1
MLV-7	0.0	0.1
MLV-8	0.0	0.1
MLV-9	<0.1	0.1
MLV-10	0.2	0.4
MLV Subtotal	2.1	3.1
Delivery/Receipt Points i/		
MXP-100 Tie-in with LEX pipeline	2.8	0.3
MXP-200 Tie-in with Line 1983	0.7	0.4
Ripley Regulator Station	0.7	0.7
Saunders Creek Regulator Station	10.7	7.0
Delivery/Receipt Points Subtotal	15.0	8.4
Additional Temporary Workspace		
Ripley Regulator Station	0.1	0.0
ATWS Subtotal	0.1	0.0
Existing Aboveground Facilities		
Lone Oak Compressor Station	10.3	0.0
Ceredo Compressor Station	14.3	0.0
Elk River Compressor Station	7.4	0.0
Existing Aboveground Facilities Subtotal	32.0	0.0
Total Aboveground Facilities	**126.9**	**41.2**
TOTAL PROJECT LAND AFFECTED	**3,590.2**	**1,075.3**

a The numbers in this table have been rounded for presentation purposes. Thus, the totals may not reflect the exact sum of the addends in all cases.

b Based on a typical 125-foot-wide construction right-of-way in uplands and a 75-foot-wide right-of-way in wetlands. Operation acreage is based on a 50-foot-wide permanently maintained right-of-way in uplands, a 30-foot-wide permanently maintained right-of-way in forested wetlands, and a 10-foot-wide permanently maintained right-of-way in non-forested wetlands. Acreage includes lands affected during construction and operation of cathodic protection systems.

c Based on a typical 100-foot-wide construction right-of-way in uplands and a 75-foot-wide right-of-way in wetlands. Operation acreage is based on a 50-foot-wide permanently maintained right-of-way in uplands, a 30-foot-wide permanently maintained right-of-way in forested wetlands, and a 10-foot-wide permanently maintained right-of-way in non-forested wetlands. Acreage includes lands affected during construction and operation of cathodic protection systems. Maintenance of permanent rights-of way would be in accordance with the Plan and Procedures.

d Temporary and permanent workspace acreages in areas where the three pipelines share a 155-foot-wide temporary workspace (MXP-100 in to station, MXP-100 out of station, and the MXP-200 pipelines) would be co-located have been included in acreages listed for the MXP-100 pipeline.

Table 2.3-1
Land Requirements for the Mountaineer XPress Project a/

Project Facility	Land Affected During Construction (acres)	Land Affected During Operation (acres)

e The X59M1 Line at the Ripley Regulator Station would be installed within the permanent easement for the MXP-100 pipeline; and it would not require additional temporary work area of permanent easement.

f Pipeline replacement facilities would require a 75-foot-wide construction right-of-way that would include the existing 50-foot-wide permanent easement. The existing permanent easement would remain 50 feet wide.

g Acreage listed for operation following replacement of short segments of the SM80 Line and SM80 Loop Line would remain within the respective pipeline's existing permanent easements.

h Each fenced valve site would be constructed within the 125-foot-wide construction right-of-way and operated within the 50-foot-wide permanent easement. Acreages associated with permanent access roads for mainline valves have been included in the 'Land Affected During Operations' acreages column. Access roads and gravel parking areas may extend outside of the permanent easement.

i Acreages identified as 'Land Affected During Construction' are associated with facility access roads where the road extends outside of the pipeline construction right-of-way. Acreages within the pipeline construction right-of-way have been accounted for in the associated pipeline acreage. This additional acreage has been included in the 'Land Affected During Operations' for each valve, where applicable.

j The tie-in locations would be constructed and operated within the area associated with the temporary and permanent pipeline right-of-way or Columbia Gas acquired property.

2.3.1.1 Pipeline Right-of-Way

MXP-100: Columbia Gas would utilize a 125-foot-wide temporary right-of-way for construction of the 36-inch-diameter pipeline in non-agricultural uplands. The construction right-of-way would consist of a 50-foot-wide spoil side and a 75-foot-wide working side, except where site conditions require specific workspace configurations that differ. A 125-foot-wide construction workspace was proposed by Columbia Gas due to the space required for topsoil segregation, spoil storage, and the establishment of safe travel lanes through mountainous terrain, which is characteristic of the majority of the proposed route. Columbia Gas would use an additional 25 feet of ATWS in certain areas within residential and agricultural upland areas, as identified on project alignments, for full-width topsoil segregation. In wetlands, Columbia Gas would reduce the construction right-of-way width to 75 feet, with 25 feet on the spoil side and 50 feet on the working side.

In most areas, Columbia Gas would retain a 50-foot-wide permanent easement centered on the pipeline following completion of construction for operation of the pipeline. Columbia Gas would maintain the pipeline rights-of way in accordance with its ECS, which is consistent with FERC's *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures).[17]

In the location where Columbia Gas intends to install three pipelines at the Sherwood Compressor Station (the MXP-100 entering the station, the MXP-100 leaving the station, and the MXP-200 leaving the station), a 155-foot-wide temporary construction workspace would

[17] The FERC Plan and Procedures are documents that comprise the best management practice standards for pipeline construction. FERC's Plan can be viewed online at https://www.ferc.gov/industries/gas/enviro/plan.pdf. FERC's Procedures can be viewed online at https://www.ferc.gov/industries/gas/enviro/procedures.pdf.

accommodate the installation of all three pipelines. The permanent easement in this area would be 80 feet wide to include all three pipelines spaced approximately 15 feet apart.

Typical right-of-way configuration diagrams for the proposed MXP are provided in appendix C.

MXP-200: Columbia Gas proposes to use a 100-foot-wide temporary right-of-way with a 35-foot-wide spoil side and a 65-foot-wide working side for construction of the 24-inch-diameter pipeline. In areas where full width topsoil segregation is required, Columbia Gas would use an additional 25 feet of temporary construction workspace width to provide sufficient space to store topsoil. Columbia Gas would reduce the construction right-of-way to 75 feet wide in wetlands, with 25 feet on the spoil side and 50 feet on the working side. Following construction in uplands, a 50-foot-wide permanent easement would be maintained for operation of the pipeline. Columbia Gas would maintain the pipeline rights-of way in accordance with FERC's Plan and Procedures.

SM80 Line and SM80 Loop Line: Pipeline replacement facilities would require a 75-foot-wide construction right-of-way that would include the existing 50-foot-wide permanent easement. The existing permanent easement would remain 50 feet wide after replacement is complete and the pipelines are operational.

Additional Temporary Workspace: Columbia Gas would require ATWS at select areas along the pipeline route based on site-specific conditions that warrant the use of additional space to construct the pipeline in a safe manner. These site-specific conditions include: road crossings, steep slopes, existing utility line crossings, HDD locations, truck turnaround areas, full right-of-way topsoil segregation areas, wetland and waterbody crossings, and at the beginning and ending of construction spreads[18] to allow for mobilization of construction equipment. Except where topographic or other factors limit the workspace, where adjacent uplands consist of actively cultivated or rotated cropland, or where otherwise specifically approved by FERC, ATWS would be set back at least 50 feet from the edge of waterbodies and wetlands. A discussion of Columbia Gas' request for ATWS within 50 feet from the edge of waterbodies and wetlands is provided in section 2.4. Although Columbia Gas has identified areas where extra workspace would be required, additional or alternative areas could be identified in the future due to changes in site-specific construction requirements. Columbia Gas would be required to file information on each of those areas for review and approval prior to use.

2.3.1.2 Aboveground Facilities

The MXP aboveground facilities would include modifications at one existing compressor station, as well as one approved compressor station and one pending compressor station proposed for construction under separate proceedings. It also would include construction of three new compressor stations. In addition, Columbia Gas proposes to construct three regulator stations and other appurtenant facilities. Construction and operational land requirements for the aboveground

[18] A "spread" is an individual segment of the overall project staffed by its own labor and equipment. The MXP would consist of nine construction spreads.

facilities are provided in table 2.3-1. Following construction, each station would be fenced and graveled for operation.

New compressor stations would be constructed on land purchased by Columbia Gas. Columbia Gas would maintain the property, and all facility components would be operated and maintained within the station fenceline. The TWS not permanently maintained for operation would be restored in accordance with Columbia Gas' Environmental Construction Standards (ECS), which we have reviewed and found to be generally consistent with FERC's Plan and Procedures; however, we've made recommendations for Columbia Gas to modify in accordance with the 2013 version of FERC's Plan. Columbia Gas' ECS is available in appendix D-1.

Columbia Gas would construct all of the MLVs within the pipeline construction right-of-way with the exception of MLVs 3, 8, and 10. At these sites, Columbia Gas would require slightly larger TWS to accommodate parking, construction of permanent access, and MLV fabrication. Following construction, an approximately 30-foot by 40-foot area would be fenced, graveled, and maintained within the permanent pipeline easement for each MLV site. With the exception of new access roads to each MLV site, no additional land beyond Columbia Gas' permanent right-of-way would be affected by operation of the MLVs.

2.3.1.3 Contractor Yards, Pipe Storage, and Staging Areas

Columbia Gas would need temporary pipe storage and contractor yards for office trailers, parking, vehicle maintenance, and storage of materials and equipment. Land requirements for contractor yards and staging areas proposed for temporary use during construction are provided in table 2.3-1. Columbia Gas selected sites with level terrain in mostly cleared areas to limit the need for clearing, grading, and filling at each site. Following construction, yards and staging areas would be restored to pre-construction conditions and uses unless otherwise specified by the landowners.

2.3.1.4 Access Roads

To the extent feasible, Columbia Gas proposes to use existing public and private road crossings along the proposed MXP route as the primary means of accessing pipeline rights-of-way and aboveground facilities. Columbia Gas selected existing access roads that would limit congestion of construction vehicles and equipment on the right-of-way; congestion could increase the duration of construction, create unsafe conditions for workers, and potentially disrupt public use of the roads. Improvements to public and private access roads include grading, placement of gravel for stability, replacing or installing culverts, minor widening, and clearing of overhead vegetation to safely accommodate construction equipment and vehicles.

In addition to the access available via public roads, some new roads would be required to facilitate construction in remote areas, as well as to access new aboveground facilities (i.e., compressor and regulator stations, MLVs, and pig launcher/receiver assemblies) during operation. Acreages for access roads are provided in table 2.3-1. Modifications or improvements to public roads would conform to the State of West Virginia's design standards or county agency standards.

2.3.2 Gulf XPress Project

The GXP would result in new temporary and permanent impacts at each of the new compressor station sites. At the approved Grayson Compressor Station, no additional land would be permanently required beyond that used to construct the facility; however, new temporary impacts would occur outside of the current fenceline at the existing Leach C Meter Station to accommodate storage, vehicles, equipment, and construction. No contractor yards would be required for the construction of the additional facilities at the Grayson or Leach C stations. A breakdown of total land requirements for construction and operation of the GXP are summarized in table 2.3-2.

Columbia Gulf would use about 198 acres of TWS for the construction activities associated with all of the GXP aboveground facilities, and about 82 acres would be permanently maintained for operations (see table 2.3-2).

Columbia Gulf proposes to construct new permanent access roads that would extend from the nearest public road to the newly fenced facilities. For existing facilities, Columbia Gulf would use the existing access roads for construction and operation. The acreages for construction of access roads were included in the construction acreages for each facility. Table 2.3-2 provides the acreages for each access road by facility.

New compressor stations would be constructed on land purchased by Columbia Gulf. Columbia Gulf would maintain the property, and all facility components would be operated and maintained within the station fenceline. The TWS not permanently maintained for operation would be restored in accordance with Columbia Gulf's ECS, which we have reviewed and found to be generally consistent with FERC's Plan and Procedures; however, we've made recommendations for Columbia Gulf to modify in accordance with the 2013 version of FERC's Plan. Columbia Gulf's ECS is available in appendix D-2.

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

Table 2.3-2
Land Requirements for the Gulf XPress Project a/

Project Facility	Land Affected During Construction (acres)	Land Affected During Operation (acres)
Kentucky		
Morehead Compressor Station	17.2	11.2
Access Road **b/**	--	0.1
Paint Lick Compressor Station	30.2	9.6
Access Road **b/**	--	0.5
Goodluck Compressor Station	25.7	13.9
Access Road **b/**	--	0.1
Grayson Compressor Station (existing)	11.9	0.0
Access Road **b/**	--	0.0

Table 2.3-2
Land Requirements for the Gulf XPress Project a/

Project Facility	Land Affected During Construction (acres)	Land Affected During Operation (acres)
Leach C Meter Station (existing)	1.4	0.0
Access Road b/	0.1	0.0
Tennessee		
Cane Ridge Compressor Station	23.0	10.3
Access Road b/	--	0.1
Clifton Junction Compressor Station	29.0	15.1
Access Road b/	--	1.0
Mississippi		
New Albany Compressor Station	26.4	10.3
Access Road b/	--	<0.1
Holcomb Compressor Station	33.3	9.0
Access Road b/	--	0.2
Project Totals		
Compressor and Meter Stations	198.0	79.4
Access Roads b/	0.1	2.2
TOTAL PROJECT LAND AFFECTED	**198.1**	**81.6**

a The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the exact sum of the addends in all cases.

b Temporary impacts associated with access roads are included within the "land affected during construction" of each new facility workspace. The impact number associated with permanent access road acreages represents only the portion of the access road that is located outside of the fenced stations.

2.4 CONSTRUCTION PROCEDURES

The projects would be designed, constructed, tested, and operated in accordance with all applicable requirements included in the U.S. Department of Transportation (USDOT) regulations in 49 CFR 192, *Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards*, and other applicable federal and state regulations, including the U.S. Department of Labor's Occupational Safety and Health Administration requirements. These regulations are intended to ensure adequate protection for the public. Among other design standards, part 192 specifies pipeline material and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion.

To reduce construction impacts, Columbia Gas and Columbia Gulf would each implement their respective ECS document for their projects. Each ECS is the Companies' comprehensive environmental manual; it provides the minimum requirements that must be followed by all personnel working on the Companies' projects. The ECSs provide personnel and contractors with instructional information to conduct work in a safe manner while limiting impacts on streams and wetland ecosystems, wildlife habitat, agricultural land, cultural resources, and the human environment. Columbia Gas' ECS was developed specifically for projects in West Virginia, and Columbia Gulf's ECS was developed specifically for the GXP and the areas where disturbances would occur. Each of the ECSs adopts and incorporates the requirements of FERC's Plan and

Procedures. Additionally, the MXP ECS also adopts West Virginia-specific environmental standards established in the West Virginia *Erosion and Sediment Control Best Management Practice Manual*. Elements of the Companies' ECSs also include: construction and restoration specifications; noise impact mitigation and dust control; hydrostatic testing requirements; spill prevention, containment and control measures; environmental construction management and inspection practices; environmental training standards; and winter construction procedures. The following sections outline the general procedures proposed by the Companies for construction of their respective facilities. We have reviewed the respective ECS' and find them acceptable.

While each of the ECSs adopt and incorporate FERC's Plan and Procedures, both of the Companies have requested modifications to certain requirements. The Procedures require that prior to construction, the following information be filed with the Secretary of the Commission (Secretary) for review and written approval:

- site-specific justifications for extra work areas that would be closer than 50 feet from a waterbody or wetland (section II.A.1); and
- site-specific justifications for the use of a construction right-of-way greater than 75 feet wide in wetlands (section II.A.2).

The Procedures also require:

- where pipelines parallel a waterbody, at least 15 feet of undisturbed vegetation must be maintained between the construction right-of-way and the waterbody (and any adjacent wetland), except where maintaining this offset will result in greater environmental impact (section V.B.3.c).

Columbia Gas has submitted site-specific justifications for deviating from each of these three requirements at numerous locations (although at only one location ATWS would be needed within a wetland). Given the terrain crossed by the proposed right-of-way, it is likely that the MXP would need this flexibility. Columbia Gulf's requested modification involved siting temporary work areas within 50 feet of a wetland or waterbody and included site-specific justifications. The locations where these modifications would be located for the MXP and GXP are identified in appendices E-1 and E-2, respectively. We have reviewed the requests and find that site-specific conditions at each location support the Companies' requests.

2.4.1 General Pipeline Construction Procedures

Columbia Gas' primary pipeline construction technique for the MXP in upland areas would be standard, sequential-assembly-line installation (described below). Columbia Gas would have nine of these assembly lines or "spreads" that would each be simultaneously completing construction activities at different locations along the route. The Companies' construction at the compressor station sites would entail standard site and industrial-development-type activities.

Specialized construction methods, such as two-tone cut-and-fill methods used on steep side-slopes, HDD and Direct Pipe® methods used to cross under sensitive resources, residential-specific methods, and procedures for crossing waterbodies and wetlands would also be employed, as appropriate. These specialized construction methods are described in section 2.4.4.

2.4.1.1 Survey and Staking

After land or easement acquisitions have been finalized and before the start of construction, crews would mark the limits of the approved work areas (i.e., the construction right-of-way boundaries and extra workspace, the pipeline centerline, and approved access roads). Property owners would be notified prior to surveying and staking activities. Wetland boundaries and other environmentally sensitive areas identified in easement agreements or by federal and state agencies would be clearly marked with visible signage and fenced with erosion control devices for protection. Each project-specific ECS assigns duties to the Companies' Environmental Inspectors (EI) including "verifying the location of signs and highly visible flagging marking the boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along the construction work area." Orange safety fencing would also be installed to identify wetlands, if required by USACE permitting requirements.

2.4.1.2 Clearing Operations

Clearing would be performed to remove trees, brush, and other existing vegetation from approved work areas. This would occur through the use of a mechanical harvester. Hand cutting with chain saws may also be used in specific areas as needed, such as between HDD entry and exit sites. Timber would be removed from the right-of-way and sold for lumber or pulp if suitable, disposed of at an appropriate receiving facility, or chipped on the right-of-way. Cleared vegetation would not be disposed of by burning. The transportation of any wood materials would comply with the state regulations intended to prevent the spread of invasive species. Methods to control the spread of invasive species are discussed further in section 4.5.5. Timber may also be cut and stacked at the edge of the right-of-way in an accessible area, if requested by the landowner. Wood chips would not be placed in agricultural areas, wetlands, or waterbodies. Timber would not be left in piles or stacks on the right-of-way.

In uplands, tree stumps and rootstock would be removed from the entire width of the permanent right-of-way. Additional stump pulling would be conducted in upland extra workspaces if deemed necessary for safety reasons. In wetlands, the pulling of stumps would be limited to the trench line and other areas where deemed necessary for safety reasons (see section 2.4.4.1 for a description of stump removal in wetlands). Elsewhere in wetlands, stumps and rootstock would be left intact to promote revegetation following construction. Excavated stumps would be removed from the right-of-way for disposal at approved locations or made available to landowners upon request.

Shortly after clearing and before beginning grading activities, crews would install erosion control devices at the locations outlined in the ECS. The ECS also include specifications for the installation and maintenance of temporary erosion controls such as silt fence, straw bales, temporary slope breakers (interceptor dikes); as well as permanent erosion controls such as permanent trench plugs, slope breakers, restoration methods, and revegetation measures. The EI would be responsible for verifying that the erosion controls are installed correctly, inspected, and maintained in accordance with the ECS.

2.4.1.3 Grading

Grading of the construction right-of-way would be scheduled to limit the amount of time between clearing and the installation of the pipeline. Where necessary, the entire width of the construction right-of-way, including the temporary construction workspace, would be rough graded with bulldozers to allow for safe passage of equipment and to prepare the work surface for pipeline installation activities. Backhoes may be used in conjunction with bulldozers in areas where tree stumps, rock outcrops, and uneven topographic features need to be removed. A travel lane would be utilized to allow for the passage of daily traffic.

Topsoil stripping would occur in agricultural and residential lands, and in other areas as requested by landowners. Up to 12 inches of topsoil would be removed and kept segregated from subsoil until replacement. Topsoil would be stripped from the full right-of-way in agricultural lands.

2.4.1.4 Trenching

The trench would be excavated with a backhoe or track-mounted excavator to provide at least the minimum cover as required by 49 CFR 192. Typically, the trench would be sufficiently deep to provide for a minimum of 3 feet of cover over the pipeline. In areas with consolidated rock, the minimum amount of cover would be 24 inches. In certain areas, such as at crossings of foreign pipelines and utilities, deeper burial would be required resulting in an increased trench depth. Where HDD and/or Direct Pipe methods are used, the pipeline would be installed deep below the ground surface.

In areas where the MXP crosses underground utilities, the construction contractors would contact the "Call Before You Dig" or "One Call" system, or state or local utility operators, to verify and mark all underground utilities (e.g., cables, conduits, and pipelines) along the pipeline route to limit the potential for accidental damage during construction. In areas where the location is not apparent, utility lines would be located by field instrumentation and test pits. The proposed route has been designed to avoid existing utility lines to the extent possible. However, relocation of utilities may be necessary in some circumstances. All required utility relocations would be coordinated with the appropriate utility owner.

Spoil material excavated from the trench would be temporarily piled to one side of the right-of-way, adjacent to the trench. Columbia Gas would avoid the mixing of topsoil and subsoil in compliance with its ECS and FERC's Plan. Where trench dewatering is needed, water would be discharged off the right-of-way into a well-vegetated upland area and/or into an approved filter. Columbia Gas developed an Unanticipated Discovery Plan (UDP), which would be implemented should features such as cultural resources or human remains be discovered during trenching or construction. We find this plan acceptable (see section 4.10.3).

2.4.1.5 Shallow Bedrock and Blasting

The MXP would cross numerous areas of shallow bedrock distributed along portions of the route, as discussed in detail in section 4.1.4.9.1. Where bedrock is encountered along the pipeline route, it would be broken up and removed using one of the following methods. Where practicable, conventional, non-explosive methods would be used, including ripping or hammering

the rock with a pointed backhoe attachment before excavating it with a backhoe. If rock cannot be removed by these techniques, blasting may be required to fracture the rock prior to its removal. Blasting would be performed under strictly controlled conditions designed to prevent damage to people and property (such as homes and wells). Columbia Gas would offer both pre- and post-construction testing of water quality and quantity in wells and mitigate any damages caused by construction on wells within 150 feet of the construction right-of-way. Minimum charges needed to perform the blasting would be used. Heavy mats are also typically used to prevent the scattering of debris, and blast monitoring would be conducted. Columbia Gas has developed a Blasting Plan to address potential issues and impacts related to blasting (see section 4.1.4.9). We have reviewed this plan and find it acceptable.

During restoration, rock would be returned to a level no higher than the existing rock profile. In agricultural areas, rock would not be used for backfill closer than 24 inches in mesic soil or 30 inches in frigid soils from the construction surface of the right-of-way, and any excess would be disposed of at a landfill or recycling facility or used for other approved purposes within the right-of-way as allowed by the landowner and applicable permits.

2.4.1.6 Pipe Stringing, Bending, and Welding

Once the trench is excavated, the next process in conventional pipeline construction is stringing the pipe along the trench. Stringing involves initially hauling the pipe by tractor-trailer, generally in 40-foot lengths (joints), from a contractor yard or staging area onto the right-of-way. The pipe would be off-loaded from trucks and placed next to the trench using a sideboom tractor. Typically, several pipe joints are lined up end-to-end, or "strung," to allow for welding into continuous lengths known as strings. Individual joints would be placed on temporary supports or wooden skids and staggered to allow room for work on the exposed ends.

Bending of the pipe onsite would be required to enable the pipeline to follow the natural grade and direction changes of the right-of-way. Selected joints would be bent by track-mounted hydraulic bending machines as necessary prior to line-up and welding. Manufacturer supplied induction bends and pre-fabricated elbow fittings may be used in certain circumstances as needed. Following stringing and bending, the individual joints of pipe would be aligned and welded together. All welding would be performed according to applicable American National Standards Institute, American Society of Mechanical Engineers, and American Petroleum Institute standards as well as the Companies' specifications. Only welders qualified to meet the standards of these organizations would be used during construction.

Every completed weld would be examined by a welding inspector to determine its quality using radiographic or other approved methods as outlined in 49 CFR 192. Radiographic examination is a non-destructive method of inspecting the inner structure of welds and determining the presence of defects. Welds that do not meet the regulatory standards and the Companies' established specifications would be repaired or removed. After a weld is approved, the joint would be cleaned and epoxy coated. The coating on the remainder of the completed pipe section would be inspected and any damaged areas repaired.

Special tie-in crews would be used at some locations, such as at waterbody and road crossings, changes in topography, and other selected locations as needed. A tie-in is typically a

relatively small segment of pipeline specifically used to cross certain features as needed. Once the pipeline segment is installed across the feature, the segment is then welded to the rest of the pipeline.

2.4.1.7 Lowering-in and Backfilling

Before the pipeline is lowered-in, the trench would be inspected to verify that it is free of rocks and other debris that could damage the pipe or protective coating. Typically, any water that is present in the trench would be removed and pumped to a vegetated upland area through an approved filter. After the pipe is lowered into the trench, final tie-in welds would be made and inspected, and then the trench would be backfilled. During backfill, the excavated subsoil would be replaced in the trench using bladed equipment or backhoes and would surround the pipe along the bottom, along both sides, and at the top. A padding machine would be used so rocks mixed with subsoil do not damage the pipe. If rock is excavated from the trench and subsequently used as backfill, it would not be allowed to extend above the soil horizon where it naturally is found. No topsoil would be used as padding material. Where there is not sufficient padding material onsite or when the native material that was excavated from the trench is not suitable backfill material (i.e., rocky), Columbia Gas would acquire subsoil from other approved sources as necessary. The top of the trench may be slightly crowned to compensate for settling.

2.4.1.8 Cleaning and Hydrostatic Testing

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

After cleaning, the pipe would be hydrostatically tested to verify that the system is capable of withstanding the operating pressure for which it was designed. Hydrostatic testing involves filling the pipeline with water and pressurizing the water in the pipeline for several hours to confirm the pipeline's integrity. The testing would be done in segments according to the Companies' requirements and the USDOT's specifications in 49 CFR 192.

Water for hydrostatic testing would be obtained from surface water and/or municipal sources located along the pipeline route and in accordance with state regulations and required permits. Additional information regarding sources used for hydrostatic testing is available in section 4.3.2.4. Test water would be reused as much as possible by transferring water from one test segment to another where practicable. Following testing, the water would be discharged in vegetated upland areas through a dewatering structure designed to slow the flow of water. All testing activities would be conducted within the parameters of the applicable water withdrawal and discharge permits.

Once the hydrostatic test water is discharged from the test segment, a "squeegee" pig would be pushed through the segment to remove as much remaining water as possible. This would be followed by air ventilation to further dry the interior of the pipe. Columbia Gas may use methanol to scavenge moisture from the pipeline following hydrostatic testing. Any remaining trace water would be collected and removed by the gas stream.

2.4.1.9 Cleanup and Restoration

The Companies would initiate cleanup and stabilization within 7 days of backfilling the trench, weather permitting. All work areas would be final graded and restored to pre-construction contours and natural drainage patterns. Permanent slope breakers or diversion berms would be constructed and maintained in accordance with the ECS as needed. Fences, sidewalks, driveways, and other structures would be restored or repaired as necessary. If seasonal or other weather conditions prevent compliance with these timeframes, temporary erosion controls would be maintained until conditions allow completion of final cleanup.

Restoration activities would be conducted in accordance with state and municipal permit requirements. Soils that supported vegetation prior to construction would be revegetated using seed mixes, application rates, and timing windows recommended by local soil conservation authorities or other duly authorized agencies (such as the Natural Resources Conservation Service [NRCS]), landowner requests, and in accordance with the ECS. The right-of-way would be seeded within 7 working days following final grading, weather and soil conditions permitting, unless otherwise directed by local soil conservation authorities. Additionally, monitoring of revegetation after construction would be conducted to evaluate and correct areas requiring remediation.

2.4.1.10 Cathodic Protection and Alternating Current Mitigation

Columbia Gas would install cathodic protection equipment along the pipelines to prevent the corrosion of metal surfaces over time. Cathodic protection equipment could consist of underground negative connection cables, linear anode cable systems, aboveground junction boxes, and rectifiers. An alternating current mitigation plan also may be developed for areas where the pipelines parallel adjacent power lines. The alternating current mitigation plan would be designed to verify safety and prevent corrosion facilitated by the presence of nearby high voltage power lines. Cathodic protection would include at least five ground beds on the MXP-100 and one on the MXP-200, to be installed in areas measuring 25 feet wide by 1,000 feet long and situated perpendicular to the permanent rights-of-way. The anticipated location of the cathodic protection equipment was identified on project alignments provided by Columbia Gas in its October 11, 2016, supplemental filing.

2.4.2 Pipeline Replacement Procedures

As part of the MXP, Columbia Gas would replace 0.4 mile of existing 30-inch-diameter natural gas pipeline on its SM80 and SM80 Loop pipelines (0.2-mile-long contiguous segments on each line). The existing pipe replacement is part of a Pipeline and Hazardous Materials Safety Administration (PHMSA) Special Permit (PHMSA-2008-0331, Special Permit Segment #1 and #2), dated April 13, 2010. For the replacement segments, Columbia Gas would segregate topsoil in accordance with the ECS and landowner requirements. The existing pipeline segments would be excavated to expose the pipe. Temporary bypass equipment would be installed to isolate the segments of the two pipelines to be removed and replaced. The lines would be replaced one segment at a time, with natural gas flow temporarily rerouted through the other line during the replacement process. The existing pipe segments would be cut out, capped, and hauled away for proper disposal. The coating of the removed segments of pipe would be tested for asbestos prior to disposal. If asbestos or polychlorinated biphenyls are detected, Columbia Gas would implement

special handling and disposal procedures in accordance with CPG procedures and applicable federal rules and regulations. New segments of pipe would be lowered into the excavation and tied into the existing pipelines. Once installed, the replacement pipes would be backfilled and the areas restored in accordance with Columbia Gas' ECS, permits, and applicable landowner agreements.

2.4.3 Aboveground Facility Construction Procedures

Both Columbia Gas and Columbia Gulf are proposing aboveground facilities as part of their projects. Columbia Gas would construct the aboveground facilities concurrently with pipeline installation using special fabrication crews that would generally work separately from the pipeline construction crews. Aboveground facilities would be constructed or modified in accordance with CPG's specifications and the USDOT requirements.

Columbia Gulf would construct the suction and discharge pipelines from the proposed compressor stations to the existing mainline pipelines using the same general pipeline construction procedures described in section 2.4.1.

Construction of compressor stations would proceed in a fashion similar to construction of any facility associated with utilities. Sites would be surveyed, cleared, and graded; foundations established; flooring, walls, and roofing added; compressors and related equipment installed; outside and inside piping connected; outside equipment tied-in; and site cleanup and fencing completed. All control equipment and safety systems would be tested.

The first step in construction of aboveground facilities would be to clear the sites of vegetation, grade the terrain as necessary to accommodate movement of construction vehicles, and prepare the area for building and equipment foundations. After clearing is completed, erosion and sediment controls would be installed to limit eroded soil from leaving the construction area.

For new compressor facilities, building construction would commence after level foundations are prepared. Typically, the building frame would be erected, followed by the installation of the roof, exterior finish, insulation, and interior finish. After that, the air inlet and exhaust facilities would be added. Construction of structures located outside of buildings would begin after concrete footings and/or foundations are prepared. Installation of suction and discharge piping would follow typical pipeline construction techniques described in section 2.4.1. The piping work may occur either in a fabrication shop offsite, or onsite, subject to size and weight considerations. Piping installed below grade would be coated for corrosion protection prior to backfilling.

Before the facilities are placed in service, the gas piping system (both above and below ground) would be pressure-tested. Hydrostatic pressure testing procedures are described in sections 2.4.1.8 and 4.3.2.4. Controls and safety devices such as the emergency shutdown system, relief valves, gas and fire detection facilities, overspeed, vibration, as well as other on- and off-engine protection and safety devices would be tested during the commissioning phase of construction.

After the completion of start-up and testing, the disturbed areas would undergo final grading. Cleanup and restoration of various parts of the site would be completed as work on the

area is finished. A security fence would be extended around the perimeter of the new facilities. Roads and parking areas would be graveled or paved.

Many of the procedures used in construction of meter stations would be similar to those described above for compressor stations and would include clearing and grading, preparing foundations, installing electric service, installing underground piping, erecting meter buildings, installing piping inside the meter buildings, testing the piping, testing the control equipment, cleaning up the work area, graveling the site, and fencing the facilities.

Valve and pig launcher/receiver construction would be similar to construction of meter stations, but without buildings, foundations, and associated facilities. These sites also would be graveled and fenced.

The Companies developed state-specific UDPs, which would be implemented should features such as cultural resources or human remains be discovered during trenching or construction. We found these plans acceptable (see section 4.10.3).

2.4.4 Specialized Construction Procedures

Construction across wetlands and waterbodies, or construction across or within roads, highways, railroads, and on steep terrain, would require techniques that differ from the standard measures implemented for routine cross-country pipelines. The Companies' special construction techniques are summarized below.

2.4.4.1 Wetland Crossings

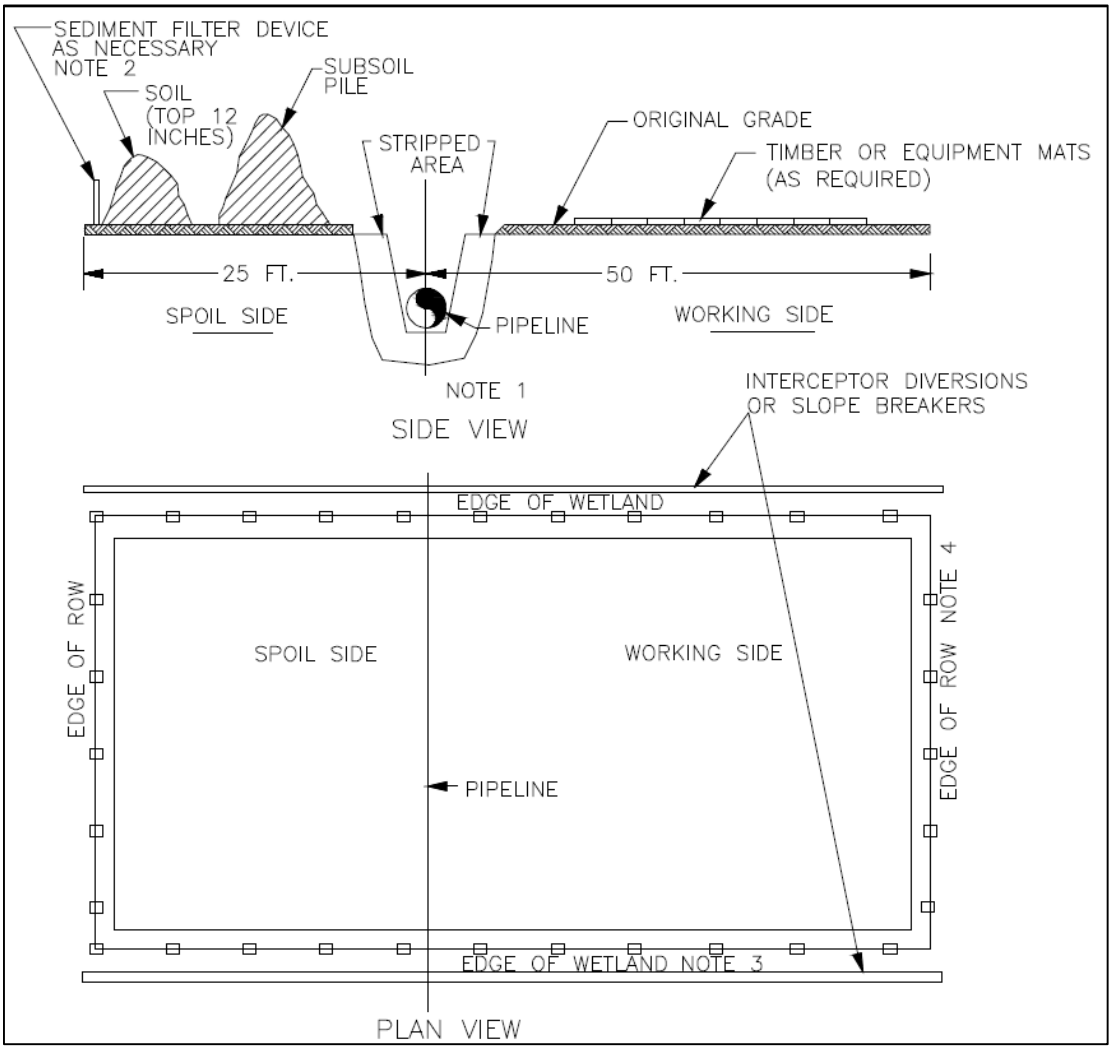
The MXP pipelines would cross 103 palustrine forested (PFO), palustrine scrub-shrub (PSS), and palustrine emergent (PEM) wetlands (see table 4.4-1). Wetland resources are discussed in detail in section 4.4. Construction within and restoration of wetlands would be performed in accordance with the wetland construction and mitigation measures contained in the ECS and FERC's Procedures.

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

During clearing, sediment barriers such as silt fence and staked straw bales would be installed and maintained adjacent to wetlands and within ATWS, as necessary, to minimize the potential for sediment runoff. Sediment barriers would be installed across the full width of the construction right-of-way at the base of slopes adjacent to wetland boundaries. If trench dewatering is necessary in wetlands, the trench water would be discharged into stable, vegetated, upland areas and/or a filter bag or hay bale structure to limit siltation, in accordance with the ECS. No heavily silt-laden water would be allowed to flow into a wetland.

Construction equipment working in wetlands would be limited to that essential to clear the right-of-way, excavate the trench, fabricate and install the pipeline, backfill the trench, and restore the right-of-way. The specific method of construction used in wetlands would depend on the stability of the soils at the time of construction. Figure 2.4-1 illustrates a typical wetland crossing (from Figure 19 of Columbia Gas' ECS).

Figure 2.4-1
Typical Wetland Crossing



Columbia Gas would determine its wetland crossing methods based on soil stability and the current saturation levels at the time of construction. For wetland crossings without standing water or saturated soils, the construction method would be similar to construction methods described for uplands, with the exception that the top 12 inches of topsoil would be removed and stockpiled separately from the remaining excavated material and the duration the pipeline trench is left open would be limited. In areas of saturated soils or standing water, low-ground-pressure construction equipment and/or timber mats would be used to reduce rutting and the mixing of

topsoil and subsoil. In unsaturated wetlands and unfrozen wetlands, the top 12 inches of topsoil from the trenchline would be stripped and stored separately from the subsoil.

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

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

2.4.4.2 Waterbody Crossings

The MXP would involve construction across 508 ephemeral, intermittent, and/or perennial waterbodies (including 8 ponds; see table 4.3-4). Waterbody crossings would be constructed in accordance with federal, state, and local permits and the ECS. Surface water resources are discussed further in section 4.3. Aquatic resources and a discussion of potential impacts on fisheries resources, including agency consultations regarding construction timing restrictions, is presented in section 4.6.4.

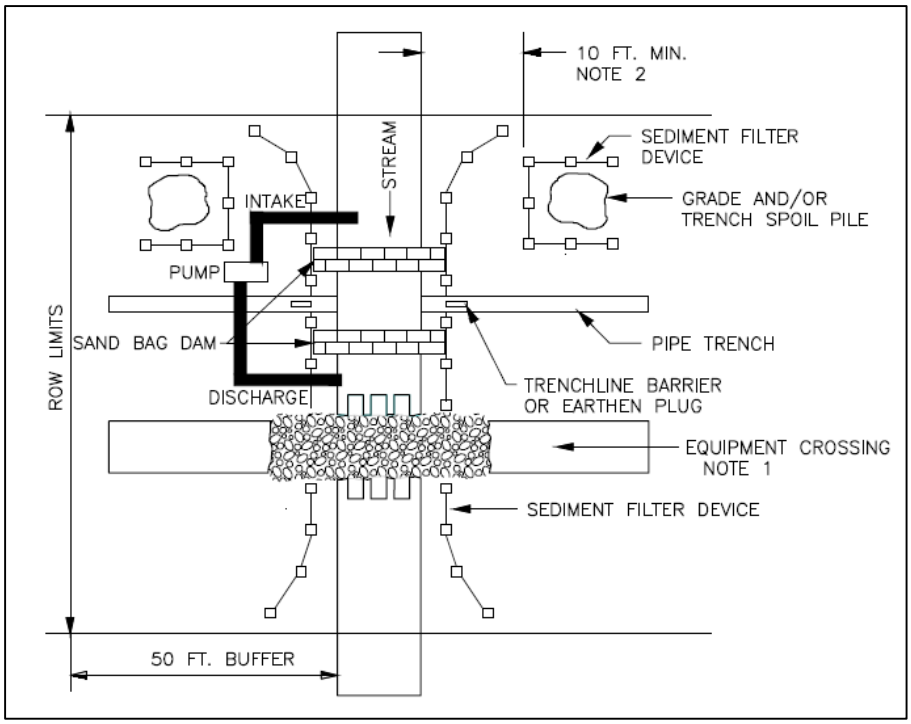
Columbia Gas would cross waterbodies using one of the following methods: open-cut (wet-trench), flume or dam-and-pump (dry-ditch), or HDD. Where standing water is present within a channel, but flow is not discernible, a dry crossing method (e.g., flume crossing or dam-and-pump) would be used to allow for construction to cross the waterbody under dry conditions. Illustrations of typical waterbody crossings are presented in figures 2.4-2 and 2.4-3 (Figures 15 and 16, respectively, from Columbia Gas' ECS).

The MXP pipeline crossings would typically require ATWS on each side of the waterbody to stage construction, fabricate an adequate length of pipeline, and store materials. These ATWS would be set back a minimum of 50 feet from the waterbody edge, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land, or where site-specific conditions require a reduced setback (as presented in the MXP ECS filed by Columbia Gas).

Columbia Gas would install temporary equipment bridges over intermittent and/or perennial stream crossings. Bridges may include clean rock fill over culverts, equipment pads supported by flumes, railcar flatbeds, flexi-float apparatus, and other types of spans. These bridges would remain in place throughout construction until they are no longer needed. Each bridge would be designed to accommodate normal-to-high stream flows and would be maintained to prevent soil from entering the waterbody. All construction equipment would be required to use the bridges, except for the clearing equipment needed for installation of the equipment bridges. Equipment crossing waterbodies would be limited to that which is necessary for clearing and the installation

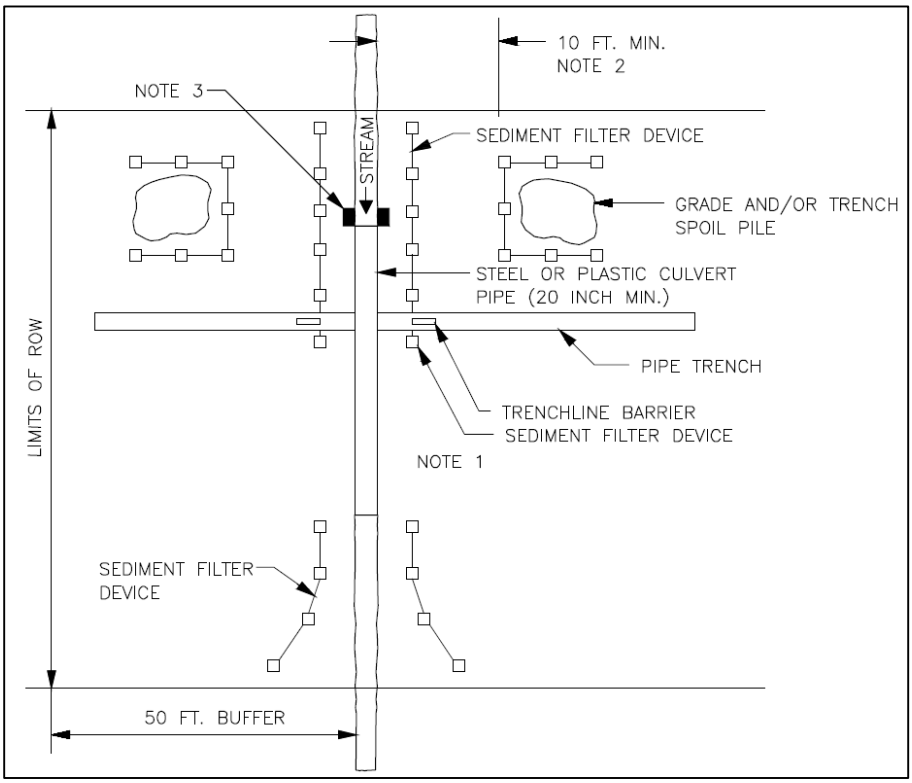
of bridges, as applicable. Sediment barriers would be installed immediately after initial disturbance of the waterbody or adjacent upland.

Figure 2.4-2
Typical Stream Crossing Dam and Pump



Note: ROW = right-of-way

Figure 2.4-3
Typical Stream Crossing Wet Ditch



2.4.4.2.1 Dry Crossing Construction Methods

The dry crossing method (flume or dam-and-pump) is used at waterbodies with perceptible flow that require flow to be diverted for a dry-ditch pipe installation. This method is appropriate only for waterbody crossings where pumps or flumes can adequately transfer streamflow volumes around the work area.

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

The dam-and-pump method is another standard dry waterbody crossing technique that may be used as an alternative to the fluming. This method is similar to the flume crossing method except that pumps and hoses are used instead of flumes to move water across or around the construction work area. The technique involves installing a pump upstream of the crossing and

running a discharge hose from the pump across the construction area to a discharge point downstream. After the pump is installed and operational, sandbags or equivalent dam diversion structures are installed upstream and downstream of the construction area to isolate the water flow from the area between the dams. An energy dissipation device is typically used to prevent scouring of the stream bed at the discharge location. Waterbody flow is maintained throughout the dam-and-pump operation until the pipeline is installed and banks are restored and stabilized.

2.4.4.2.2 Wet Open-Cut Crossing Method

The open-cut crossing technique is a "wet" crossing method that is completed while the waterbody continues to flow across the work area. The open-cut crossing method involves excavating a pipeline trench across the waterbody, installing a section of pipe, and then backfilling the trench with material excavated from the stream bed. Excavation and backfilling of the trench is typically accomplished using backhoes or other excavation equipment operating from one or both banks of the waterbody. Trench spoil is required to be stored at least 10 feet from the stream banks (topographic conditions permitting), per the Procedures. Sediment barriers, such as silt fence and staked straw bales, are then installed to prevent spoil and sediment-laden water from entering the stream. FERC's Procedures require that open-cut crossings be completed and backfilled within 24 hours for minor water bodies (less than 10 feet wide) and within 48 hours for intermediate waterbodies (10 to 100 feet wide).

2.4.4.2.3 Trenchless Crossing Methods

The HDD construction method would be used at one location to cross under the Kanawha River and an associated wetland at MP 146.7. The HDD method avoids disturbing surface and shallow subsurface features (such as waterbodies, wetlands, vegetation, manmade structures, public use, and protected areas) between two construction points. The HDD method typically involves establishing workspaces in upland areas on both sides of the feature(s) to be avoided/crossed and confining the work and equipment to these areas. For the proposed HDD crossing, electric grid guide wires would be laid by hand on the ground along the pipeline drill path to create an electromagnetic sensor grid. The grid would be used by the HDD operator to steer the drill head during drilling. The sensor grid would be fabricated by stringing an insulated coil wire along either side of the drill path. The wire would be energized with a portable generator, which would create a magnetic field used to track the drilling head. No ground or subsurface-disturbing activities would be required for installation of the guide wires except for minor hand clearing of a 2- to 3-foot-wide path for the wires in thickly vegetated areas.

The HDD process begins with drilling a pilot hole in an arced path beneath the feature using a drill rig positioned on the "entry" side of the crossing. When the pilot hole is completed, reamers are attached and are used to enlarge the hole in one or more passes until its diameter is sufficient to accommodate the pipeline. As the hole is being reamed, a pipe pull-back section, or a pipe section long enough to span the entire crossing, is fabricated (staged and welded) on one side of the crossing (typically the "exit" side) and then coated and hydrostatically tested to confirm the integrity of the welds. When the reaming is complete, the prefabricated pipe section is pulled through the drilled hole back to the entry side of the crossing.

During the drilling process, drilling fluid consisting of bentonite clay and water would be circulated through the hole to power and lubricate the cutting bit, move cuttings to the surface, and maintain the integrity of the hole. Water for the mixture is generally pumped from the waterbody to the drill site through a hose or temporary network of irrigation-type piping. (If a waterbody is not available, water may be trucked in from another source.) The pump intake is appropriately screened to prevent entrainment of aquatic species. Small pits are typically dug at or near the HDD entry and exit points to temporarily store the drilling fluid and cuttings. The fluid and cuttings are then pumped from the pits to an onsite recycling unit where the fluid is processed for reuse.

Although the HDD method typically avoids impacts on water quality by precluding disturbance of the waterbody bed and banks, an inadvertent release of drilling fluid could occur if fluid were to escape the drill hole and be forced through the overlying substrate to the ground surface. In order to minimize potential impacts of inadvertent releases of drilling fluid, Columbia Gas would implement measures identified in its HDD Inadvertent Return Contingency Plan (see appendix G). This plan describes procedures to monitor, contain, and clean up any inadvertent releases of drilling fluid. It also identifies contingency measures to be implemented in the event that an HDD is unsuccessful.

Columbia Gas has created (and filed to the docket) a site-specific HDD crossing plan for the Kanawha River crossing. We find this plan to be acceptable. Any deviations from this plan would require additional authorization(s) from FERC and the USACE.

2.4.4.3 Road and Railroad Crossings

The MXP pipelines would cross numerous public or private roads and railroads. Most two-lane (or wider) paved roads, highways, and railroads would be crossed by boring methods. Roads and railroads that would be crossed by the MXP are shown on alignments in appendix B-1, along with the proposed crossing method. Road crossings would either be conventionally bored, open-cut, or crossed by Direct Pipe. The use of conventional boring and/or Direct Pipe methods would avoid road and rail surface impacts. All railroad crossings would be conventionally bored.

At least one lane of traffic would typically be kept open when constructing an open-cut crossing of local or residential streets. However, detouring may be utilized in some areas. During the brief period when a road is completely cut, steel plates maybe used to cover the open area to permit travel by emergency vehicles. Traffic lanes and residential access would be maintained except for the temporary periods essential for installing the pipeline. Following pipeline installation at open-cut roadways, the trench would be backfilled and the roadbed would be restored.

Road crossing permits would be obtained from applicable federal, state, and local agencies. These permits would dictate the specific requirements for the day-to-day construction activities and methods at each crossing.

The Direct Pipe method is proposed for the MXP crossing of U.S. Highway 50 (U.S. 50) at MP 48.3. It would combine installation processes used in microtunneling and HDD installation methods. A single, continuous process would allow the trenchless installation of a pre-fabricated pipeline simultaneously with development of the bore hole. A Direct Pipe installation is different

from an HDD because a much larger initial cutterhead is used, eliminating the reaming process. Excavation and hole boring is performed with a navigable microtunnelling machine and cutterhead. Temporary flushing pipes located inside the pipeline are used to transport the drilling fluid to the cutterhead and earthen cuttings to the surface. The pressure used to advance the boring process and simultaneously install the pipeline is applied directly to the pipeline by a piece of equipment called a "pipe thruster." The force applied on the pipeline pushes the cutting head forward. Reliable installation and monitoring methods allow for accurate measurement of the pipe's location along the intended pathway. Direct Pipe installations may be shorter and shallower than HDD installations because the bore hold is continuously cased, thereby limiting the risk of hole collapse and the inadvertent release of drilling fluid.

2.4.4.4 Residential Areas

The proposed MXP-100 pipeline route crosses numerous residential properties and would pass within 50 feet of at least 20 homes. Residential structures within 50 feet of the construction work areas are discussed in section 4.8.1.3 and are shown in table 4.8-4. Columbia Gas has developed site-specific residential construction plans for these homes (see appendix B-1). These plans identify the mitigation measures to be implemented by Columbia Gas to further reduce impacts on residents during the construction period. **We encourage affected residents to review these plans and provide comments to us prior to the end of the draft EIS comment period.**

Temporary impacts on residential areas from MXP pipeline construction may include disturbance of lawns; removal of fences, mailboxes, and other minor residential accessory structures; removal of ornamental shrubs; loss of shade trees; disturbance of streets, driveways, and sidewalks; disruption of household utilities; altered traffic patterns; and the noise and general annoyance of construction activities. Columbia Gas would implement the following measures to reduce potential impacts in residential areas:

- Mature trees and landscaping would not be removed from within the edge of the construction work area unless necessary for safe operation of construction equipment, or as specified in landowner agreements.
- Safety fencing would be installed along the construction work area to discourage non-workers from entering the area. At a minimum, fencing would be installed adjacent to residences for a distance of 100 feet on either side of the residence.
- The trench would be secured with safety fencing at the end of each work day.
- Immediately after backfilling the trench, all lawn and landscaping would be restored to final restoration conditions, or temporarily restored pending weather and soil conditions or as specified in landowner agreements. If seasonal or other weather conditions prevent restoration within these time frames, temporary erosion controls would be maintained and monitored until conditions allow restoration.
- Landowners/occupants of each residence within 50 feet of construction work areas would be notified of construction activities prior to the commencement of construction work.

During extremely dry conditions, the construction work area would be sprayed with water to reduce fugitive dust in residential areas. Construction activities would be expedited to the extent practical while maintaining safety.

The Companies would implement an environmental complaint resolution procedure for implementation during construction. The procedures included in this resolution are outlined in section 4.8.1.3.

2.4.4.5 Agricultural Lands

Agricultural lands crossed by the MXP include active croplands, pastures, rangeland, or hayfields. In agricultural areas, Columbia Gas would strip and segregate topsoil from the full right-of-way in accordance with the ECSs. Following pipeline installation, the subsoil would be returned to the ditch and the topsoil replaced in the area from which it was stripped. As necessary, the working side of the right-of-way would be de-compacted prior to final grading and restoration.

Where livestock fences (including electric fences) would need to be cut to access the construction right-of-way, Columbia Gas would brace and secure the fencing prior to construction, and would repair the fences to preconstruction condition or better during the restoration phase of the project. Further, Columbia Gas would work with landowners either to remove livestock to alternate fields during construction or maintain adequate fencing in grazing areas. If livestock are present during construction, Columbia Gas would install temporary fencing around the right-of-way in areas where the pipe trench is left open overnight. Columbia Gas would negotiate with landowners regarding a potential grazing deferment to allow vegetation to establish within the right-of-way after construction is complete.

No existing drainage tiles were identified during surveys. Prior to construction, Columbia Gas would consult with landowners to locate existing drainage tiles crossed by the MXP. If drainage tiles were exposed or damaged during construction activities, Columbia Gas would implement appropriate measures to repair/replace them through coordination with the landowner and in accordance with the ECS.

Impacts on agricultural lands associated with the GXP would result from the permanent conversion of agricultural land to permanent facility or access road. Columbia Gulf would compensate landowners through easement negotiations for any crop removal or loss from construction activities within temporary workspaces that are not owned by Columbia Gulf.

2.4.4.6 Rugged Topography

Rugged topography, such as steep (greater than 30 percent), vertical slopes and steep side slopes (i.e., slopes running parallel to the proposed route), is present in numerous areas along the proposed MXP pipeline routes. Where possible, Columbia Gas would use conventional overland pipeline construction techniques to construct the MXP facilities. However, construction in the mountainous West Virginia terrain may require special construction techniques.

Columbia Gas attempted to route the pipeline along ridges and hills running perpendicular to the slope (i.e., along the natural fall of the slope) to provide a flat surface for vehicles and other equipment during construction. Except for short distances and in unique circumstances, pipelines

are not typically routed laterally along the sides of ridges and hills (i.e., on side-slopes). As described in more detail below, construction on side-slopes requires cut-and-fill grading to create a flat surface for construction vehicles and equipment. Relative to construction along the natural fall of a slope, cut-and-fill grading typically requires more workspace and is more challenging to restore. Because steep- and side-slope construction requires wider rights-of-way, the construction footprint is larger, and more tree clearing, soil stabilization, and restoration effort is required, all of which increase environmental impact and soil stabilization risk. Additionally, and especially over longer distances, the potential for slips or slope failure is greater in areas of side-slope construction relative to construction along the natural fall of a slope. Further details are discussed in section 4.1.4.

Pipe installation and construction activities across steep slopes would be similar to standard upland construction methods, but equipment would be tethered via winch lines to other equipment at the top of slopes. Equipment used to prepare the construction corridor and excavate the trench would be secured with a series of winch tractors to maintain control of the equipment and provide an additional level of safety. Appendix C, drawings A6987-TYP-5 and A6987-TYP-6, includes a construction drawing depicting operating equipment on steep slopes. All construction equipment and winch lines would be inspected daily prior to operation. Spoil piles adjacent to the trench would be stabilized with temporary sediment barriers, including reinforced silt fence, to keep excavated soils on the construction work area. Erosion controls, including anchored erosion control matting and temporary slope breakers, would be installed in accordance with Columbia Gas' ECS, and project-specific Erosion and Sediment Control (E&SC) Plan (to be prepared as part of its Stormwater Permit), to reduce runoff velocity and divert water off the construction corridor into stable, well-vegetated areas or through energy dissipation devices.

Pipeline construction along ridgelines may require the pipe to be buried deeper than normal (i.e., with greater than the typical 3 feet of cover over the pipeline required in non-agricultural uplands) due the techniques needed to construct along narrow ridgelines. The surface of ridgelines may be temporarily lowered to create a level construction right-of-way. Graded materials would be stored within the construction right-of-way and ATWS. Excavation of the trench would begin from the leveled work area. When the temporary right-of-way is restored to preconstruction contours, the depth of cover over the pipeline could exceed the minimum of 3 feet by an additional 7 feet or more.

Pipe joints would be staged at the top or bottom of each slope along the construction right-of-way and in approved ATWS. A side-boom tractor suspended from a winch would carry one joint at a time up or down the slope and place the joint along the trench line. The joint would then be lowered into the ditch by a tractor. Welders would connect the joint to the previous joint within the trench to assemble the pipeline. Once welding is complete, the welds would be visually and radiographically inspected. The weld joints would be hand coated with fusion bonded epoxy in accordance with required specifications. The coating would be inspected for defects, and repaired, if necessary.

Permanent trench breakers consisting of sandbags, gravel, cement, cement-filled sacks, or other approved materials would be installed within the ditch over and around the pipe in areas of steep slopes to control water channeling downslope along the pipeline. Placement of permanent slope breakers and trench breakers would be in accordance with Columbia Gas' ECS and project-

specific E&SC Plan. Once the pipeline is installed and backfilled, the surface of the right-of-way would be restored as near as practicable to original contours, and permanent slope breakers would be installed in accordance with Columbia Gas' ECS. During restoration, seed would be applied at an increased application rate to enhance rapid stabilization. Mechanically fastened erosion control blankets, in lieu of mulch, may be installed on steep slopes to promote revegetation while inhibiting erosion. Grades in excess of 3:1 would be stabilized with degradable blanket mulch such as jute mesh, wood excelsior, or fibers, until vegetation is re-established. The area would be monitored until revegetation is successful and temporary erosion control devices can be removed.

In areas where the pipeline crosses side-slopes, cut-and-fill grading may be necessary to create a safe, flat work terrace. Soil from the upper side of the construction work area would be excavated and moved to the lower side of the construction work area. Cut-and-fill operations in side-slope areas involve the excavation and movement of large volumes of soil. These activities require a construction right-of-way footprint upwards of 150 feet wide. After installation of the pipeline, the cut-and-fill area must be restored to preconstruction conditions and stabilized through soil packing, seeding, and other soil stabilization measures. Springs or seeps present in the work area would be diverted off of the construction workspace to stable areas or carried downslope through drain pipes and/or graveled French drains installed during restoration.

In addition to the construction measures described above, Columbia Gas would develop and implement additional measures in areas where slopes exceed 30 percent to control land movement, surface erosion, backfill erosion, and general stability when backfilling the trench and restoring the right-of-way. The following are some of the special design and construction measures that would be implemented during construction:

- targeted management and diversion of surface water around potential landslide sites, including the use of ditches, berms, slope breakers, and/or grading;
- mitigation of surface erosion by armoring or otherwise stabilizing surface soils using riprap, coir cloth (coconut fiber), hydroseeding, mulching, and/or tracking;
- targeted management of water sources along the trench, including the use of trench breakers and/or added drainage piping in the trench; and
- targeted mitigation of seeps, springs, or other subsurface water encountered along the right-of-way using subsurface drains or other special drainage measures.

2.4.4.7 Winter Construction Procedures

Columbia Gas would typically initiate its Winter Season Construction Plan for the MXP on or after November 1 of each year of active construction, as well as in areas along the MXP where all construction activities, including restoration, have not been completed prior to November. Columbia Gas' Winter Construction Plan, found in section VII of its ECS, addresses winter-specific procedures for snow removal and storage, temporary erosion and sediment controls, topsoil segregation, backfilling, restoration, wetland and waterbody crossings, and dewatering.

During winter months, Columbia Gulf may need to implement measures outlined in its Winter Season Construction Plan for facilities and improvements at existing facilities in Kentucky.

Columbia Gulf's Winter Season Construction Plan, found in section VIII of its ECS, addresses concerns associated with construction and reclamation activities that would be conducted during winter, including site stabilization, snow storage, and measures to be implemented if reclamation activities are delayed due to winter conditions.

2.4.4.8 Karst Areas

Based on U.S. Geological Survey (USGS) mapping, no karst would be crossed or found in proximity to the MXP. Mapping indicated the possible presence of karst topography at five of the seven new GXP compressor station sites, and subsequent geotechnical investigations found such topography at the Paint Lick, Goodluck, Cane Ridge, and Clifton Junction sites. However, soil materials at these four sites did not exhibit typical signs of karst. As such, we believe karst is unlikely to be present at these locations.

In areas where karst terrain is encountered, both Companies would exercise appropriate measures to avoid or limit the potential impact of karst on the proposed facilities. Columbia Gas would implement guidance provided by the WVDEP in conjunction with a karst mitigation plan Columbia Gas recently developed for a project in Kentucky. If Columbia Gulf determines that subsurface karst presents a potential hazard, it would construct foundations supported by competent bedrock to mitigate the risk of foundation disturbance.

2.4.4.9 Overhead Powerlines

CPG has developed a set of minimum requirements that both Companies would follow when construction activities occur in proximity to overhead power lines. These requirements include:

- construction contractors must have personnel dedicated to electrical safety during the course of the project;
- adequate warning signs of possible electric hazards must be posted at each access to the right-of-way;
- each piece of equipment used to handle pipe in any way must be grounded and equipped with a cable assembly capable of grounding the joints of pipe to the piece of the equipment handling the pipe; and
- work must be suspended in areas of overhead power lines during any thunderstorm activity.

Contractors would also be required to develop a site-specific safety plan consistent with CPG's safety policies.

2.5 CONSTRUCTION SCHEDULE AND WORKFORCE

In their applications, Columbia Gas and Columbia Gulf propose to begin construction of the MXP and GXP in October 2017, and to commence service in November 2018. This schedule depends on many factors, including the following:

- whether the Commission issues a Certificate for each proposal;
- subsequent acquisition of any outstanding survey access and completion of any remaining easement agreements;
- completion of any outstanding field surveys and submittal of permit applications;
- receipt of all necessary federal, state, and local authorizations;
- other project-specific requirements such as stream, migratory bird, and/or protected bat construction window restrictions (see sections 4.6.3, 4.6.4, and 4.7.6);
- satisfaction of all pre-construction conditions of any Certificate issued for the projects;
- FERC's completion of all necessary federal consultations, such as section 7 of the ESA and section 106 of the NHPA; and
- FERC staff's separate, post-Certificate authorization that construction may begin (i.e., Notice to Proceed with Construction).

Columbia Gas anticipates construction of the proposed MXP would be accomplished using eight construction spreads with a peak temporary workforce of about 4,200 workers. Table 2.3-1 identifies the location of each spread. Construction of the MXP facilities would be performed in a phased sequence with some facility construction occurring concurrently. Restoration activities would continue after the project is placed in-service and until disturbed areas are stabilized in accordance with the ECS and applicable permit requirements. Columbia Gas anticipates hiring 29 new permanent employees to operate the MXP facilities.

Columbia Gulf would utilize multiple contractors to facilitate project construction activities. Construction of the proposed GXP facilities would be conducted concurrently. At any given time, the temporary workforce for construction of the GXP facilities would range from 372 to 471 individuals divided among the 9 facilities. Fourteen new permanent employees (two persons for each of the seven new compressor stations) would be required for operation and maintenance of the GXP facilities.

2.6 ENVIRONMENTAL COMPLIANCE AND MONITORING

2.6.1 Environmental Training and Inspection

The Companies would incorporate into their construction drawings and specifications the mitigation measures identified in their permit applications and additional requirements of federal, state, and local agencies. Columbia Gas and Columbia Gulf would also provide copies of applicable environmental permits and construction drawings and specifications to their construction contractors.

The Companies would develop environmental training programs tailored to the proposed MXP and GXP and their requirements. The programs would be designed to require:

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

The Companies also would conduct training for construction personnel regarding proper field implementation of the project-specific ECS and other project-specific plans and mitigation measures.

The Companies would assign at least two EIs per construction spread to the MXP and one per GXP facility site, with additional inspectors as necessary to monitor environmental compliance. The role of the EI would be to verify compliance with the environmental mitigation and construction procedures included in all permits issued for the respective projects. The EI would be required to adhere to the project-specific ECS, which incorporates FERC's Plan and Procedures. The EI would have authority to stop construction activities that violate the measures set forth in the documents and permit authorizations for both MXP and GXP, as well as authority to order corrective actions. At a minimum, the EIs would be responsible for:

- verifying compliance with the measures set forth in the project-specific ECS and all other environmental permits and approvals, as well as environmental requirements in landowner agreements;
- identifying, documenting, and overseeing corrective actions as necessary to bring an activity back into compliance;
- verifying that the limits of authorized construction work areas and locations of access roads are properly marked before clearing;
- verifying the location of signs and highly visible flagging marking the boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along the construction work area;
- identifying erosion/sediment control and stabilization needs in all areas;
- locating dewatering structures and slope breakers to confirm they would not direct water into sensitive areas such as known cultural resource sites or sensitive species habitat;
- verifying that trench dewatering activities do not result in the deposition of sand, silt, and/or sediment near the point of discharge in a wetland or waterbody. If such deposition is occurring, the EI would stop the dewatering activity and take corrective action to prevent a reoccurrence;
- advising the Resident Engineer/Chief Inspector when conditions (such as wet weather) make it advisable to restrict construction activities to avoid excessive rutting;

- determining the need for and checking that erosion controls are properly installed, as necessary, to prevent sediment flow into wetlands, waterbodies, sensitive areas, and onto roads;
- inspecting and verifying the maintenance of temporary erosion control measures at least daily in areas of active construction or equipment operation, or a weekly basis in areas with no construction or equipment operation, and within 24 hours of each qualifying rain event;
- checking restoration of contours and topsoil;
- checking the repair of all ineffective temporary erosion control measures as soon as possible but not longer than 24 hours after identification;
- checking that the Companies' contractors implement and comply with their spill prevention and mitigation plans;
- keeping records of compliance with conditions of all environmental permits and approvals during active construction and restoration; and
- identifying areas that should be given special attention to achieve stabilization and restoration after the construction phase.

Columbia Gas and Columbia Gulf would maintain sufficient oversight of construction, stabilization, and restoration activities via the EIs; if additional inspectors are required for specific areas or situations, the Companies would provide additional inspectors.

In addition to the Companies' EIs, Columbia Gas and Columbia Gulf would require the construction contractors to provide at least one Environmental Foreman per spread or facility site. Environmental Foremen would be responsible for the contractor's efforts to correctly install and maintain environmental controls as well as implementing specific controls for construction in environmentally sensitive areas. They also would be available at all times during the duration of the projects and have a sufficient number of employees to implement the MXP's and GXP's compliance standards.

2.6.2 Compliance Responsibility

CPG's Project Delivery and Natural Resource Permitting Departments, consisting of a Project Manager, Construction Superintendent, Environmental Compliance Manager, Permitting Manager, and EIs, would be responsible for project environmental compliance on behalf of the Companies. As such, each of the individuals would receive copies of pertinent compliance materials and documents in a project-specific Environmental Management & Construction Plan prior to the commencement of construction. All environmental noncompliance issues would be reported by the EIs to the CPG Construction Superintendent, Permitting Manager, Environmental Compliance Manager, and the MXP or GXP Project Manager for resolution.

CPG would maintain records for the MXP and GXP, identifying by milepost or facility site, where soil additives, mulch, and seed is used and documenting the method of application, rate, and acreage treated. The dates of backfilling and seeding would be kept as part of the MXP and GXP record. Where special landowner requests concerning restoration are made, the names of landowners, tracts affected, and description of specialized methods would be documented.

Records would also include the location of any subsurface drainage repairs or improvement made during restoration and any problem areas encountered and how they were addressed.

In addition to CPG's compliance inspection program, the Commission will conduct independent inspections throughout construction and restoration to audit CPG's compliance program and independently verify project compliance with the Commission's certificate (and other pertinent requirements). As part of its inspection activities, the Commission may use a third-party compliance monitoring (3PCM) program. As the name implies, the program involves the use of a third party to assist us in compliance inspections and oversight.[19] A typical 3PCM program involves a compliance manager and several compliance monitors who represent our "eyes and ears" along the construction right-of-way. This program has the benefit of keeping us informed, on a daily basis, of the level of compliance on the project and can be a useful tool for project proponents to ensure a higher level of compliance. Another benefit that accrues for projects that implement a 3PCM program is efficient review of post-approval variances (discussed in the next section). Columbia Gas has determined that the MXP would benefit from a 3PCM program.

2.6.3 Post-Approval Variance Process

The pipeline alignments and work areas identified in this EIS should be sufficient for construction and operation (including maintenance) of the projects. However, minor workspace refinements sometimes continue past the project planning phase and into the construction phase. These changes could involve minor route realignments, shifting or adding new ATWS or staging areas, adding additional access roads, or modifications to construction methods. We have developed a procedure for assessing impacts on the areas that have not been evaluated in this EIS and for approving or denying their use following any Certificate issuance. In general, biological and cultural resources surveys were conducted using a survey corridor larger than that necessary to construct the facilities. Where survey access was denied, the Companies would complete the required surveys following a Certificate issuance. If Columbia Gas or Columbia Gulf request shifting an existing workspace or require a new ATWS subsequent to issuance of a Certificate, these areas would typically be within the previously surveyed area. Such requests would be reviewed using a variance request process.

A variance request for route realignments or extra workspace locations along with a copy of the survey results would be documented and filed with FERC in the form of a "variance request" in compliance with recommended condition number 5 in section 5.2 of this EIS. We would take the lead on reviewing the request. Typically, no further resource agency consultation would be required if the requested change is within previously surveyed areas and no sensitive environmental resources are affected. The procedures used for assessing impacts on work areas outside the survey corridor and for approving their use are similar to those described above, except that additional surveys, analyses, and resource agency consultations may be necessary to assess the extent of any impacts on biological, cultural, and other sensitive resources and identify any avoidance or minimization measures necessary. Variance requests are required to include a statement of landowner approval for the requested activity. All variance requests for the MXP and

[19] Like the Commission's use of consultants to assist in the analysis and preparation of environmental impact documents, a 3PCM program is funded by the project proponent but is completely under the guidance and direction of the Commission staff.

GXP and their approval status would be documented according to the process described above. Any variance activity by either of the Companies (whether submitted through the 3PCM program or directly to FERC) and subsequent FERC action would be available on FERC's eLibrary webpage under the docket number for the respective project (CP16-357 for the MXP and CP16-361 for the GXP).

2.6.4 Post-Construction Monitoring

After construction, the Companies would conduct follow-up inspections of all disturbed upland areas after the first and second growing seasons to determine the success of restoration. Restoration of upland areas would be considered successful if the right-of-way vegetation is visually successful in density and cover, surface conditions are similar to adjacent undisturbed lands, construction debris is removed, and proper drainage has been restored. For at least 2 years following construction, the Companies would submit quarterly reports to FERC that document any problems identified by Columbia Gas, Columbia Gulf, or landowners and describe the corrective actions taken to remedy those problems. FERC would also continue to conduct oversight inspection and monitoring to assess the success of restoration for at least two growing seasons. If it is determined that the success of any of the restoration activities are not adequate at the end of the respective timeframes, the Companies would be required to extend their post-construction monitoring programs. Columbia Gas proposed to perform monitoring for invasive plant species on at least an annual basis for 3 years following construction. However, we are recommending in section 4.5 that Columbia Gas extend the monitoring of invasive species for a period of 3 years following successful revegetation, as determined by the Commission's post-construction inspections. The monitoring period for invasive species would be extended as needed or as required by permits or regulatory agencies.

In accordance with their ECSs, the Companies would monitor the success of wetland revegetation annually for the first 3 years (or as required by the projects' permits) after construction or until wetland revegetation is successful. Wetland revegetation would be considered successful when the cover of herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent undisturbed wetland areas or as compared to documented, pre-project conditions. In accordance with the ECSs, if revegetation is not successful at the end of 3 years, the Companies would develop and implement (in consultation with a professional wetland ecologist) a plan to actively revegetate the wetland with native wetland herbaceous and woody plant species.

2.7 OPERATION AND MAINTENANCE

Columbia Gas and Columbia Gulf would operate and maintain the proposed pipelines and/or aboveground facilities in compliance with the USDOT's regulations provided in 49 CFR 192, the Commission's guidance at 18 CFR 380.15, and the maintenance provisions of their respective ECSs. The Companies would operate and maintain the newly constructed facilities in the same manner as they currently operate and maintain their existing systems. Right-of-way maintenance would be conducted in accordance with FERC's Plan and Procedures. The new MXP pipelines and facilities would be patrolled by either aerial flyovers or ground surveys on a schedule as described in table 2.7-1, although additional ground surveys would be conducted as necessary.

Table 2.7-1
Maximum Scheduled Intervals between Patrols for the Proposed Mountaineer XPress Project Pipelines

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

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

In its 7(c) application to the Commission, Columbia Gas identified, by milepost, the results of its class location study. Section 4.12.1 contains further discussions regarding the different class locations along the MXP.

Vegetation on the permanent 50-foot-wide right-of-way (and 80-foot-wide right-of-way where the three pipelines would be parallel going in and out of Sherwood Compressor Station) in uplands would be periodically maintained no more than once every 3 years by mowing and trimming to prevent the establishment of trees or deep-rooted shrubs over the pipeline that could damage its protective coating, obscure surveillance, or interfere with routine maintenance activities.

Columbia Gas may maintain a cleared corridor within the permanent easement portion of a wetland not exceeding 10 feet in width centered on the pipeline in all areas, as frequently as necessary to maintain an herbaceous state, and to facilitate periodic corrosion and leak detection surveys. In wetlands, trees within 15 feet of the pipeline may be cut and removed from the permanent right-of-way. No vegetation maintenance activities would be conducted in riparian areas between HDD and Direct Pipe entry and exit points. Use of herbicides for vegetation management would not be allowed within 100 feet of a waterbody or wetland without prior written approval from appropriate agencies.

The Companies would also inspect and maintain the proposed compressor station facilities, including calibrating equipment; assessing cathodic protection systems; checking safety systems; and monitoring pressures, temperature, and vibration data. The Companies also would mow and maintain the landscaping around the compressor stations.

The Companies would not conduct vegetation clearing for maintenance between April 15 and August 1 (i.e., during the general nesting season for migratory birds) unless written approval from the USFWS is obtained prior to commencing clearing activities. Vegetation maintenance would normally not be required in agricultural or pasture areas. Vegetation within the fenced portions of aboveground facilities would be mowed as often as needed.

2.8 FUTURE PLANS AND ABANDONMENT

During public scoping, a comment was submitted regarding the potential for Columbia Gulf to request an expansion at one of its new compressor stations, proposed under the GXP, or an expansion of the Columbia Gulf Transmission pipeline system. Neither Columbia Gas nor Columbia Gulf has identified any plans for future expansion of their systems or abandonment of any of the projects' facilities. If in the future, Columbia Gas or Columbia Gulf proposes any expansion or abandonment of the MXP or GXP facilities, then the applicable company would have to seek specific authorization for that action from FERC. An appropriate environmental review would be conducted, and the public would have the opportunity to comment on the Company's proposal. Likewise, any proposed abandonment of any facilities approved in these dockets would require additional environmental and regulatory review under section 7(b) of the NGA.

3.0 ALTERNATIVES

In accordance with NEPA and our policies, we evaluated alternatives to the MXP and GXP to determine whether an alternative would be environmentally preferable, reasonable, and/or technically and economically feasible to the proposed actions. We evaluated the no-action alternative, system alternatives (including the use of electric driven compressors), major route alternatives, route variations, and alternative locations for the proposed compressor station facilities. We compared each alternative to the proposed action using three key criteria:

1. Would the alternative have the ability to meet the objectives of the proposed action?
2. Would the alternative offer a significant environmental advantage over the proposed action?
3. Would the alternative be technically and economically feasible, reasonable, and practical?

Regarding the first criterion and for the purposes of NEPA, Columbia Gas' stated objectives for the MXP are to increase firm transportation service from receipt points in the Appalachian Basin to markets in the Midwest, Northeast, Mid-Atlantic, South, and Gulf Coast; specifically to increase natural gas deliverability by approximately 1,800,000 Dth/d to Columbia Gas' TCO Pool, as well as up to an additional 900,000 Dth/d to Columbia Gas' Leach Interconnect with Columbia Gulf's existing system.

The MXP is supported by binding Precedent Agreements with eight shippers[20], all of whom are anchors (shippers that have made long-term capacity commitments), collectively representing more than 96 percent of the project's capacity. The project is designed to transport natural gas from the Oak Grove, Majorsville, Goodwin, Sherwood, and Stonewall receipt points in West Virginia (up to about 2,300,000 Dth/d); the Clarington receipt point in Ohio (up to about 300,000 Dth/d); and the Waynesberg receipt point in Pennsylvania (up to about 100,000 Dth/d) through the MXP facilities to markets on the CPG system.

Columbia Gulf's stated objective for the GXP is:

- to provide an additional 860,000 Dth/d of natural gas supplies to southern markets in Mississippi and Louisiana with deliveries to receipt points in Humphreys County, Mississippi, and Acadia, Evangeline, Lafayette, and Saint Mary Parishes, Louisiana.

Our analysis of each alternative as described in the subsections below is based on information provided by the Companies; our review of aerial photographs, USGS topographic maps, and other publicly available information; input from cooperating and other agencies; public interactions that occurred during the scoping portion of our PF review for the MXP; and our site visits, including an aerial reconnaissance of specific segments of the MXP. Where environmental data are presented within this alternatives analysis, it is data collected from desktop (e.g., maps, literature, aerial photography, and agency databases) sources. The Companies collected field survey data for their proposed pipeline route and compressor station sites and some (but not all)

[20] "Shippers" are defined as the individual companies who are paying for natural gas to be transported on CPG's system.

alternatives. Therefore, to present the most consistent comparisons of potential impacts on environmental resources, this section presents data obtained from desktop sources only, for both the proposed route and facility sites and alternatives, even when field data may exist.

For the proposed MXP, Columbia Gas participated in our PF process (see section 1.3.1) during the preliminary design stage of its project. This process emphasizes identification of potential stakeholders early in the development of a project, identification and resolution of issues before a formal application is filed with the Commission, and identification and evaluation of alternatives that may avoid or minimize environmental impact. During this process, Columbia Gas made multiple modifications to its proposed pipeline route and other MXP components to address stakeholder or landowner concerns that would be directly affected by the project facilities. The majority of the route changes were made to avoid conflicts with existing or planned land uses or to address the distance of the pipeline route from residences or commercial businesses, recreation areas, or other infrastructure. These changes were subsequently made a part of Columbia Gas' proposed route when it filed its formal application and supplements, and as such are evaluated in section 4 of this EIS.

Using the evaluation criteria discussed above and subsequent environmental comparisons, each alternative was considered to the point where it was clear that the alternative could not meet the projects' objectives, offered no significant environmental advantage over the proposed action, or was not reasonable from a technical or economic standpoint. Alternatives that appeared to result in less than or similar levels of environmental impact were reviewed in greater detail. It is important to recognize that not all conceivable alternatives are technically or economically feasible or practical. Some alternatives may be impracticable because they are unavailable and/or incapable of being implemented after taking into consideration costs, existing technologies, or logistics in light of the overall project purpose. It is also important to consider the environmental advantages and disadvantages of the proposed actions and to focus the analysis on those alternatives that may reduce impacts and/or offer a significant environmental advantage rather than merely shifting impacts from one location to another. The following sections discuss and analyze each of the alternatives we evaluated in sufficient detail to explain why they were eliminated from further consideration or are recommended for adoption into the respective project.

3.1 NO-ACTION ALTERNATIVE

Our evaluation of the no-action alternative primarily addresses the effects and actions that may result if the MXP and GXP facilities are not constructed.

Under the no-action alternative, the environmental impacts identified in this EIS would not occur; however, the stated purposes of the Companies' proposals would not be met. The MXP would not be available to increase the capacity of Columbia Gas' system by up to 2,700,000 Dth/d, would not increase deliverability by approximately 1,800,000 Dth/d of natural gas to Columbia Gas' TCO Pool, and would not deliver an additional 900,000 Dth/d capacity to Columbia Gas' Leach Interconnect with Columbia Gulf's system. The GXP would not provide an additional 860,000 Dth/d of natural gas capacity to southern markets at identified locations in Mississippi and Louisiana.

Under the no-action alternative, existing natural gas transportation systems would continue to provide natural gas service to these regions; however, the projects' customers would likely seek natural gas and transportation services from other sources. Over the past several years, natural gas production in the Marcellus and Utica regions in the Northeast, which includes West Virginia, has grown significantly: their combined growth of 12 billion cubic feet per day since 2011 accounts for 89 percent of the U.S. total growth in natural gas production. The U.S. Energy Information Administration (EIA) annual energy outlook predicts that natural gas production will rise steadily, reaching 35.5 trillion cubic feet per year by 2040, an increase of 45 percent over 2012 levels (EIA, 2015). Because of this growth, both domestic natural gas consumption and exports of natural gas by pipeline have increased. However, because infrastructure projects often have longer lead times than production projects, infrastructure growth in the Northeast has not kept pace with production growth, and capacity has been insufficient to move natural gas out of the Northeast (EIA, 2016).

To increase capacity or to provide access to new sources of natural gas, the Companies may need to construct additional and/or new gas pipeline facilities and appurtenances in other locations (i.e., system alternatives) to provide the volumes of natural gas contracted through the projects' binding precedent agreements with the respective shippers. Alternatively, customers of the projects' shippers could seek to use other energy alternatives, such as alternative fuel or renewable energy sources, which could also require new facilities. If other new natural gas pipeline facilities or other energy infrastructure were approved and constructed, each project would result in specific environmental impacts that could be less than, similar to, or greater than the current proposals.

For these reasons, the no-action alternative is not preferable to or provide a significant environmental advantage over the proposed actions, and we do not recommend it.

3.2 SYSTEM ALTERNATIVES

To analyze system alternatives, we evaluated potential impacts associated with using other interstate natural gas pipelines to transport an equivalent volume of gas to meet customer requirements set forth in the binding precedent agreements, and to provide firm transportation service to Columbia Gas' TCO Pool, as well as more southerly markets accessible from Columbia Gulf's pipeline. As discussed in section 1.1.1, one of the primary purposes of the MXP is to increase deliverability by approximately 1,800,000 Dth/d to the TCO Pool. Columbia Gas' TCO Pool is the main pooling point on its system (i.e., the main hub to major markets across Columbia Gas' system and to the Columbia Gulf system by way of the Leach Interconnect in Boyd County, Kentucky). Therefore, the TCO Pool is an essential delivery point, and delivering gas to this point is critical to achieving the purpose of the MXP. We received comments asking us to discuss the process the projects used for identifying route segments and for evaluating and selecting compressor station sites. To meet the projects' objectives of increasing the capabilities of the CPG system to transport up to an additional 2,700,000 Dth/d of natural gas, including delivery of 860,000 Dth/d of natural gas supplies to southern markets in Mississippi and Louisiana, Columbia Gas and Columbia Gulf reviewed their systems' existing capabilities and evaluated several options for increasing capacity through increased compression, looping, and construction of new pipeline segments, as well as consideration of using existing systems with or without modifications to transport the load.

The Columbia Gas system transports an average of 3 billion cubic feet of natural gas per day through a nearly 12,000-mile pipeline network, with 92 compressor stations in 10 states. The company also has 600 billion cubic feet of natural gas storage capacity, including 37 underground storage fields in West Virginia, Ohio, Pennsylvania, and New York. Columbia Gulf operates nearly 3,400 miles of pipeline and 11 compressor stations in Louisiana, Mississippi, Tennessee, and Kentucky. Columbia Gulf interconnects with nearly every major pipeline system operating in the Gulf Coast. The MXP would aggregate supply from diverse receipt areas in the Marcellus and Utica Basins and transport approximately 2,700,000 Dth/d of natural gas from Columbia Gas' proposed LXP in Marshall County, West Virginia, to an interconnect with its TCO Pool in Cabell County, West Virginia.

3.2.1 System Alternatives for MXP

We received comments during public scoping regarding the availability of a system alternative to provide the capacity necessary to meet the purpose and need of the MXP. West Virginia has a broad network of high-pressure, high-volume, natural gas pipelines that provide transportation services to delivery points in the Northeast, Mid-Atlantic, and Southeast. These existing systems provide transportation services near MXP, and include facilities owned and operated by Dominion Transmission Inc. (Dominion), Texas Eastern Transmission, LP (TETCO), and Tennessee Gas Pipeline Company (TGP) (see figure 3.2-1).

Near the proposed MXP, Dominion has an extensive existing system of natural gas pipelines, including infrastructure in West Virginia, Ohio, and Kentucky. Additionally, Dominion has recently proposed several new projects and is currently completing upgrades to its system in the MXP area. None of the planned, current, or recently completed Dominion projects meet the capacity needs or in-service schedule of the MXP, however. In areas where the Dominion system provides access to the same supply areas as the Columbia Gas system, new pipelines and associated facilities would be required to reach all the supply and delivery points associated with the MXP. For example, Dominion would be required to construct approximately 40 miles of new pipeline to connect with Columbia Gas' SM80 Line at the Saunders Creek Regulating Station in Cabell County, West Virginia. Additional infrastructure would be expected to be constructed by Dominion to reach other delivery points on the MXP. For this reason, and the fact that the current Dominion system does not meet MXP's purpose and need, modification of the existing Dominion system is not considered a viable alternative to the MXP.

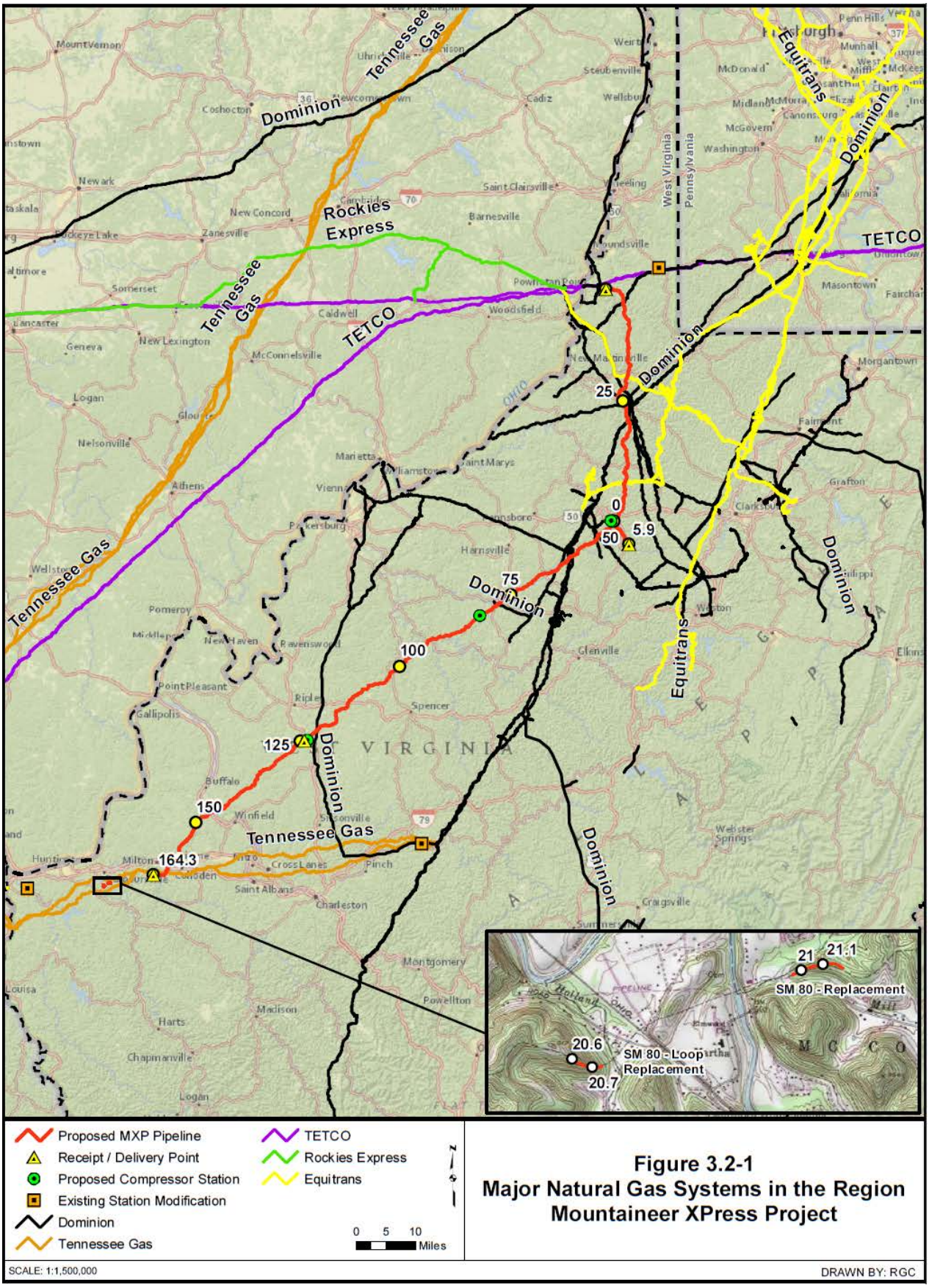


Figure 3.2-1
Major Natural Gas Systems in the Region
Mountaineer XPress Project

Near the MXP, TETCO's mainline roughly parallels the MXP's Line 100 route approximately 40 miles to the west; however, TETCO's system reaches different supply and delivery points than does MXP. TETCO recently completed two system upgrades (the U2GC and Ohio Pipeline Energy Network Projects) that allow for bi-directional flow to increase natural gas supply diversity to downstream Midwest markets. However, it is unlikely that TETCO's system could transport the volumes required by MXP's shippers, as the entire volume of TETCO's recently completed upgrades in the area is fully subscribed. Additional infrastructure (i.e., new pipelines, looping[21], and compression) would be required to reach the MXP receipt and delivery points and to create sufficient capacity to carry the load required by the MXP shippers. We do not have access to specific information related to the TETCO system, but using aerial photography to determine straight-line distances from the TETCO system to MXP delivery points, it is about 65 miles to the tie-in with the Columbia Gas Line 1983 and about 45 miles each to the Columbia Gas X59M1 pipeline tie-in in Jackson County, the tie-in with the Columbia Gas SM80 system in Cabell County, and the Ceredo Compressor Station in Wayne County. Each of these laterals would require a crossing of the Ohio River. In addition to the estimated 200 miles of laterals to the MXP delivery/receipt points, we assume that TETCO would be required to construct additional pipeline or looping segments and add compression to move the additional natural gas volume. Further, it is unlikely that the TETCO system could be upgraded to transport the same volume of natural gas as MXP by the requested in-service date of November 2018. For these reasons, we do not consider modification to the TETCO system a reasonable alternative to the MXP.

The TGP mainline roughly parallels the MXP route approximately 50 miles to the west. A TGP lateral intersects MXP Line 100 near MP 164 and the Saunders Creek Regulator Station and tie-in. For TGP to transport MXP's required capacity from Marshall County to Cabell County, West Virginia, approximately 55 miles of new pipeline would be required to connect the TGP system in Ohio to the northernmost point of the MXP. For TGP to access the additional MXP tie-in sites, a number of additional facilities would need to be constructed, including a new lateral from the closest point on the TGP system near McConnelsville, Ohio to the MXP delivery points in Doddridge County, West Virginia, a straight-line distance of about 75 miles. However, even if these connections were made, TGP's existing system and proposed upgrades would not have the capacity needed to transport the natural gas volumes associated with the MXP. TGP currently is undertaking an expansion of its system in the area of the MXP to transport 200,000 Dth/d of firm incremental transportation services (Broad Run Expansion Project, FERC Docket No. CP15-77). That project includes piping modifications and increasing horsepower at existing stations, and construction of new compressor facilities in West Virginia, Kentucky, and Tennessee. Given the fully subscribed nature of the Broad Run Expansion Project, we assume that considerable new pipeline, looping, and compression would be required on the TGP system to transport the load proposed for the MXP, which is more than 10 times the volume of the Broad Run Expansion. We do not have access to the design details necessary to determine all of the probable environmental impacts from assumed modifications to TGP's system to reach the same delivery/receipt points as the MXP, but considering a minimum of 130 miles of laterals to connect the TGP system to the MXP receipt/delivery points, the construction of additional pipeline and/or looping segments on the TGP system, and additional compression that may be required, it can be reasonably assumed

[21] "Looping" is one pipeline laid parallel to another and connected at both ends, often used to increase capacity along a right-of-way)

that the environmental impacts associated with such expansion would be equal to or greater than the proposed action. Additionally, TGP would not be able to permit and construct the necessary upgrades to its system in time to meet the November 2018 MXP requested in-service date. Therefore, we do not find any significant advantage to the TGP system over the MXP.

None of the other pipeline systems near the MXP have the capacity to transport the large volumes of gas that would be carried by the MXP, and none of the existing systems would be able to expand their facilities within the schedule required by the MXP's shippers. Because other pipeline carriers in the MXP area would be required to construct new pipeline segments and other appurtenances to reach the receipt and delivery points required by MXP, we do not consider the use of these other existing pipeline systems a viable alternative to the MXP. Therefore, these system alternatives were eliminated from further analysis.

3.2.2 System Alternatives for GXP

The GXP would compress gas received from the Leach C interconnect in Boyd County, Kentucky, and deliver it to southern markets in Mississippi and Louisiana, with significant deliveries to Columbia Gulf's mainline pool south of Inverness, Mississippi. TETCO's mainline passes through Kentucky about 10 miles northwest of the GXP Morehead and Paint Lick Compressor Station sites, crosses Columbia Gulf's system northeast of the Goodluck Compressor Station, roughly parallels the system south of the Cane Ridge Compressor Station, and passes the Clifton Junction Compressor Station about 28 miles to the south. In Mississippi, TETCO's mainline is about 40 miles southeast of the New Albany Station and 55 miles southeast of the Holcomb Compressor Station. Recently authorized upgrades to the TETCO system will provide 650,000 Dth/d of firm transportation service to the Gulf Coast region of Louisiana and Texas from natural gas basins in the Northeast and Texas (Spectra, 2016). TETCO plans to install bidirectional compressor stations in Ohio, Kentucky, Tennessee, Mississippi, and Louisiana. TETCO has entered into firm agreements for the entire capacity of its upgrades; therefore, use or modification of the TETCO system is not considered a viable alternative to the GXP.

The TGP mainline roughly parallels Columbia Gulf's system from 0.25 to 25 miles west through Kentucky, Tennessee, and Mississippi. A 30-inch-diameter TGP pipeline is within 250 feet of the Morehead Compressor Station site. The TGP system would require expansion to transport the additional volumes associated with the GXP from Kentucky to Mississippi. TGP's proposed Broad Run Expansion Project's entire capacity has already been subscribed. Therefore, TGP would require significant upgrades to its system (including new pipeline and compressor station construction) to meet the purpose and need of the GXP. For these reasons, and the fact that TGP's current system does not meet the GXP's purpose and need, use or modification of the TGP system is not considered a viable alternative to the GXP.

Columbia Gulf considered two alternatives using its existing system to meet the purpose and need of the GXP: a loop-intensive alternative that would include modifications to an existing facility and seven new pipeline looping sections, and a separate alternative that involved a combination of looping and horsepower increases at five existing compressor stations. The first alternative would require approximately 600 miles of new pipeline and would require all affected compressor stations to operate at 100 percent utilization. Because the affected compressor stations use older turbines, operating at full utilization could affect the reliability of the units, and the

resulting air emissions from these older compressor units would potentially be greater than the proposed emissions from the GXP facilities. In addition, the environmental impacts associated with 600 miles of new pipeline would be substantially greater than those for the GXP. For these reasons, we do not consider a loop-intensive alternative to be preferable to the proposed project.

Columbia Gulf also conducted hydraulic modeling to identify how its existing system might be upgraded to meet the GXP's purpose and need. One alternative involved adding compression at six existing compressor stations and significant looping of its system (as depicted in table 3.2-1). This alternative would require 228 miles of new looping, an additional 279,492 hp of compression, and an operational footprint of about 40 acres for each of the six compressor stations (240 acres total) to accommodate the construction of gas cooling bays.

Table 3.2-1
Compression-Intensive Alternative Loop Beginning and End Points

Facility	Upstream Point a/	Downstream Point	Length (miles)
Loop 1			
Ceredo to Stanton	Ceredo Compressor Station	Stanton Compressor Station	92
Loop 2			
Clementsville to Hartsville	MLV 308-2, MLV 308-3	Hartsville Compressor Station	12.6
Loop 3			
Hartsville to Hampshire	MLV 408-2, MLV 408-3	Hampshire Compressor Station	13.2
Loop 4			
Hampshire to Corinth	MLV 508-2, MLV 508-3	Corinth Compressor Station	11.7
Loop 5			
Corinth to Banner	MLV 608-2, MLV 608-3	Banner Compressor Station	11.5
Loop 6			
Banner to Inverness	Banner Compressor Station	Inverness Compressor Station	87
		Total	**228**

MLV = Mainline Valve
a Upstream Points may start at compressor station or a MLV located between two compressor stations

The combination of looping and increased horsepower would result in a greater number of landowners impacted, and would have greater potential to impact sensitive environmental resources than would the GXP. Additionally, the increase in horsepower at the existing compressor stations would result in greater air emissions than estimated for the GXP. We do not consider the looping and addition of compression at Columbia Gulf's existing compressor stations to be preferable to or to provide a significant environmental advantage over the facilities proposed for the GXP, and we eliminated this alternative from further analysis.

3.3 MAJOR PIPELINE ROUTE ALTERNATIVES

We received comments from the public and other federal agencies regarding the use of co-location opportunities with other utilities to reduce MXP impacts on landowners, communities, and the environment. A pipeline is considered co-located with an existing corridor if the new right-of-way is adjacent to or overlaps the existing right-of-way. A pipeline can parallel an existing

linear facility without being co-located (i.e., there is a separation between the rights-of-way), but this can result in multiple clear-cuts along similar paths with limited benefit in reducing impacts on environmental and other resources. Parallel configurations are typical for a gas pipeline where the corridor being followed is a foreign pipeline or utility, or where the company does not have multiple line rights within its existing right-of-way. In either scenario, whether truly co-located or simply paralleling another utility, construction within or adjacent to existing rights-of-way can minimize impacts on visual sightlines and intrinsic value, depending on how the new pipeline is configured in relation to the existing corridors. Because co-location usually minimizes vegetation clearing, it subsequently reduces fragmentation of forested habitats. Conversely, multiple corridors can have negative impacts on landowners, and studies have shown there can be detrimental effects on certain species of wildlife in areas with multiple co-located pipelines, as corridors can expand to the point that they create barriers to wildlife passage, and in some cases, effectively isolate populations. The extent of this effect depends on the species, life cycles, the geography of an area, and the cleared corridor width (USFS, 2013).

Columbia Gas' route review during the MXP pipeline siting process considered co-location opportunities where practicable, with several caveats. The co-location opportunity had to follow a reasonably direct path between the receipt and delivery points to avoid adding length to the pipeline. The terrain had to be conducive to allowing multiple pipelines without constraints such as steep side slopes or other factors that could jeopardize the safety and integrity of the pipeline during construction and operation. Also, the overall benefits from co-location to the types of properties and landforms crossed was to be considered, as Columbia Gas determined that attempting to co-locate through certain types of developed areas could add unnecessary length to the pipeline with little or no environmental or land use benefit.

The topographic setting of the MXP is characterized by steep slopes, narrow ridgetops and valleys, and shallow soils. Construction of the pipeline would require creating a corridor wide enough to allow for equipment and personnel to deliver, assemble, and install the pipeline safely. Other utilities (e.g., powerlines and pipelines) have taken advantage of ridgetops in the MXP area and are already sited to avoid side slopes and narrow valleys, which may be prone to extensive erosion during heavy rainfall events. Co-location opportunities on ridgetops and in the narrow valleys, which are prominent within the project setting and often contain waterbodies, limits the availability of workspace needed to safely construct and operate the proposed facilities. Even with the limited opportunities available, Columbia Gas was able to co-locate with other utility corridors almost 24 miles, or about 13.9 percent, of the MXP route.

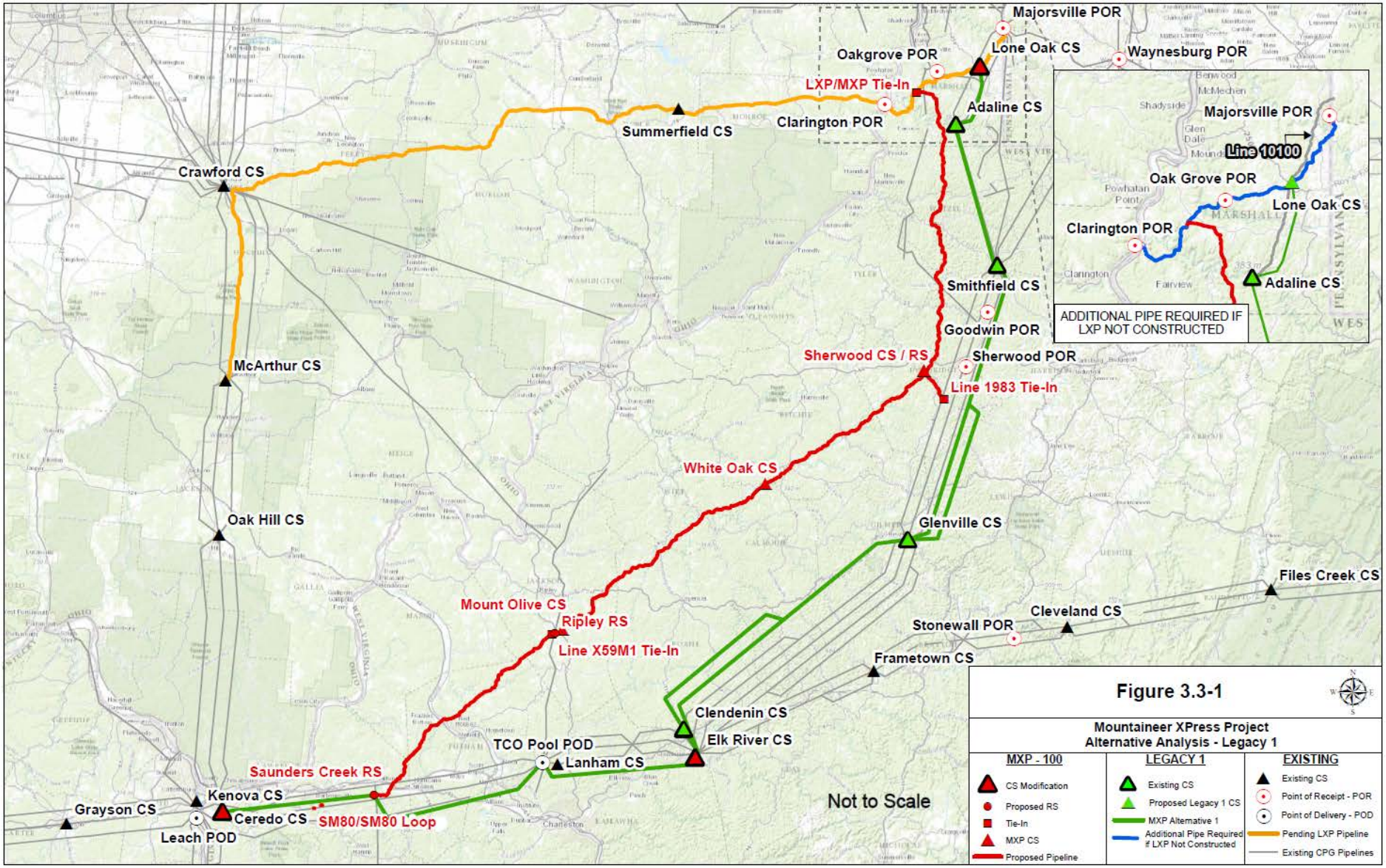
We analyzed two major route alternatives to the MXP that involved looping/upgrades to the existing Columbia Gas pipeline systems with greater ability to co-locate pipelines (Legacy 1 and Legacy 2 Alternatives), and one major route alternative (LXP Alternative) that included modifications to a Columbia Gas project currently under our review (the LXP; Docket No. CP15-514). These alternatives are substantially different from the proposed MXP route and from each other. A comparison of environmental factors pertinent to each major route alternative is provided in table 3.3-1, and the locations of these alternatives are shown on figures 3.3-1 and 3.3-2.

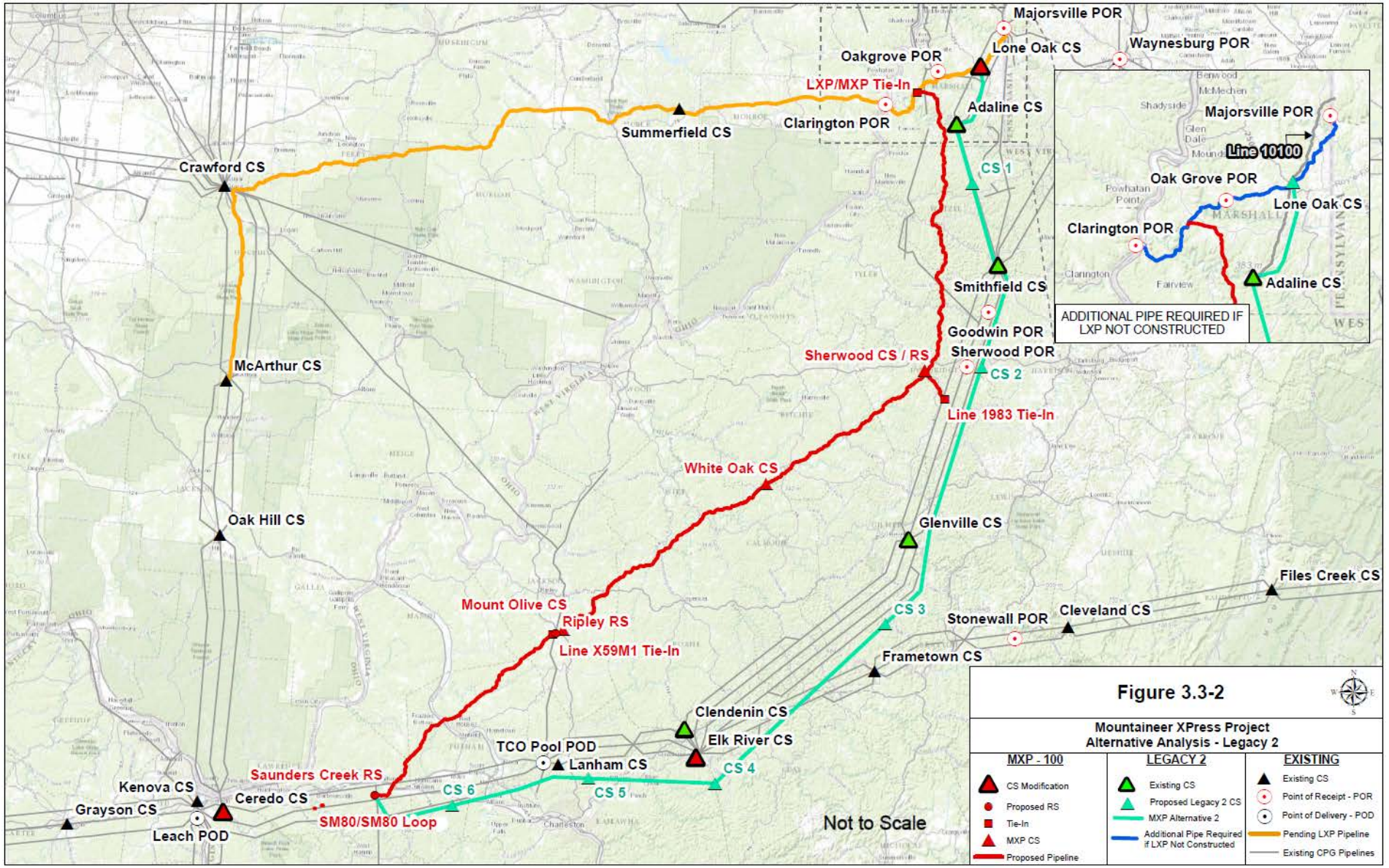
Table 3.3-1
Comparison of MXP with Major Route Alternatives

Component	MXP	Legacy 1 Alternative		Legacy 2 Alternative		LXP Alternative	
		Total	Increase (Decrease) from MXP	Total	Increase (Decrease) from MXP	Total	Increase (Decrease) from MXP
Pipeline (miles)	170	281	111	195	25	236	66
New Compressor Stations (number)	3	0	(3)	6	3	4	1
Modifications to Existing Compressor Stations (number of units)	3	7	4	1	(2)	6	3
Compression (hp)	228,000	226,200	(1,800)	282,500	54,500	315,600	87,600
Temporary right-of-way (acres) **a**/	2,575	3,406	831	2,364	(211)	2,860	285
Permanent right-of-way (acres) **b**/	1,030	1,703	673	1,181	151	1,430	400

a Assumes 125-foot-wide construction right-of-way for MXP and 100-foot right-of-way for alternatives (if co-location were achieved for the entirety of the route).

b Assumes 50-foot-wide permanent right-of-way for MXP and all alternatives.


Majorsville POR
Lone Oak CS
Waynesburg POR
Oakgrove POR
LXP/MXP Tie-In
Adaline CS
Summerfield CS
Clarington POR
Crawford CS
Smithfield CS
Goodwin POR
Sherwood CS / RS
Sherwood POR
Line 1983 Tie-In
McArthur CS
White Oak CS
Oak Hill CS
Glenville CS
Files Creek CS
Mount Olive CS
Ripley RS
Line X59M1 Tie-In
Stonewall POR
Cleveland CS
Frametown CS
Clendenin CS
Elk River CS
TCO Pool POD
Lanham CS
Saunders Creek RS
Kenova CS
Grayson CS
Ceredo CS
SM80/SM80 Loop
Leach POD
Not to Scale
Line 10100
Oak Grove POR
Lone Oak CS
Clarington POR
Adaline CS
ADDITIONAL PIPE REQUIRED IF LXP NOT CONSTRUCTED
Figure 3.3-1
Mountaineer XPress Project
Alternative Analysis - Legacy 1
MXP - 100
CS Modification
Proposed RS
Tie-In
MXP CS
Proposed Pipeline
LEGACY 1
Existing CS
Proposed Legacy 1 CS
MXP Alternative 1
Additional Pipe Required if LXP Not Constructed
EXISTING
Existing CS
Point of Receipt - POR
Point of Delivery - POD
Pending LXP Pipeline
Existing CPG Pipelines


Majorsville POR
Lone Oak CS
Waynesburg POR
Oakgrove POR
LXP/MXP Tie-In
Adaline CS
Clarington POR
Summerfield CS
Crawford CS
CS 1
Smithfield CS
Goodwin POR
Sherwood CS / RS
Sherwood POR
CS 2
Line 1983 Tie-In
McArthur CS
White Oak CS
Oak Hill CS
Glenville CS
Files Creek CS
Mount Olive CS
Ripley RS
CS 3
Stonewall POR
Cleveland CS
Line X59M1 Tie-In
Frametown CS
Clendenin CS
Elk River CS
TCO Pool POD
Lanham CS
CS 4
Saunders Creek RS
Kenova CS
CS 6
CS 5
Ceredo CS
Grayson CS
SM80/SM80 Loop
Leach POD
Not to Scale
Line 10100
Oak Grove POR
Lone Oak CS
Clarington POR
Adaline CS
ADDITIONAL PIPE REQUIRED IF LXP NOT CONSTRUCTED
Figure 3.3-2
Mountaineer XPress Project
Alternative Analysis - Legacy 2
MXP - 100
CS Modification
Proposed RS
Tie-In
MXP CS
Proposed Pipeline
LEGACY 2
Existing CS
Proposed Legacy 2 CS
MXP Alternative 2
Additional Pipe Required if LXP Not Constructed
EXISTING
Existing CS
Point of Receipt - POR
Point of Delivery - POD
Pending LXP Pipeline
Existing CPG Pipelines

3.3.1 Legacy 1 Alternative

We evaluated looping Columbia Gas' existing pipeline system between the approved LEX pipeline/MXP tie-in in Marshall County, West Virginia and the proposed MXP Line 100 terminus at the Saunders Creek Regulator Station in Cabell County, West Virginia (via Columbia Gas' Majorsville, Adaline, Smithfield, Glenville, Clendenin, and Lanham Compressor Stations, collectively referred to as Columbia Gas' "Legacy 1" system) (see figure 3.3-1). This alternative would require approximately 281 miles of new pipeline (compared to 170 miles for the proposed route) and approximately 226,200 hp of additional compression at several existing stations. If Columbia Gas could overlap its existing right-of-way by 25 feet during construction and reduce the overall corridor width to 100 feet, the added length of the Legacy 1 Alternative would still disturb considerably more acreage than the MXP (3,406 acres versus 2,575 acres) (see table 3.3-1).

The MXP involves modifications at three compressor stations: one currently in operation (Ceredo), a new station approved for construction as part of the LXP (Lone Oak), and a new station proposed as part of Columbia Gas' WBX (Elk River). Construction of the WBX- and MXP-specific components for the Elk River Compressor Station would have overlapping and sequential schedules. The Legacy 1 Alternative also would require compression to be added to five existing compressor stations (Adaline, Smithfield, Glenville, Clendenin, and Lanham).

Columbia Gas estimates that the increased horsepower at or near the five existing compressor stations, in addition to Ceredo and Elk River, would result in an increase in air quality and noise impacts at nearby receptors. Several existing compressor stations (specifically, Smithfield, Glenville, and Lanham) along this portion of Columbia Gas' system are space constrained and cannot readily accommodate the required expansions. Additionally, Columbia Gas does not have multiple-line-right agreements in areas where it would need to loop its system; therefore, a new corridor would need to be established to construct a parallel pipeline (although Columbia Gas could potentially use portions of its existing right-of-way to reduce impacts). In addition, the narrow ridges and valleys associated with the topography along this alternative present challenges for co-location. Since this alternative would require over 110 more miles of pipeline construction than the MXP, it is reasonable to assume that a greater number of landowners would be affected by paralleling the existing system and expanding the existing compressor stations, in addition to the acreage impacts.

We also evaluated a variation to this alternative, which involved replacing all or a portion of the existing pipeline facilities along this route with a larger-diameter pipeline capable of transporting both the existing volumes of gas and the planned volumes associated with the MXP. To serve existing customers and also meet the needs of the MXP customers, we considered replacement of the existing 20- and 24-inch-diameter pipelines with a 42-inch-diameter pipeline, but determined that a 42-inch-diameter pipeline would not have sufficient capacity to serve all customers, and new pipeline segments would be needed to meet both the existing and new service requirements. In addition, it would not be possible for Columbia Gas to take the existing lines out of service to install a larger-diameter pipeline in the same rights-of-way given Columbia's significant ongoing delivery requirements. Therefore, construction of a parallel pipeline would be required, resulting in substantially more impacts than the MXP. Columbia Gas estimates that the

cost to construct the Legacy 1 Alternative would increase project costs by $1 billion. Because the Legacy 1 Alternative would be longer than the proposed MXP route, result in greater environmental impacts, potentially affect more landowners, and increase construction costs substantially, we do not view this alternative as providing a significant environmental advantage over the proposed action. Therefore, this alternative was eliminated from further analysis.

3.3.2 Legacy 2 Alternative

We also evaluated a second major route alternative to the MXP between the approved LEX pipeline/MXP tie-in in Marshall County, West Virginia and the proposed MXP terminus at the Saunders Creek Regulator Station in Cabell County, West Virginia, referred to as Columbia Gas' "Legacy 2" system. This alternative would parallel Columbia Gas' existing system, but unlike the Legacy 1 Alternative, this alternative would operate independently of the existing system (see figure 3.3-2). This alternative would require approximately 195 miles of new pipeline (25 miles longer than the proposed route), approximately 282,500 hp of additional compression at six new compressor stations, and upgrades to one existing compressor station. Assuming a reduction of the construction corridor width to 100 feet (if co-location were achieved for the entirety of the route), impacts from construction of this alternative would be only slightly less than those of the MXP (2,363 acres versus 2,575 acres), but the permanent right-of-way impact would still be 151 acres greater than that of the MXP (see table 3.3-1). Columbia Gas estimates that this alternative would add $300 million to the cost of the project.

A new pipeline along this corridor would expand Columbia Gas' easement to include up to seven pipelines in some areas, with at least four lines through most of the route. Such a corridor could inhibit wildlife crossings and further reduce interior forested areas. The narrow ridges and valleys associated with the topography along this alternative present challenges for co-location, and several existing compressor stations (specifically, Smithfield, Glenville, and Lanham) along this portion of Columbia Gas' system are space constrained and cannot readily accommodate the required expansions. We assume that a greater number of landowners would be affected with the Legacy 2 Alternative than with the MXP, considering that it is 25 miles longer than the MXP and would require a new corridor paralleling the existing Columbia Gas system. Further, construction of an additional pipeline corridor adjacent to areas where several pipelines currently exist could result in adverse land use restrictions on individual affected properties.

Constructing the proposed MXP system and retaining Columbia's existing pipelines offers much greater flexibility to shippers than constructing a new pipeline corridor adjacent to the existing system. The TCO Pool was designed to provide system flexibility; a need established by shippers. Without MXP and its intermediate delivery/receipt points, the TCO Pool would lose some ability to provide variable shipper options, a major factor in the current design of the MXP.

Given the potential impacts on landowners through right-of-way expansions and the construction of six new compressor stations; the resulting increase in environmental, air, and noise impacts; the construction challenges associated with constructing this alternative; the reduced flexibility on the CPG system to accommodate shippers; and additional costs, we conclude the Legacy 2 Alternative would offer no environmental benefits over the MXP. Therefore, this alternative was eliminated from further analysis.

3.3.3 Leach XPress Alternative

On June 8, 2015, in Docket No. CP15-514, Columbia Gas filed an application with the Commission to construct and operate facilities located in West Virginia, Pennsylvania, and Ohio to transport natural gas produced in these states to its existing pipeline system in central Ohio (i.e., the LXP). The LXP consists of four new natural gas pipeline segments totaling approximately 160 miles, as well as the abandonment in place of a segment of an existing line (see figure 3.3-3).

In addition to new pipelines, the LXP would include the construction and operation of three new compressor stations (Lone Oak in Marshall County, West Virginia; Summerfield in Noble County, Ohio; and Oak Hill in Jackson County, Ohio) and four new regulator stations in Ohio (K-260 and R-System in Fairfield County; Benton in Hocking County; and McArthur in Vinton County). The LXP also consists of modifications at two existing compressor stations (Crawford in Fairfield County, Ohio and Ceredo in Wayne County, West Virginia) and one existing regulator station (RS-1286 in Vinton County, Ohio). The LXP is scheduled to begin construction in the fourth quarter of 2016 pending the Commission's approval and receipt of all required permits.

We evaluated an alternative that would loop portions of the LXP between Columbia Gas' existing Crawford Compressor Station and the terminus of the LXP at the McArthur Compressor Station as an option to deliver the proposed capacity of the MXP (see figure 3.3-4); this is the LXP Alternative shown in table 3.3-1. To meet the objectives of the MXP using the LXP, Columbia Gas would need to loop portions of the existing and proposed pipeline rights-of-way between the Lone Oak and Crawford Compressor Stations via the Summerfield Compressor Station, as well as loop the route between the McArthur Compressor Station and the Kenova Compressor Station via the Oak Hill Compressor Station. Looping the LXP pipeline between the Crawford and McArthur Compressor Stations would require about 25 miles of pipeline. Portions of Columbia Gas' existing system between the Smithfield and Lanham Compressor Stations would need to be looped as well.

Overall, approximately 236 miles of new pipeline and about 315,000 hp of compression would be required for the LXP alternative. This would be accomplished through modifications to several existing stations and construction of new stations. Table 3.3-1 provides a comparison of the MXP and LXP requirements and impacts. If Columbia Gas were to overlap its existing right-of-way by 25 feet during construction, the remaining 100-foot-wide construction corridor would impact about 2,860 acres, still 285 acres greater than the impacts for the MXP. As with the other route alternatives considered, co-locating the MXP with the LXP would result in a loss of system flexibility. The two projects ultimately serve different markets, and linking the two project routes would result in the construction of substantially more pipeline and ensuing environmental impacts. Additionally, the MXP is proposed to connect with the MarkWest Sherwood Facility, which is about 5.7 miles from Columbia Gas' existing system. As currently designed, the LXP would not be capable of providing natural gas pipeline service in the area of MarkWest's Sherwood facility; therefore, additional pipeline and compression would be required to receive gas from this facility. More landowners would be affected under this alternative than those affected by the MXP because of the increased amount of pipeline, expansion of approved, pending, and existing compressor stations, as well as the construction of four new compressor stations. Thus, we did not view this alternative as providing a significant environmental advantage over the proposed action. Therefore, this alternative was eliminated from further analysis.

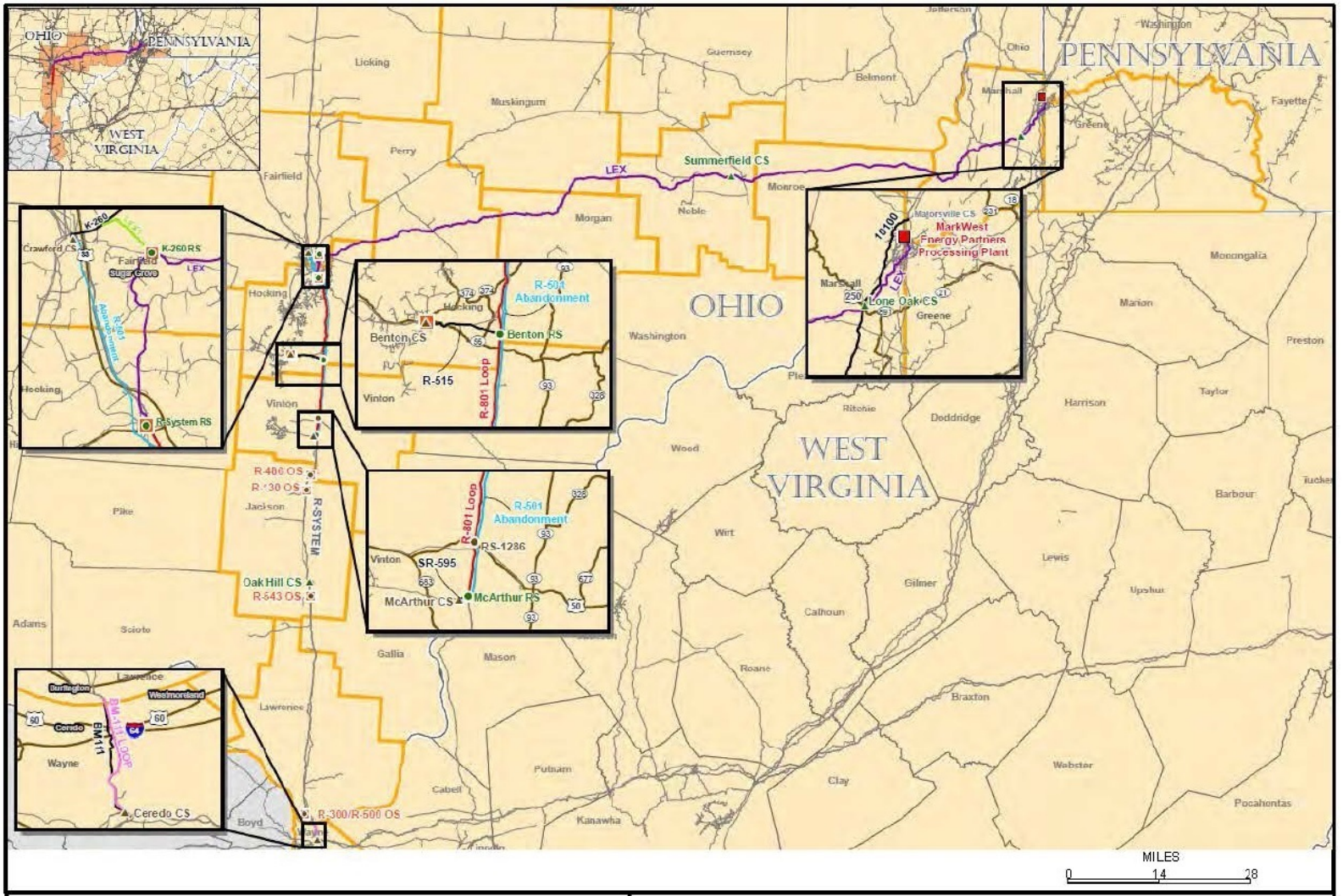
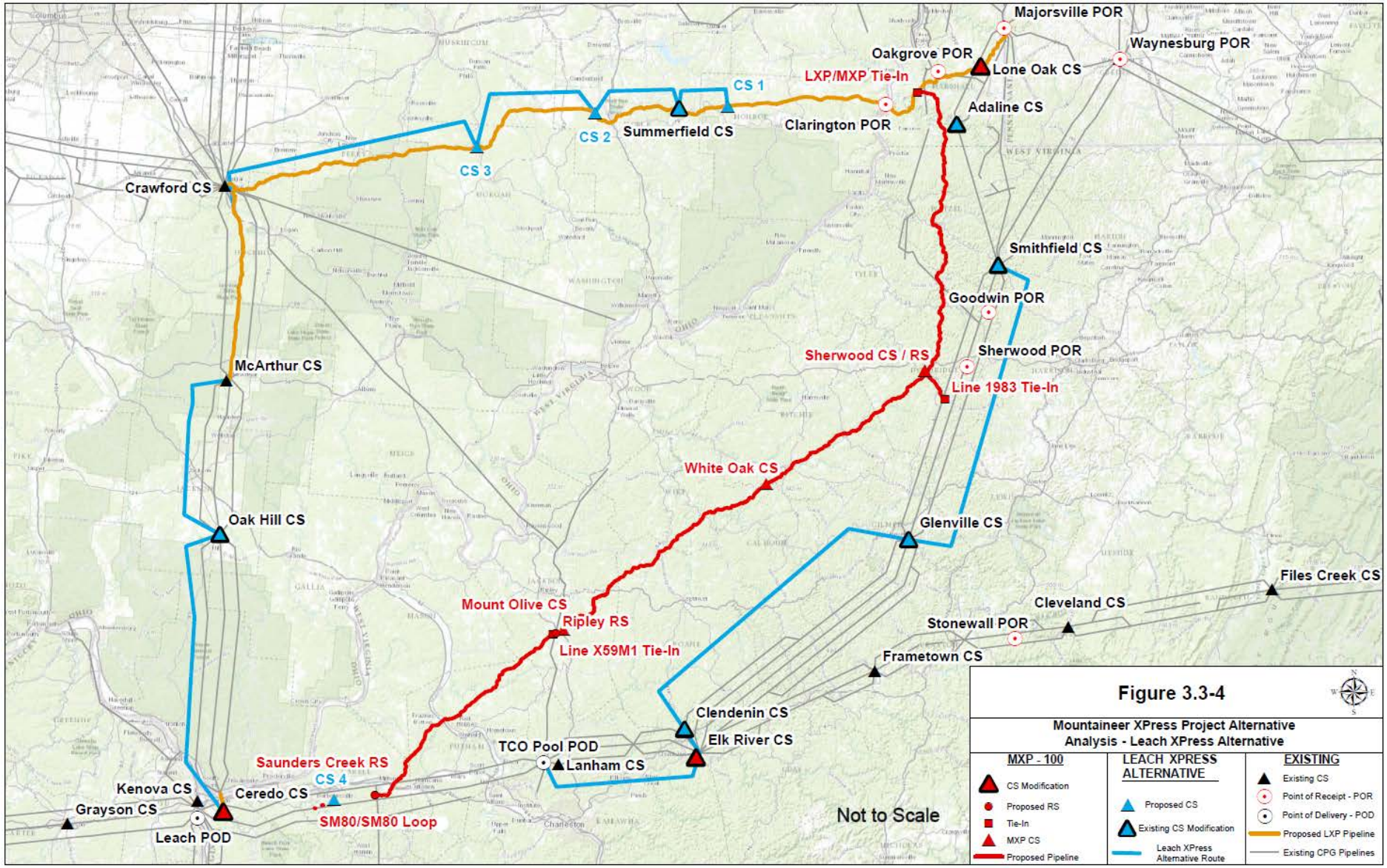


Figure 3.3-3
Leach XPress Project
Columbia Gas Transmission, LLC


Majorsville POR
Waynesburg POR
Oakgrove POR
Lone Oak CS
LXP/MXP Tie-In
CS 1
Adaline CS
Clarington POR
CS 2
Summerfield CS
CS 3
Crawford CS
Smithfield CS
Goodwin POR
Sherwood CS / RS
Sherwood POR
Line 1983 Tie-In
McArthur CS
White Oak CS
Oak Hill CS
Glenville CS
Files Creek CS
Cleveland CS
Mount Olive CS
Ripley RS
Stonewall POR
Line X59M1 Tie-In
Frametown CS
Clendenin CS
Elk River CS
TCO Pool POD
Lanham CS
Saunders Creek RS
CS 4
Kenova CS
Ceredo CS
Grayson CS
SM80/SM80 Loop
Leach POD
Not to Scale
Figure 3.3-4
Mountaineer XPress Project Alternative
Analysis - Leach XPress Alternative
MXP - 100
CS Modification
Proposed RS
Tie-In
MXP CS
Proposed Pipeline
LEACH XPRESS ALTERNATIVE
Proposed CS
Existing CS Modification
Leach XPress Alternative Route
EXISTING
Existing CS
Point of Receipt - POR
Point of Delivery - POD
Proposed LXP Pipeline
Existing CPG Pipelines

3.3.4 Major Route Alternatives Conclusions

Constructing the MXP system and retaining Columbia Gas' existing pipelines would offer greater flexibility to shippers and overall less environmental impact than looping or constructing a new pipeline corridor adjacent to portions of the existing system. The TCO Pool was designed to provide system flexibility, a need established by shippers. Without the MXP and its intermediate delivery/receipt points, the TCO Pool would lose some ability to provide variable shipper options, a major consideration in the design of the MXP. The alternatives we reviewed were determined not to be environmentally preferable to the proposed action. Additionally, all the major pipeline route alternatives involve constructability issues and potential impacts on a larger number of landowners when compared to the MXP. Therefore, we conclude that the MXP, as proposed, is preferable to the major route alternatives considered.

3.4 PIPELINE ROUTE VARIATIONS

Route variations differ from system or major route alternatives in that they are designed to reduce impacts on specific localized features, are typically shorter than major route alternatives, and do not result in a significant departure from the original alignment.

During development of the MXP, Columbia Gas identified and evaluated numerous route variations and alignment modifications as additional information became available. In its application filing, Columbia Gas identified and provided its rationale for adopting 21 minor variations and 3 more significant route modifications (the Maxwell Ridge, Sherwood Lateral, and Hurricane Creek Alternatives) that were considered during PF.[22] Two of the modifications (the Sherwood Lateral at approximately MP 49.0 to MP 54.4 and Hurricane Creek at approximately MP 146.3 to MP 158.4) were specifically developed in response to comments received during project scoping.

In its October 13, 2016 supplemental filing, Columbia Gas identified an additional 48 route changes, which resulted from further project refinements in consideration of its 2016 field surveys, stakeholder comments, input from FERC staff, and other considerations. These route adjustments were adopted to address landowner concerns, design changes, and constructability constraints, as well as to avoid certain parcels and landmarks.

The above changes to the originally planned alignment were incorporated into the proposed route to minimize or avoid areas with engineering constraints and constructability issues, and to reduce impacts on environmentally sensitive features (e.g., water resources and cultural resources), existing structures (e.g., water wells, residences, and barns), and other land uses. Because these routes became part of the filed proposed project, the environmental impacts are assessed in section 4 of this EIS.

We received four comment letters from affected landowners in December 2016 asking us to consider specific route variations to the currently proposed MXP-100 alignment. In each case,

[22] Columbia Gas' application referred to the Maxwell Ridge, Sherwood Lateral, and Hurricane Creek Alternatives as "Major Route Alternatives."

the proposed pipeline route would be shifted to different locations while still remaining on the respective landowners' property.

- On the Hall property, the variation would result in an approximately 200-foot-long increase in the length of the pipeline; however, the amount of tree clearing needed to achieve this variation appears to be consistent with the current route. Mr. Hall requests this variation in order to increase the setback of the MXP-100 from his house, to avoid traversing his driveway, and to avoid crossing two tributaries near his drinking water well.
- On the Elliot property, the variation would not result in additional length but would involve additional forest clearing within a small patch of mature trees. Ms. Elliot requests this variation in order to increase the setback of the MXP-100 from her home and to allow for construction of a new house on the property.
- On the Cobb property, the variation would increase the distance between the pipeline and the Cobb residence while reducing the length of the current route by approximately 1,000 feet. However, the reroute would result in additional clearing of mature trees. The additional tree clearing would be along existing forest edge lines and would not result in further forest fragmentation.
- On the Umstead property, the variation would preserve desired building sites while moving the pipeline towards the property boundary. The variation appears to be similar in length to the proposed route and would affect comparable forest areas.

All four of these requested route adjustments would require further environmental and cultural resource surveys to quantify their desirability from a purely environmental resource standpoint. However, we are generally inclined to support minor reroutes requested by property owners (especially those that don't involve other properties) absent significant environmental resource or engineering issues. In order to address the concerns raised by Mr. Hall, Ms. Elliot, Mr. and Mrs. Cobb, and Mr. and Mrs. Umstead, and to assess the associated environmental advantages or disadvantages of any route variations on these properties, **we recommend that:**

- **Prior to the end of the draft EIS comment period, Columbia Gas should file with the Secretary the following information regarding route variations of the proposed MXP-100 route on the Umstead (milepost 68.0), Hall (milepost 97.1), Elliot (milepost 145.8), and Cobb (milepost 144.9) properties:**
  - **a a brief description and associated aerial and/or topographic maps identifying the requested route variation (or a similar variation that addresses the identified landowner issue(s);**
  - **b a comparison of the environmental impacts, in tabular form, for the proposed route and each of the potential route variations;**
  - **c documentation of correspondence with the landowners regarding any potential route variations; and**
  - **d clarification whether Columbia Gas proposes to adopt the requested route variations or a detailed explanation as to why the requested route variations were not adopted over the corresponding segment of the proposed route.**

It is possible that additional minor (i.e., property-specific) refinements to the MXP route could be identified before construction. Any such refinements or modifications that are identified after a Certificate is issued would be evaluated as per our variance approval process (see section 2.6.3, above).

3.5 MXP ABOVEGROUND FACILITY SITE ALTERNATIVES

The MXP would require modifications at one existing compressor station, modifications to two compressor stations (one approved and one pending) under separate proceedings (the LXP and WBX), and construction of three new compressor stations (see figure 2.1-1). Columbia Gas selected the proposed compressor station locations to optimize gas flow hydraulics, integrate with other pipelines on the Columbia Gas system, and to minimize construction challenges given that much of the terrain where compression is required is mountainous and rugged. The three new compressor station sites proposed by Columbia Gas are privately owned parcels for which Columbia Gas has obtained purchase rights.

During public scoping for the MXP, we received comments requesting a description of the criteria used for selection of compressor station sites. In general, factors considered for assessing new compressor station sites include required system hydraulics;; availability of the land for purchase or lease; constructability and land use compatibility; access; noise-sensitive areas (NSA); proximity to electrical service; local and regional air emissions; wetland disturbance; presence of threatened or endangered species or their critical habitat; presence of NRHP-eligible cultural resources; and other resource concerns.

According to information provided by Columbia Gas, the general location of the Sherwood Compressor Station is integral to the overall project design as this site is where three separate gas streams (receipts from the LEX pipeline tie-in, MarkWest gas processing facility, and the MXP-200 connection to CPG's legacy system) are joined. At this anchor location, gas would be regulated, comingled and compressed from the three sources for shipment. Based on the Sherwood Compressor Station location, Columbia sited the White Oak and Mount Olive Compressor Stations as necessary to meet the required system hydraulics.

The proposed Sherwood Compressor Station site is within a relatively flat and remote upland area of cleared pasture and woodlands. The station would be constructed on approximately 30 acres within a cleared portion of a 151-acre parcel, with 11.8 acres affected during operation. The parcel contains approximately 9.4 acres of prime farmland. Three cultural sites were identified within the parcel boundaries; however, all three were evaluated and recommended as ineligible for listing on the NRHP. The site is buffered by trees on all sides except along the frontage with SR 18 on the southwest portion of the property. Electric service and access are both available from SR 18. One ephemeral stream would require installation of a permanent culvert to gain access to the property. This site also would provide pipeline access to the MarkWest facility, from which Columbia Gas would receive gas volumes.

The White Oak Compressor Station would be constructed on about 17 acres within a larger 84-acre parcel that includes both forest and open land. The site is situated on a mostly open, gently rolling portion of the parcel with access to a public county road. No prime farmland or sensitive environmental features were identified on the property, and the site would require minimal clearing

and grading for construction. Additionally, the MXP-100 corridor traverses this parcel, and it was available for purchase.

The proposed Mount Olive Compressor Station site is within an approximately 72-acre area on multiple parcels that Columbia Gas has acquired rights to purchase. Approximately 31 acres would be affected for construction of the facility. This forested site is located on a hillside that would require tree clearing and grading to construct the station. However, the site is large enough that the 9.2-acre station could be constructed with sufficient forested buffers between the proposed facility and nearby residences. Field surveys identified a foreign gas production well and pipeline on the eastern portion of the tract; however, the proposed compressor station would not affect these existing facilities. Electrical service and public access onto Charleston Road/County Road 21 is available.

No significant issues were identified with any of the three proposed sites, and we received no comments to evaluate any specific alternate sites. As such, we did not evaluate alternatives sites for the Sherwood, White Oak, or Mount Olive Compressor Stations. Additionally, we did not receive comments or evaluate alternatives for modifications at existing compressor facilities.

3.6 GXP COMPRESSOR STATIONS

For the GXP, Columbia Gulf proposes to construct seven greenfield compressor stations in Kentucky, Tennessee, and Mississippi, and to upgrade one recently certificated compressor station and one existing meter station (see figure 3.6-1).

In Kentucky, three new compressor stations are proposed. Additionally, Columbia Gulf proposes to upgrade its recently-approved Grayson Compressor Station (certificated as part of the RXP under Docket No. CP15-539-000) in Carter County and its existing Leach C Meter Station in Boyd County.

In Tennessee and Mississippi, Columbia Gulf proposes to construct and operate four new compressor stations (two in each state). The new stations, located at midpoints between existing compressor stations, would compress gas on Columbia Gulf's existing 30-inch-diameter Line 200 and 36-inch-diameter Line 300, and flow gas into its existing 30-inch-diameter Line 100. The existing pipelines were constructed in 1952 (Line 100), 1962 (Line 200), and 1968 (Line 300).

The number and locations of the compressor stations proposed for GXP considered the basic flow dynamics of natural gas on Columbia Gulf's system and the effects of the GXP. To determine the amount of compression needed by the GXP and the location of compressor stations, Columbia Gulf used a combination of factors, including compression ratios, fuel consumption, and compressor suction and discharge pressures.

Columbia Gulf proposed the new compressor stations to meet the volumetric and pressure requirements for its existing lines, as well as to meet the requirements of the project shippers, while minimizing environmental impacts and maintaining service to existing customers. Applying site-specific conditions to the results of hydraulic modeling led Columbia Gulf to determine that each compressor station must be located within approximately 1 mile upstream and downstream of the optimal compression location. This would achieve the hydraulic efficiency necessary to meet the required project shipper volume.

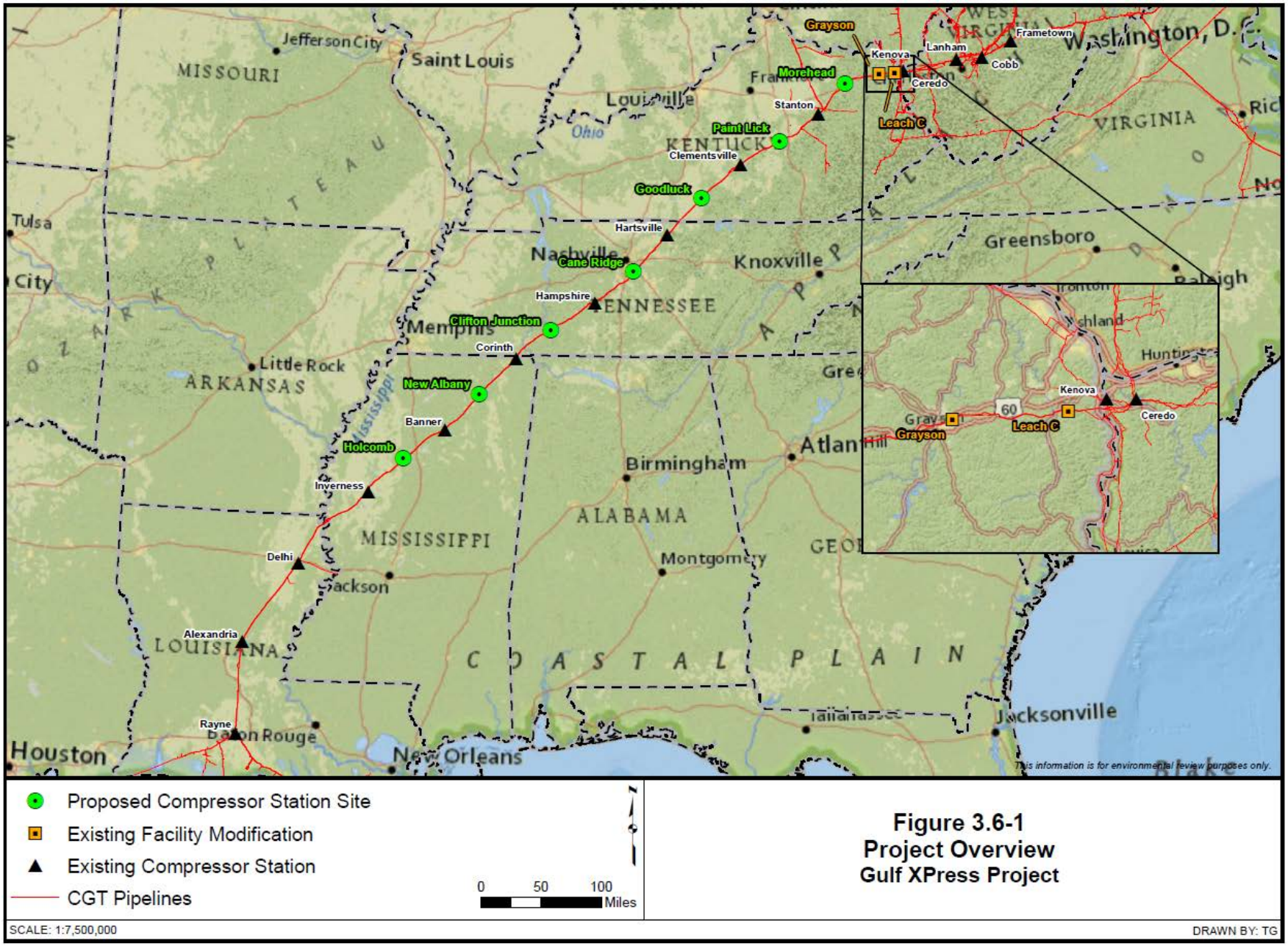


Figure 3.6-1
Project Overview
Gulf XPress Project

Columbia Gulf identified potentially suitable land parcels within the acceptable hydraulic ranges at each of the seven optimal compression locations. In selecting the new compressor station sites, Columbia Gulf considered alternatives when specific issues were identified at a proposed site. The criteria used in Columbia Gulf's site selection process generally included proximity of the sites to its existing lines, land use compatibility, and factors related to constructability. Columbia Gulf also considered the distance of the compressor station boundary from NSAs, NRHP-eligible cultural resources, and where possible, selected sites that would provide a buffer against future encroachment from outside development. Site selection also prioritized parcels that would require minimal clearing of forested areas to limit impacts on species that are dependent on arboreal habitats.

Columbia Gulf evaluated several compressor station sites that potentially would meet the purpose and need of the GXP using the criteria described above. Because active agricultural fields were sought for the compressor station sites, the environmental characteristics (e.g., limited forest, few wetlands and waterbodies, absence of critical habitat) were generally similar for all sites. At several locations, suitable parcels were identified and then removed from consideration because the landowner was not interested in selling the property or the property was not otherwise available.

In addition to evaluating possible compressor station sites, Columbia Gulf assessed the use of electric-driven compressors for GXP. As stand-alone pieces of equipment, electric-driven compressors can be more efficient than compressors driven by gas turbines. However, they require the availability of a suitable high-voltage electric power supply that could result in additional construction and environmental impacts. In addition, electric-driven compressors are subject to the reliability of the electric power transmission grid. Severe weather can damage transmission lines and interrupt electrical service. While electric motors have advantages over gas turbines in terms of their carbon footprint, this advantage is offset by high energy losses in the transmission of electric power and the potentially higher carbon footprint of the electric generation power source (e.g., electricity from coal) (INGAA, 2010).

Coal is used to generate most of the electricity in Kentucky, and is second only to nuclear power in Tennessee; in Mississippi, natural gas is used to produce most electricity (EIA, 2016). The use of electric-driven compressors in West Virginia, Kentucky, Tennessee, and Mississippi would not necessarily reduce air emissions related to the project. Rather, it would shift the emissions from the compressor station site to the power generation site, which in the case for coal-generated electricity, would result in an increase in emissions at the power generation site. Electric-driven compressors are typically selected to reduce air emissions in areas of nonattainment with National Ambient Air Quality Standards (NAAQS). Most of the areas crossed by the MXP and all the GXP areas are in attainment; therefore, the Companies' decision to incorporate gas turbine compressors into the project design primarily was based on the additional impacts and cost to construct transmission lines to their facilities, and because electric reliability would therefore not be an issue during operations. For these reasons, we do not consider electric driven compressors preferable to or as providing a significant environmental advantage over the proposed actions, and this alternative was eliminated from further analysis.

3.6.1 Kentucky

Morehead Compressor Station

The Morehead Compressor Station is proposed for construction on a 44.2-acre site in Rowan County, Kentucky, with 11.3 acres required for operation of the facility, including the area within the fenced facility and the permanent access road from SR 377 (Cranston Road). Approximately 91 percent of the soils at this site are classified as prime farmland. About 10.5 acres of the site would be permanently graveled or otherwise occupied by buildings and facilities, and 0.7 acre would be paved for vehicle access and parking. The remainder would be maintained grass. The proposed site is in mostly flat farmland situated between Cranston Road and I-64. The property is bordered on the north and south by trees, which would provide natural visual screening, and to the west by Cranston Road, which would provide access to the site. DeBord Branch flows from west to east along the northern site boundary into North Fork Triplett Creek, east of the site. Columbia Gulf would site temporary and permanent workspaces such that DeBord Branch would be unaffected by construction and operation of the compressor station. The preliminary engineering design for the station also locates it to avoid forested areas. Five unoccupied structures are located within the property boundary, but these would be avoided by the temporary and permanent workspaces. The closest NSA, measured from the property boundary, is 101 feet south; four other NSAs are within 1,000 feet of the site boundary.

Paint Lick Compressor Station

Columbia Gulf proposes to construct the Paint Lick Compressor Station on approximately 30.2 acres near the town of Lancaster, in Garrard County, Kentucky. The completed station would require approximately 9.6 acres during operation, with another 0.5 acre required for the site access road. The proposed site is on relatively flat agricultural land with a general topographic gradient toward the southeast. Approximately 56 percent of soils at the site are classified as prime farmland. The property is situated adjacent to the south side of Richmond Road and is surrounded by open agricultural fields and rolling hills. The site was identified as having the potential for karst topography; however, no sinkholes have been identified on the property. The closest NSA is about 277 feet northeast of the site on the north side of Richmond Road. Four additional residences are located within 1,000 feet of the parcel boundary on the north side of Richmond Road. No wetland or waterbody features have been identified on the property. The proposed station site was originally 59 acres in size; however, to avoid a nearby archaeological site, Columbia Gulf acquired a much smaller land parcel.

Goodluck Compressor Station

Construction of the Goodluck Compressor Station would be on an approximately 21-acre site in Metcalfe County, Kentucky. Approximately 37 percent of the soils on this parcel are classified as prime farmland. The permanent footprint of the site, including the access road, would require approximately 14 acres. The site is on relatively flat agricultural land in an area characterized as having potential karst topography; however, geotechnical investigations at the site did not identify any sinkholes on the property. The property is bounded to the north by Earl Shives Road. The adjacent properties include woodlands to the east and west and agricultural land to the north and south. The closest NSA is about 150 feet north of the site. No wetland or waterbody

features are within the property; however, forested upland occurs between Columbia Gulf's existing system and the farmed portion of the property, a distance of about 290 feet. This would require about 0.3 acre of tree removal to accommodate the suction and discharge piping, assuming a 50-foot right-of-way.

3.6.2 Tennessee

Cane Ridge Compressor Station

The Cane Ridge Compressor Station is proposed for construction on an approximately 31-acre site zoned AR2A (Agricultural) in Antioch Township, Davidson County, Tennessee (see figure 3.6-2). Approximately 10.6 acres would be permanently affected for operation of the facility. The site is pasture and forest with a general topographic gradient toward the southeast. Approximately 49 percent of the soils at the site are classified as prime farmland. The property is adjacent to the north side of Barnes Road and surrounded by woodlands and residences. The closest NSA is about 83 feet west of the site. Columbia Gulf has purchased the land surrounding the site as a buffer from noise sensitive receptors and against future encroachment that could result from outside development. Columbia Gulf has no plans to develop this land beyond construction of the proposed station.

We received comments from numerous residents in the surrounding area during the scoping period regarding identification of an alternative site that is not in a residential area. Columbia Gulf selected four alternative sites for evaluation, but two (Alternative Site 2 and Alternative Site 4) were excluded from further analysis early in the planning process. Columbia Gulf's research documented that Alternative Site 4, which is zoned SP (Specific Plan District), was already under contract to be sold, and the land is currently undergoing commercial development. Alternative Site 2, which is zoned partially AR2A (Agricultural) and partially City of Brentwood OSRD (Open Space Residential), was not evaluated because the landowner was not interested in selling the property.

As part of its response to a July 29, 2016, data request, Columbia Gulf responded to comments received during scoping. Among other concerns raised, Columbia Gulf addressed comments regarding the siting of the Cane Ridge Compressor Station within a densely populated residential area. Specifically, Columbia Gulf stated that the siting of the Cane Ridge Compressor Station was based on the need to maximize the optimum hydraulic efficiency necessary to meet required shipper volume. To achieve maximum utilization at existing compressor stations, Columbia Gulf proposed each new compressor station to be sited equidistant along its pipeline system between the eight existing compressor stations. As a result of these hydraulic studies, Columbia Gulf determined that each new compressor station must be located within an approximate 1-mile radius of the optimal location.

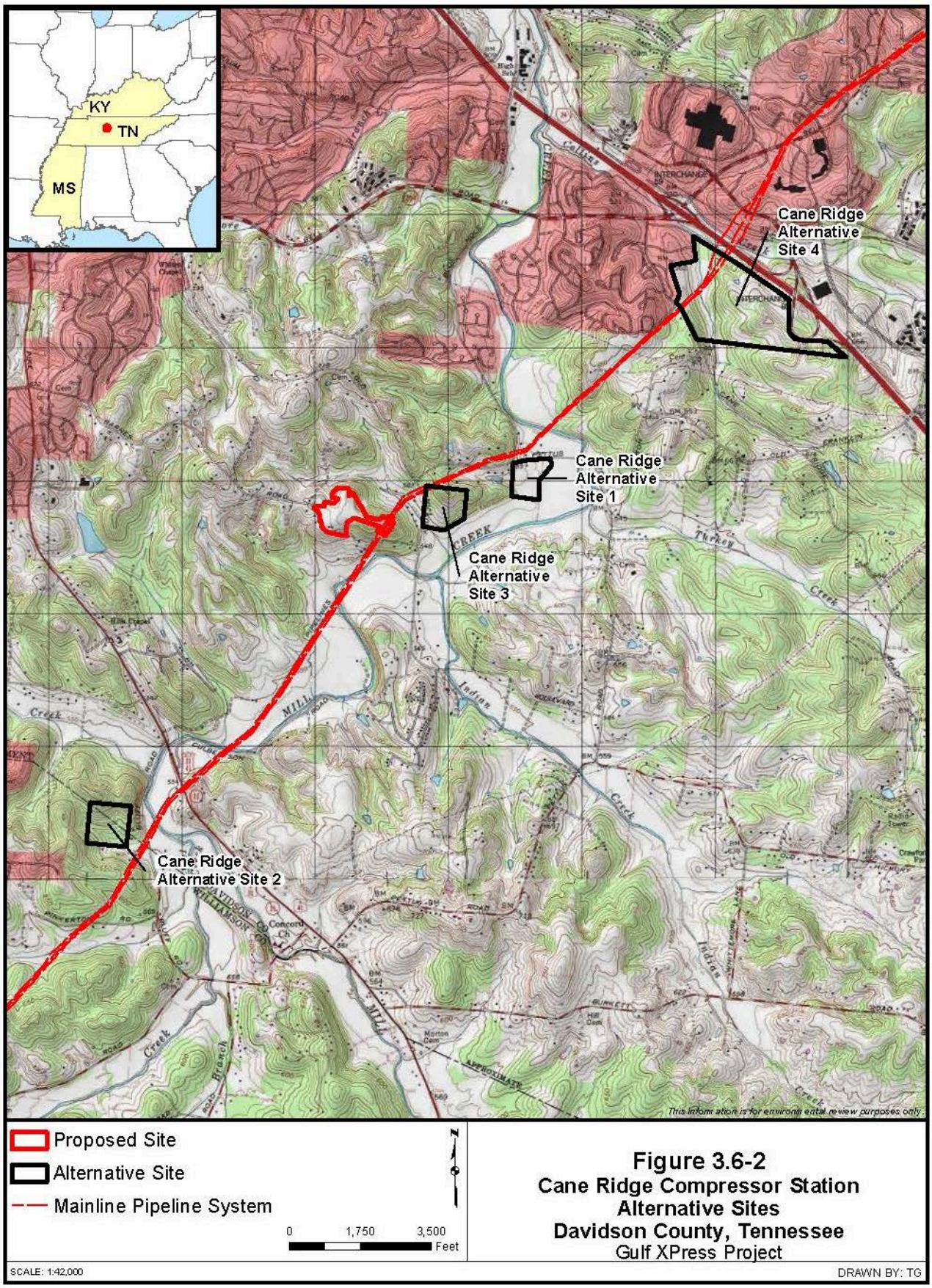


Figure 3.6-2
Cane Ridge Compressor Station
Alternative Sites
Davidson County, Tennessee
Gulf XPress Project

On January 31, 2017, Columbia Gulf filed its response to our January 23, 2017, data request to provide its hydraulic models used to determine the optimal location, as well as data to support the location of the compressor stations by a distance of no more than 1-mile from the proposed locations. Columbia Gulf's hydraulic studies show that additional pipeline looping or additional compression would be required in order to move the Cane Ridge Compressor Station to an alternative site. For its response, Columbia Gulf examined four hydraulic scenarios for the Cane Ridge Compressor Station: (1) move one mile south of the optimal location; (2) move two miles north of optimal location; (3) move five miles south of the optimal location; and (4) move five miles north of the optimal location. In each case, Columbia Gulf provided hydraulic models to support its claim that additional facilities would be required if the Cane Ridge Compressor Station is sited outside the optimal location. Specifically, Columbia Gulf's hydraulic models show that between 1,000 hp and 7,000 hp or 3 to 11 miles of new 36-inch-diameter pipeline loop would be needed to return the system to optimal hydraulic operating conditions.

Based upon our review of the engineering hydraulic models and flow diagrams, we agree Columbia Gulf's proposed optimal location for the new Cane Ridge Compressor Station would maximize the hydraulic efficiency of the system. As a result, we conclude that Columbia Gulf's design constraint of limiting the siting of the Cane Ridge Compressor Station to a 1-mile radius of the optimal location is reasonable and therefore properly designed.

We evaluated the remaining two alternatives for the Cane Ridge station to determine if there were environmental advantages associated with either of the sites over the site selected by Columbia Gulf. Table 3.6-1 provides a comparison between the proposed Cane Ridge Compressor Station site and the two alternatives.

Table 3.6-1
Cane Ridge Compressor Station Alternatives Comparison a/ for the Gulf XPress Project

Category	Proposed Site	Alternative 1	Alternative 3
Property Size (acres)	31.2	16.2	21.9
Closest Public Road	Barnes Road	Pettus Road	Old Hickory Blvd.
Land Use (approximate percent of property)			
Agriculture	41	--	--
Forest	50.6	30.9	100
Floodplain	--	61.1	--
Developed	8.4	8.0	--
Open water	--	--	--
Prime farmland (approximate percent of property)	49	90	6
Tree clearing required (yes or no)	Yes	Yes	Yes
NSAs within 1 mile (count)	20	23	17
Distance to nearest NSA (feet) b/	83	33	169
NHD Waterbody c/(length in feet)	--	--	158
NWI wetlands c/ (approximate percent of property)			
Pond	--	<0.1	--
Non-forested (PEM/PSS) Wetland c/	--	4.3	--
Forested Wetland	--	--	--

a The proposed and alternative sites have similar vegetation and habitat characteristics due to their proximity and the general land uses of the project areas. Therefore, impacts associated with the construction of a compressor station on fisheries, vegetation, wildlife, and/or threatened and endangered species would be similar at the proposed and alternative sites.

b Measured from property boundary.

c PEM = Palustrine Emergent; PSS = Palustrine Scrub/Shrub; NHD = National Hydrography Dataset; NWI = National Wetlands Inventory.

Alternative Site 1 is located south of Pettus Road, which separates the site from Columbia Gulf's system. This site is zoned AR2A (Agricultural, Partially in Floodplain Overlay District). The Maxwell Henry Elementary School is located about 795 feet north, and the closest NSA is 33 feet west. Approximately 90 percent of the soils at the site are classified as prime farmland. The site is situated within the Davidson County Flood Overlay Zone and has a high risk for flash flooding of Mill Creek. After a historic rainfall event in 2010, Mill Creek flooded, causing so much damage that the Metropolitan Council of Nashville approved the buyout of flooded houses in cases where it was cost prohibitive to elevate and rebuild, including properties adjacent to this site (Metropolitan Government of Nashville and Davidson County, 2016; USACE, 2014). In consideration of the proximity of the site to the elementary school, the need for a road crossing to construct the suction and discharge pipelines, associated additional workspace and permitting for the road crossing, and the potential for flash flooding, Columbia Gulf determined that Alternative Site 1 was not a preferable option for construction of the compressor station. We agree.

Alternative Site 3, located east of Old Hickory Boulevard, is entirely within upland forest. This site is zoned AR2A (Agricultural, Potentially Partially in Floodplain Overlay District). Approximately 6 percent of the soils at the site are classified as prime farmland. The elevation change along the northern boundary of the site to the southern boundary of the site is about 40 degrees. A tributary to Mill Creek crosses the southwest corner of the property. The closest NSA is 169 feet west of the site. Extensive tree removal and substantial grading would be required to construct and operate a compressor station on this steep terrain. Additionally, Columbia Gulf was unsuccessful in its attempt to contact the owner of this property.

Of the sites reviewed, we found the proposed site to be the preferred location for the Cane Ridge Compressor Station due to the availability of a large buffer to mitigate noise and visual impacts, an existing cleared area to accommodate construction, the need for only limited tree removal, and its location in an upland area. Alternative Sites 1 and 3 were found less suitable because of topography, proximity to NSAs, and flooding potential. Columbia Gulf determined that Alternatives 1 and 3 did not offer any significant environmental advantages over the proposed site, and we agree with its selection of the proposed site.

Clifton Junction Compressor Station

Columbia Gulf proposes to construct the Clifton Junction Compressor Station in Waynesboro, Wayne County, Tennessee, on the north side of U.S. 64/Savannah Highway. The station is proposed for a hilltop consisting of pasture and mesic hardwoods. Approximately 15 percent of the soils at the site are classified as prime farmland. The closest NSA is about 291 feet southeast of the site, which may require additional mitigation to reduce noise levels to federally acceptable standards. No wetland features are on the property. The site is in an area characterized as having the potential for karst topography; however, no sinkholes have been identified on the property.

3.6.3 Mississippi

New Albany Compressor Station

Construction of the New Albany Compressor Station would be in New Albany, Union County, Mississippi. The property is adjacent to the south side of County Road 137 (Pleasant Hill Road) on relatively level agricultural farmland. Approximately 81 percent of the soils at the site are classified as prime farmland. The South Branch Wilhite Creek at the confluence with the Little Tallahatchie River borders the parcel. A portion of the site's TWS is located within the floodplain, but the creek does not cross the property. The closest NSA is about 526 feet west, and one additional residence is within 1,000 feet of the site.

Holcomb Compressor Station

The Holcomb Compressor Station is proposed for construction in Holcomb, Grenada County, Mississippi. The property is situated on Columbia Gulf's system adjacent to the west side of Ferguson Road and consists of two relatively level agricultural farm fields separated by a tree line. Approximately 55 percent of the soils at the site are classified as prime farmland. The parcel is bordered by trees, which would provide natural visual screening for the compressor station facilities. The closest NSA is about 2,060 feet south of the site. One forested wetland extends partially into the property along the western boundary; however, construction would avoid this wetland.

Other than the Cane Ridge site, we received no comments to evaluate other alternative sites and no significant issues were identified. As such, we did not evaluate alternatives sites for the Morehead, Good Luck, Paint Lick, Clifton Junction, New Albany, or Holcomb Compressor Stations. Additionally, we did not receive comments or evaluate alternatives for modifications at existing meter and compressor facilities.

4.0 ENVIRONMENTAL ANALYSIS

4.1 GEOLOGY

4.1.1 Geologic Setting

The United States is divided into 8 physiographic divisions, 25 provinces, and 86 sections based on common topography, rock types and structure, and geologic and geomorphic history.

4.1.1.1 Mountaineer XPress Project

The MXP is located within a single physiographic province known as the Appalachian Plateaus. The Appalachian Plateaus province consists of sedimentary rocks comprised of elevated and horizontal strata that extend continuously from the Adirondacks in northern New York to the coastal plain in Alabama. Much of the plateau is composed of Pennsylvanian and Permian sedimentary strata, including sandstone, siltstone, shale, limestone, and coal, of which the upper strata are more resistant to weathering, resulting in decreased erosional processes (Fenneman and Johnson, 1946; USGS, 2014a; West Virginia Geological and Economic Survey [WVGES], 1969). Topographically, the MXP is within the Kanawha section of the Appalachian Plateaus, which is characterized by relatively flat-lying rocks with elevation ranging from 500 to 3,700 feet (Gesch, 2007). The Kanawha section features undulating low, broad ridges and swells parallel to the mountains to the east, reducing in amplitude as the plateau slopes to the west.

4.1.1.2 Gulf XPress Project

The GXP facilities are located within three physiographic provinces: the Appalachian Plateaus, Interior Low Plateaus, and Coastal Plain (Fenneman and Johnson, 1946). Table 4.1-1 provides a summary of the characteristics of the physiographic sections within these three physiographic provinces.

Table 4.1-1
Characteristics of the Physiographic Provinces Affected by the GXP Facilities

Facility	Province	Section	Geologic Characteristics
Morehead Compressor Station, Grayson Compressor Station, Leach C Meter Station	Appalachian Plateaus	Kanawha	Relatively flat-lying rocks with elevation ranging from 500 to 3,700 feet. Features undulating low, broad ridges and swells parallel to the mountains to the east, reducing in amplitude as the plateau slopes to the west.
Paint Lick Compressor Station	Interior Low Plateaus	Lexington Plain	Primarily underlain by limestone and has rolling upland dissected by streams. Erosion of limestone bedrock has created rolling hills with deep soil.
Goodluck Compressor Station, Clifton Junction Compressor Station	Interior Low Plateaus	Highland Rim	Landforms were formed by platform deposition of continental sediments into a shallow inland sea, followed by uplifting to form a level-bedded plateau, which has been shaped by differential erosion to form a moderate to deeply dissected area.
Cane Ridge Compressor Station	Interior Low Plateaus	Nashville Basin	Oval depression with a gently rolling surface in central Tennessee, which is low-lying and surrounded by the Highland Rim. The basin was formed by the differential erosion of more erodible rock that had been uplifted during the creation of the Nashville Dome.
New Albany Compressor Station	Coastal Plan	East Gulf Coastal Plain	Subtle topography, soils derived primarily from unconsolidated sands, silts, and clays transported to the region by the weathering of the Appalachian Mountains.
Holcomb Compressor Station	Coastal Plan	Mississippi Alluvial Plain	Mostly a broad, flat alluvial plain with river terraces, swales, and levees providing the main elements of relief.

The GXP involves nine discrete sites spread across nearly 520 miles. Because of the distances among the nine facilities, there is geological variability among the locations, ranging from the inland side of the Appalachian Mountains in Kentucky to the relatively flat sedimentary layers of Mississippi.

In Kentucky, the GXP includes three new compressor station facilities and upgrades at two existing facilities. The overburden material above bedrock at the Morehead Compressor Station site consists of Quaternary Alluvium that is primarily a silty sand. This Quaternary Alluvium is underlain by Mississippian Period shales. The Paint Lick and Goodluck Compressor Station sites are located on carbonate bedrock that is karst susceptible. The Paint Lick Compressor Station site has bedrock of the Ordovician Period Ashlock Formation, which has a dominant lithology of limestone and shale. The Goodluck Compressor Station site has bedrock of the Mississippian Period Salem, Warsaw, and St. Louis limestones. The existing Leach C Meter Station is located above bedrock of the Monongahela and Conemaugh Formations (undivided siltstones), and the approved Grayson Compressor Station is positioned above Breathitt Formation bedrock which is predominantly a shale, but does contain some siltstone (Kentucky Geologic Survey, 2016; USGS, 2015a).

In Tennessee, the GXP includes the Cane Ridge Compressor Station, located within the Nashville Basin, and the Clifton Junction Compressor Station, located in the western Highland Rim (see table 4.1-1). The Cane Ridge Compressor Station and the Clifton Junction Compressor

Station have bedrock that consists of limestone from the Ordovician and Silurian Periods, respectively (USGS, 2015b).

In Mississippi, the GXP includes the New Albany Compressor Station and the Holcomb Compressor Station. Mississippi is completely underlain by sedimentary rocks dating as far back as the Paleozoic Era. The combined thickness of all the formations is approximately 50,000 feet. Many of the formations extend to the surface, but others are completely covered by younger sediments and have been identified by wells drilled in the area (Rainwater, 1961). The New Albany Compressor Station lies above the Ripley Formation, an Upper Cretaceous Period sandstone with some intermixed clay and sandy limestone. The Ripley Formation overlies units containing limestone and chalk. The Holcomb Compressor Station lies just east of the Mississippi Alluvial Plain and consists of the Kosciusko bedrock formation, which contains irregularly bedded sandstone intermixed with clay and some quartz (MDEQ, 2016a; USGS, 2015c).

4.1.2 Mineral Resources

The following sections describe the mineral resources identified near the MXP and GXP facilities.

4.1.2.1 Mountaineer XPress Project

Columbia Gas investigated the possible presence of wells, mines, or mining areas within 0.25 mile of the MXP facilities through the review of publicly available data from the WVDEP.

The proposed MXP facilities are within 0.25 mile of several known oil or gas wells, mines, and quarries. A summary of the known mineral resources within 0.25 mile of the facilities, as depicted in the publicly available datasets, is provided in table 4.1-2. Of the 1,658 oil and gas wells identified within 0.25 mile, 1,015 are active wells or under construction; 79 wells have an unknown status; and the remaining 564 are inactive. Inactive wells are either plugged and abandoned or were permitted and never drilled (WVDEP, 2015a and 2015b).

Table 4.1-2
Summary of Mineral Resources within 0.25 mile of MXP Facilities

Project Facility	Number of Oil and Gas Wells	Number of Active Oil and Gas Wells	Number of Active Oil and Gas Wells within Workspace	Number of Mines or Quarries
MXP-100	1,438	890	0	4
MXP-200	112	65	0	0
SM80 Line	0	0	0	0
SM80 Loop Line	0	0	0	0
Other Facilities	108	60	0	0
Total	**1,658**	**1,015**	**0**	**4**

Source: WVDEP 2015a; WVDEP, 2015b

Existing operating or non-operating wells have been identified within the MXP footprint. These production wells vary in age, size, and condition. Construction activity would be limited

and avoided in proximity to these wells (regardless of operational status), and workspace would be reduced around the demarcated area and any maintained well pads. Signs and safety fencing would be installed so that Columbia Gas' activities would not damage the well or holding tank. Columbia Gas would attempt to identify the owners of the wells to locate associated pipelines as well as coordinate the MXP construction schedule. If the owners cannot be identified, Columbia Gas would mark all lines identified through owner and/or landowner consultations, county records searches, permitting records, and West Virginia 811 (One-Call), as well as field identifications prior to construction.

Four known subsurface coal mines are within 0.25 mile of MXP workspaces, as described in table 4.1-3. There are documented inaccuracies in the publicly available datasets; thus, the locations are only approximations. Based on review of coal mining operations near the MXP, two of these mines have the potential to impact MXP facilities. Columbia Gas has been meeting regularly with the mine operator representatives and has determined that the MXP would not be undermined by longwall methods at the active mines for at least 6 years (see section 4.1.4.6 for additional details regarding longwall mining). Columbia Gas would continue communications with local mine operators regarding mining operations near the MXP. No mines are within 0.25 mile of the proposed MXP compressor station sites.

Table 4.1-3
Coal Mines Within 0.25 mile of MXP Workspaces

Proposed Facility/ Nearest Milepost	Status	Owner	Direction from Workspace	Distance from Workspace (feet)
MXP-100				
1.4	Active	McElroy Coal Company	In workspace	0
2.9	Active	McElroy Coal Company	Northeast	814
4.4	Active	McElroy Coal Company	West	1,247
4.9	Active	McElroy Coal Company	In workspace	0
Source: WVDEP, 2015a and 2015b				

If mineral resources are encountered on or near the pipeline or facility locations, the information would be used to make route adjustments, as necessary. Any mineral resources discovered by Columbia Gas in the MXP workspaces would be avoided on a case-by-case basis and as reasonably practicable, including but not limited to rerouting or reducing the width of the workspace to avoid the resource or as defined by the terms of the landowner agreement or coordination with the operator. The MXP would not have an effect to these mineral resources or disrupt any future reclamation activities. However, once the MXP easement is acquired, no future mineral resource surface excavation would be allowed to occur within the easement.

4.1.2.2 Gulf XPress Project

Columbia Gulf investigated the possible presence of wells, mines, or mining areas within 0.25 mile of the GXP facilities through the review of publicly available data from the USGS and Hart Energy (USGS, 2003a; Hart Energy, 2013). Only the existing Leach C Meter Station is within 0.25 mile of any known oil or gas wells, and none of the GXP work sites are within 0.25 mile of a mine or quarry. The Leach C Meter Station boundary is approximately 33 feet south-southwest

from an active oil well; however, the well would not be disturbed by GXP activities. No wells were identified within the boundaries of any GXP facility sites. Any mineral resources discovered in the GXP workspace during construction would be avoided on a case-by-case basis and as reasonably practicable, including but not limited to adjusting the GXP workspace to avoid the resource.

4.1.3 Paleontology

4.1.3.1 Mountaineer XPress Project

Based on a review of the project by the WVGES, no significant paleontological resources are known to occur within the vicinity of the MXP work areas. Although the WVGES has no legal authority to control access to any potential paleontological sites, Columbia Gas would consult with the WVGES if any paleontological resources are discovered during MXP construction.

4.1.3.2 Gulf XPress Project

Columbia Gulf does not anticipate encountering scientifically significant paleontological resources within the proposed project areas. The New Albany and Holcomb Compressor Station sites are not located in areas with shallow bedrock. The modifications proposed for the GXP at the approved Grayson Compressor Station and the existing Leach C Meter Station would take place within the permanent footprint of these facilities or on previously disturbed land and would result in no new impacts on paleontological resources. The remaining five sites (Morehead, Paint Lick, Goodluck, Cane Ridge, and Clifton Junction) were assessed as having low potential for significant paleontological resources. Columbia Gulf would consult with the appropriate state agencies if paleontological resources are uncovered during GXP construction.

4.1.4 Geologic Hazards

The MXP facilities would be designed and constructed to provide adequate protection from geologic hazards that may cause infrastructure to move or sustain abnormal loads. Such hazards include seismicity (e.g., earthquakes), surface faults, soil liquefaction, landslides, flash flooding, karst terrain, steep slopes, and mine subsidence. The overall effects of MXP construction and operation on topography and existing geologic conditions would be minor. Primary impacts would be limited to construction activities and would include temporary disturbance of slopes at facilities or within pipeline corridors resulting from grading and trenching operations. During construction activities, some slopes within the construction workspaces would be contoured to safely accommodate construction equipment operation (see section 2.4.4.6). However, after completion of construction activities, topography and associated drainageways would be returned to pre-construction contours and elevations to the extent practicable.

The overall effects of GXP construction and operation on topography and existing geologic conditions would be negligible. Primary impacts would be limited to construction activities, including the potential need for blasting to remove shallow bedrock. During construction activities, some slopes within the construction workspaces may require minor contouring to level the site for the station facilities. However, this would not substantially alter the topography of the sites.

The followings sections discuss the geologic hazards that could potentially occur at MXP and GXP work areas and the mitigation measures that would be implemented to limit or avoid impacts on project facilities. Conditions necessary for the development of other geologic hazards, including avalanches and volcanism, are not present in the region crossed by the projects and, therefore, are not discussed. In addition, conditions necessary for the development of landslides, soil liquefaction, and mine subsidence are not present in the GXP work areas; therefore, these hazards were not evaluated for the GXP.

4.1.4.1 Earthquakes

Most significant earthquakes around the world are associated with tectonic zones where one crustal plate is overriding another, where tectonic plates are sliding past each other, or where tectonic plates are converging. The size of an earthquake can be measured using three descriptions: intensity, magnitude, and acceleration (U.S. Atomic Energy Commission, 1963).

Earthquake intensity is an observed measure of the extent to which man-made structures are damaged by a seismic event and generally depends on a structure's distance from the epicenter of that event. The Modified Mercalli Intensity Scale ranges from an earthquake intensity of I to XII, with increasing severity from "not felt" to "total damage," respectively (see table 4.1-4) (Cargo and Mallory, 1977).

Table 4.1-4
Range of Earthquake Intensities

Modified Mercalli Intensity Value	Description of Intensity (Severity) Factors
I	Not felt except by a very few people under especially favorable circumstances.
III	Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing automobiles may rock slightly. Vibration like a passing truck.
V	Felt by nearly everyone; many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.
VI	Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate damage in well-built ordinary structures; considerable damage in poorly built or badly designed structures. Some chimneys broken. Noticed by persons driving automobiles.
XII	Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

Source: Modified from Cargo and Mallory, 1977

The magnitude of an earthquake can be measured using the Richter Magnitude Scale, among other scales. The Richter Magnitude Scale measures the velocity of the seismic waves of energy released by the earthquake. The scale is logarithmic; an increase of one unit of magnitude means that the amount of energy released has increased by a factor of approximately 30 (U.S. Atomic Energy Commission, 1963). Depending upon its size and location, an earthquake can cause ground shaking, surface fault rupture, and ground failure. Four characteristics influence the

damage that can be caused by ground shaking: size, attenuation, duration, and site response. Surface faulting is the offset or tearing of the ground surface by differential movement along a fault during an earthquake. Surface faulting is rare in earthquakes of Richter Scale magnitude 5.5 or less. However, earthquakes can induce landslides and liquefaction of susceptible soils.

4.1.4.1.1 Mountaineer XPress Project

The east coast of the United States is a passive tectonic plate boundary located on the "trailing edge" of the North American continental plate, which is relatively seismically quiet. Earthquakes do occur in the region where the MXP would be constructed, but are generally less severe and less damaging than those occurring at plate boundaries (Virginia Department of Mines, Minerals, and Energy, 2013).

The USGS probabilistic seismic hazard mapping model (2014) characterizes potential earthquake ground shaking from future earthquakes. The model allows for the calculation of peak ground acceleration (PGA) measured in percent gravity (g) for various return periods and for specific locations. The MXP work areas have a PGA of 0 to 4 percent g for the northern portion of the pipeline route and a PGA of 5 to 8 percent g for the southern portion of the pipeline route with a 2-percent probability of exceedance in a 50-year period. For a 10-percent probability of exceedance in a 50-year period, the entire pipeline corridor has a PGA of 0 to 2 percent g (USGS, 2014b and 2014c). As indicated in table 4.1-5, earthquake ground shaking resulting from the predicted PGAs within the MXP work areas could be expected to result in light-to-moderate perceived shaking and very light-to-no damage (Wald et al., 2006).

Table 4.1-5
Comparison of Earthquake Peak Ground Acceleration, Perceived Shaking Effects, and Potential Damage

PGA (percent gravity)	Perceived Shaking	Potential Damage
< 0.17	Not felt	None
0.17 - 1.4	Weak	None
1.4 - 3.9	Light	None
3.9 - 9.2	Moderate	Very light
9.2 - 18	Strong	Light
18 - 34	Very strong	Moderate
34 - 65	Severe	Moderate to heavy
65 - 124	Violent	Heavy
> 124	Extreme	Very heavy

Source: Wald et al., 2006

According to the USGS, the largest magnitude and most intense earthquake in West Virginia occurred in 1969 in Mercer County, approximately 95 miles southeast of MP 163. The earthquake registered a Richter Scale magnitude of 4.5 (VI on the Modified Mercalli Intensity Scale) and resulted in minor damage to structures, including cracked and fallen plaster and broken windows (Stover and Coffman, 1993). The WVGES reported a magnitude 4.7 earthquake occurring in 1976 in McDowell County, approximately 70 miles southeast of MP 163 (WVGES,

2014). The largest recorded earthquake in counties crossed by MXP facilities was in 1824, centered in Wetzel County, West Virginia, with a magnitude of 4.1 (WVGES, 2014).

Based on the low probability of localized earth movements near the MXP work areas, we do not anticipate any significant impacts attributable to earthquakes. Activities typically associated with the installation and maintenance of pipelines and associated aboveground facilities are considered low impact, as they disturb only limited areas of surface soil and shallow bedrock, and would not be expected to induce earthquakes. In addition, natural gas pipelines and associated aboveground facilities constructed using modern welding techniques have performed well in seismically active areas of the United States, such as California (O'Rourke and Palmer, 1996).

4.1.4.1.2 Gulf XPress Project

Seismically, the region containing the GXP work areas is relatively quiet. However, earthquakes are possible in the region, largely due to trailing edge tectonics and residual stress release. The New Madrid Seismic Zone (NMSZ) (located in southeastern Missouri, northeastern Arkansas, western Tennessee, western Kentucky, and southern Illinois) is approximately 80 miles from the nearest GXP facility (Clifton Junction site) and is the most active seismic area in the United States east of the Rocky Mountains (Missouri Department of Natural Resources, 2015). The NMSZ experienced a series of major earthquakes in 1811 and 1812 that were Richter magnitudes 7 to 8 and have an average recurrence time of 500 years (USGS, 2009).

In 2011, the USGS created modeling scenarios to depict the geographic extent and effects of a magnitude 7.7 earthquake in the NMSZ. These scenarios indicate that the shaking from a magnitude 7.7 earthquake would have a Modified Mercalli Intensity Value of VII across the GXP work areas and a PGA of 25 percent g or less (USGS, 2014d). Columbia Gulf would design its facilities to withstand potential seismic activities anticipated in the NMSZ.

As previously mentioned, the USGS probabilistic seismic hazard mapping model (2014) characterizes potential earthquake ground shaking from future earthquakes. PGAs for each GXP facility are listed in table 4.1-6 (USGS, 2014b and 2014c).

Table 4.1-6
Peak Ground Acceleration per GXP Facility

Facility	10 Percent Probability of Exceedance in a 50-year Period (percent gravity)	2 Percent Probability of Exceedance in a 50-Year Period (percent gravity)
Morehead Compressor Station	3-5	5-8
Paint Lick Compressor Station	3-5	5-8
Goodluck Compressor Station	3-5	5-8
Grayson Compressor Station	0-2	5-8
Leach C Meter Station	0-2	5-8
Cane Ridge Compressor Station	3-5	9-14
Clifton Junction Compressor Station	6-7	15-20
New Albany Compressor Station	6-7	15-20
Holcomb Compressor Station	3-5	9-14

Source: USGS, 2014b, 2014c

As indicated in tables 4.1-5 and 4.1-6, earthquake ground shaking resulting from the predicted PGAs within GXP work areas could be expected to range from shaking that is not felt and no damage to very strong perceived shaking with moderate damage (Wald et al., 2006).

Based on the low probability of localized earth movements near the GXP work areas, we do not anticipate any damage attributable to such movements. Activities typically associated with facility construction and maintenance are considered low impact, as they disturb only limited areas of surface soil and shallow bedrock. In addition, Columbia Gulf would design and construct the facilities to withstand the anticipated seismic activity at each site.

4.1.4.2 Faults

Faults are fractures in the earth's crust where displacement has occurred. Tectonic movement along faults can cause seismic events. The USGS maintains a database containing information on faults and folds in the United States believed to be sources of earthquakes greater than Richter magnitude 6 in the past 1.8 million years (Quaternary age) (USGS, 2006).

4.1.4.2.1 Mountaineer XPress Project

No Quaternary-aged faults in the USGS database are located beneath or near MXP facilities. The nearest areas of potential concern to the MXP facilities are at least 100 miles away: the Central Virginia Seismic Zone, approximately 190 miles southeast of MP 150; the Eastern Tennessee Seismic Zone, approximately 100 miles southwest of MP 163; and Virginia's Giles County Seismic Zone, approximately 100 miles southeast of MP 163.

4.1.4.2.2 Gulf XPress Project

No Quaternary-aged faults in the USGS database are located beneath or near GXP facilities.

4.1.4.3 Soil Liquefaction

Soil liquefaction is a phenomenon often associated with seismic activity in which saturated, non-cohesive soils temporarily lose their strength and behave like a viscous liquid when subjected to forces such as intense and prolonged ground shaking. Areas susceptible to liquefaction generally include sandy or silty soils along rivers, streams, lakes, and shorelines, or in areas with shallow groundwater.

4.1.4.3.1 Mountaineer XPress Project

Soil conditions necessary for liquefaction to occur would likely be present within MXP work areas. However, due to the low potential for a seismic event that would cause strong and prolonged ground shaking, the potential for soil liquefaction to occur within the MXP work areas is considered very low.

4.1.4.3.2 Gulf XPress Project

Soil conditions necessary for liquefaction to occur are not anticipated to be present within GXP work areas.

4.1.4.4 Landslides

Landslides are the down slope movement of rock, debris, or soil under the force of gravity due to natural or man-made causes. Slope failure causing a landslide can be initiated by precipitation, seismic activity, slope disturbance due to construction or other activity, or a change in groundwater conditions, such as a seasonal high groundwater table. Construction factors that may increase the potential for slope failure could include trenching along slopes and the burden of construction equipment on unstable surfaces. Earthquake-induced landslides occur under a broad range of conditions: in steeply sloping to nearly flat land; in bedrock, unconsolidated sediments, fill, and mine dumps; and under dry and very wet conditions. The principal criteria for classifying landslides are types of movement and types of material. The types of landslide movement that can occur are falls, slides, spreads, flows, and combinations of these. Materials are classified as bedrock and engineering soils, with the latter subdivided into debris (mixed particle size) and earth (fine particle size) (Campbell, 1984).

4.1.4.4.1 Mountaineer XPress Project

The Radbruch-Hall Landslide Incidence and Susceptibility Maps summarize geologic, hydrogeologic, and topographic data (Radbruch-Hall, 1982). Based on Radbruch-Hall data, the MXP is entirely within areas with a high incidence and high susceptibility to future landslides. Columbia Gas would implement monitoring and mitigation for slope hazards as described in section 2.4.4.6.

If a significant landslide hazard is identified during MXP construction, Columbia Gas would implement mitigation measures intended to stabilize the area. Measures could include burial of the infrastructure below the potential landslide depth, if feasible, and/or drainage control. Drainage control may include frequent permanent erosion controls, subsurface gravel or cobble drains, or culverts and drainage ditches to divert water away from the pipeline corridors. Construction techniques described in section 2.4.4.6 would minimize the potential of slope failure, erosion, and other potential impacts from construction on steep slopes. These techniques may include both temporary and permanent erosion control measures and other best management practices (BMP), as outlined in Columbia Gas' ECS.

To further refine our assessment of proposed mitigation measures in areas characterized by steep slopes or slip-prone soils and to provide location-specific information to aid during compliance inspections, **we recommend that:**

- **Prior to the end of the draft EIS comment period, Columbia Gas should file with the Secretary the results of a Phase I Landslide Hazard Assessment, which identifies and characterizes (through desktop analysis utilizing published data and reports, aerial photographs, and LiDAR imagery) landslide hazards along the pipeline alignment. The Phase I assessment should consider surface and subsurface water sources in**

combination with changes in the local ground conditions from recent or historical changes in geologic conditions and/or due to construction-related activities.

- **<u>Prior to construction</u>, Columbia Gas should file with the Secretary for review and approval from the Director of OEP, the results of a Phase II Landslide Hazard Assessment, which includes the results of all field activities to investigate and document the status of all potential landslide areas, and provide a Landslide Mitigation Plan that includes site-specific mitigation measures to be conducted during construction and operation of the project on steep slopes and slip-prone soils. The Landslide Mitigation Plan should include:**
  - **a. a description of how construction activities would be conducted on steep slopes and in areas prone to instability;**
  - **b. safety protocols for personnel working on steep slopes or areas prone to instability;**
  - **c. measures Columbia Gas would implement if project-related activities result in instability/landslides during, and after, MXP construction; and**
  - **d. steps to be taken to stabilize and restore such areas affected by project-related activities.**

  The Phase II Landslide Hazard Assessments and the Landslide Mitigation Plan should be developed in consultation with the WVDEP and WVDNR.

4.1.4.4.2 Gulf XPress Project

Conditions necessary for the development of landslides are not present in the GXP work areas.

4.1.4.5 Steep Slopes

Steep slopes are defined as slopes 30 percent and greater. Steep slopes are a concern due to the specialized construction techniques required on these slopes and due to the increased risk of construction equipment losing stability.

4.1.4.5.1 Mountaineer XPress Project

The MXP would be constructed in areas with steep slopes. MXP pipelines would cross about 58.2 miles of greater than 30 percent slopes, including 55.6 miles along MXP-100, 2.4 miles along MXP-200, less than 0.1 mile along the SM80 Line, and 0.1 mile along the SM80 Loop Line.

On steep slopes, or other areas of special concern that may be prone to landslides, the spacing of the permanent erosion controls would be reduced to 100 feet (or even to 50 feet if the area contains a steep slope and is highly susceptible to landslides). Additional erosion control measures approved by the EI may be used on steep slopes to help stabilize the construction work areas, including soil stabilization/retainment methods such as soil anchors, gabion baskets, soil blending, etc., and/or including engineering systems, as required.

4.1.4.5.2 Gulf XPress Project

Steep slopes are not present in the GXP work areas.

4.1.4.6 Mine Subsidence

Mine subsidence is a shift in the ground surface due to a collapse or failure of underground mine workings. Subsidence can range from small, localized areas of collapse, including sinkholes or troughs, to a broad, regional lowering of the ground surface.

4.1.4.6.1 Mountaineer XPress Project

We received a comment during public scoping regarding the safety risk of mining land beneath a pipeline. Underground mining for coal has occurred in West Virginia since the 1800s. In the United States, the traditional method used for coal extraction is room-and-pillar mining. This consists of excavating an area ("room") while leaving pillars of coal in place to support the mine roof. The other basic method of underground coal mining is longwall mining. Longwall mining involves the complete removal of coal contained in a large rectangular block or "panel." Following removal of the coal, the mined-out area is allowed to collapse. Longwall mining coal production has grown rapidly over the past 50 years and is now one of the principal underground mining methods in the United States (EIA, 1995).

One impact of underground mining, especially longwall mining, is subsidence at the surface when the mine collapses. The potential damage of subsidence on structures (e.g., building, roads, utility lines) at or near the surface depends on the structure's orientation and position within the subsided area (EIA, 1995). Based on a review of the publicly available data from the WVDEP, four known coal mine sites are within 0.25 mile of MXP facilities (WVDEP, 2015a and 2015b). There are known and documented inaccuracies in the publicly available datasets that have a margin of error as to the exact location of the mineral resources.

Columbia Gas has active working relationships with the local mining companies that conduct longwall mining in the area. Columbia Gas would coordinate with the mining companies in advance of any proposed mining so that appropriate planning for subsidence can occur. Once a mining schedule has been finalized, Columbia Gas would strip the overlaying topsoil from its pipeline(s) to reduce the downward pressure created by subsidence in the area to be mined. If subsidence is detected in the vicinity of the pipeline, and as necessary, Columbia Gas would coordinate with FERC to mitigate any potential effects on the pipeline. Any mineral resources discovered in the MXP workspace during construction would be avoided on a case-by-case basis, including but not limited to rerouting or narrowing the right-of-way width to avoid the resource. Columbia Gas would continue to coordinate with the mining companies for the duration of operation.

4.1.4.6.2 Gulf XPress Project

None of the GXP work sites are within 0.25 mile of a mine or quarry.

4.1.4.7 Karst Terrain

Karst is a landscape type or terrain characterized by the presence of sinkholes, caverns, and in some cases a highly irregular, pinnacled bedrock surface. Karst develops from the dissolution of soluble bedrock (limestone, dolomite, marble, or gypsum) by groundwater. Karst terrain often has unique hydrology and highly productive aquifers; however, these aquifers are very susceptible to contamination. Additionally, sinkhole features can present a risk of ground collapse that can damage structures.

Sinkholes, which are a major feature of karst terrain, fall into two broad categories: vault-collapse sinkholes and cover-collapse sinkholes. Vault-collapse sinkholes are characterized by the sudden catastrophic failure of a subterranean cavern vault (i.e., a roof), causing the rapid displacement of surface materials into the resulting void. The more common sinkhole type, a cover-collapse sinkhole, forms from the transport of soil materials from the surface into the bedrock through pre-existing voids or conduits. The resulting voids from this process are filled with the surrounding soil materials (a process called piping), and over time, form a noticeable depression on the land surface. This natural process can be exacerbated by disturbances such as:

- precipitation events;
- an increase or redirection of overland or subsurface hydrology (i.e., surficial grading), which may accelerate the transportation of soil materials;
- removal of vegetation cover and topsoil (e.g., stripping or grubbing), which can reduce the cohesive strength of soils; and
- sudden changes in the elevation of the water table (e.g., due to drought, over-pumping of wells, or quarry dewatering), which can remove the natural buoyancy of the water supporting a soil plug in a bedrock channel.

4.1.4.7.1 Mountaineer XPress Project

Based on mapping from the USGS, the nearest known karst to the MXP is approximately 7.5 miles north of MP 0 (Weary and Doctor, 2014). Because known karst is not present in or in proximity to the MXP workspace, karst is not considered a risk to the MXP facilities, and the MXP would not pose a risk of contamination to karst aquifers. If Columbia Gas encounters a sinkhole, notification would be made to the WVDEP – Groundwater/Underground Injection Control Department, and Columbia Gas would follow the WVDEP's Sinkhole Mitigation Guidance document in addition to the Karst Mitigation Plan that was developed for the E Systems Project (FERC Docket No. CP15-160), a recent Columbia Gas project in Kentucky.

4.1.4.7.2 Gulf XPress Project

Based on karst topography mapping from the USGS on a national scale, karst terrain may be present at the locations of the Paint Lick, Goodluck, Cane Ridge, Clifton Junction, and New Albany Compressor Station sites (Weary and Doctor, 2014). Columbia Gulf conducted geotechnical studies at each of the new facilities and found that there was no karst terrain present at the New Albany site. However, karst terrain was found at the remaining four sites. During the geotechnical exploration of the four sites, the encountered soil materials with karst terrain did not

exhibit typical signs of active features, such as soft overburden soils, elevated moisture contents, thick weathered zone of bedrock, or voids/clay-filled seams within the bedrock. The existing Leach C Meter Station and approved Grayson Compressor Station are not located in karst terrain. At sites where karst topography is determined to be a potential hazard, Columbia Gulf would construct foundations that are supported by competent bedrock to mitigate the risk of foundation disturbance due to seismic activity or sinkhole development.

4.1.4.8 Flash Flooding

Flash floods can occur very rapidly, during periods of extremely heavy rain or when levees, dams, or water systems break. The greatest potential for flash flooding to impact the project areas is at a wetland or waterbody crossing during or after a large storm event with significant precipitation over a short period.

4.1.4.8.1 Mountaineer XPress Project

Flooding associated with heavy rainfall can occur throughout most MXP work areas. However, the potential for flash flooding to occur and significantly impact construction or operation of MXP facilities is low. Potential effects associated with high rainfall events during construction would be mitigated by implementing the measures in Columbia Gas' ECS. These measures include using additional equipment (e.g., stand-by pumps) during high rainfall events. We do not anticipate impacts on construction due to flooding within the MXP work areas. MXP facilities located within FEMA's 100-year floodplain would be built according to county floodplain ordinances; therefore, we do not anticipate impacts on project operation due to flooding within the MXP work areas.

4.1.4.8.2 Gulf XPress Project

Portions of the approved Grayson Compressor Station site as well as portions of the TWS for the New Albany Compressor Station are located within the 100-year floodplain. At the Holcomb Compressor Station site, a portion of the TWS is within the 100-year floodplain, and two small corners of permanent workspace encroach into the 100-year floodplain along the western fenceline. GXP facilities located within FEMA's 100-year floodplain would be built according to county floodplain ordinances; therefore, we do not anticipate impacts on project operation due to flooding within the GXP work areas. The potential for flash flooding to occur and significantly impact construction or operation of the GXP facilities is low.

4.1.4.9 Blasting

MXP and GXP construction may require blasting if shallow bedrock is encountered, as discussed in section 2.4.1.5.

4.1.4.9.1 Mountaineer XPress Project

Based on analysis of the U.S. Department of Agriculture (USDA) NRCS Soil Survey Geographic (SSURGO) database, approximately 80 percent of the MXP workspace contains bedrock within 60 inches of the ground surface (USDA, 2015). The absence of recorded shallow bedrock does not preclude the potential of encountering shallow bedrock in other areas.

If paralithic (soft) bedrock is encountered at depths less than 60 inches along the MXP pipeline corridors, the technique used for bedrock removal would depend on such factors as strength and hardness of the rock. Columbia Gas would attempt to use mechanical methods, such as ripping, hydraulic hammers, or conventional excavation, to remove the bedrock. The method(s) chosen would depend upon the conditions encountered at the time of construction. If dense, consolidated bedrock without fractures (lithic bedrock) is encountered and the use of hydraulic hammers or other mechanical methods are found to be ineffective, blasting may be required.

Columbia Gas has prepared a Blasting Plan, which would be implemented during construction. As part of this plan, contractors would be required to submit site-specific blasting plans to Columbia Gas for approval prior to blasting activities for each location requiring blasting.

General blasting precautions would include, but not be limited to:

- inventorying public and private drinking-water wells and potable springs in proximity to the construction work area (typically within 150 feet) and completing pre- and post-blast (within 2 months of construction work restoration) water quality and flow rate testing, if requested by the landowner;
- completing pre-blast inspections and, if necessary, seismographic monitoring of nearby residences (within 150 feet of construction area) and other structures by an independent contractor;
- installing blasting mats in congested areas, in shallow waterbodies, or near structures that could be damaged by fly-rock;
- posting visual and audible warning signals, flags, and barricades for personnel safety;
- notifying occupants of nearby buildings, stores, residences, places of business, and places of public gathering, as well as farmers, at least 48 hours in advance of blasting activities;
- notifying the local fire marshal of blasting activities prior to blasting; the fire marshal would be notified the day of blasting via phone or email;
- following procedures for safe storage, handling, transportation, loading, firing, and disposal of explosive materials;
- conducting a three-axis seismic survey for each blast event within 300 feet of a Columbia Gas pipeline, unless otherwise permitted by appropriate Columbia Gas personnel; and
- monitoring ground vibration and air-blast using peak-particle-velocity measurements when seismographic monitoring is necessary.

The blasting specifications would meet or exceed applicable federal, regional, state, and local requirements, limits, permits, and guidelines governing the use of explosives. Explosive material would only be brought onsite the day of its intended use. Unused explosive material would be inventoried and transported to a designated storage facility.

A pre-blasting survey would be conducted, with landowner permission, to assess the conditions of structures and wells within 150 feet of the blasting area. The survey may include the following:

- discussions with adjacent property owners to familiarize them with blasting effects and planned precautions to be taken by Columbia Gas;
- identification of site-specific structures, utilities, and water wells and potable springs;
- collection of pre-blast photographs and/or video of adjacent structures and utilities; and
- detailed mapping and measurement of large cracks, crack patterns, and other evidence of structural stress observed in specific structures.

The results of the pre-blasting survey would be summarized in a report to be completed prior to the initiation of blasting in the specific area. If property owners were to identify damage or change to properties, or if excessive peak-particle velocities were recorded during the blasting operations, Columbia Gas would perform an additional post-blasting survey of the affected properties to verify the damage. Once confirmed, Columbia Gas would either repair the damage or compensate the owner for blast-related damages.

4.1.4.9.2 Gulf XPress Project

Facility construction may require blasting if shallow bedrock is encountered. Based on analysis of the SSURGO database, approximately 36 percent of the GXP workspace contains bedrock within 60 inches of the surface (USDA, 2016c). Shallow bedrock is present at the Morehead, Paint Lick, Goodluck, Cane Ridge, and Clifton Junction stations sites, as well as at the existing Leach C Meter and approved Grayson Compressor Stations. The New Albany and Holcomb sites do not have identified shallow bedrock. The absence of recorded shallow bedrock does not preclude the potential for encountering it. In areas with potentially shallow bedrock, Columbia Gulf would attempt to utilize ripping or hammering techniques, where possible, to break through the bedrock. If the bedrock proves too hard for these techniques, blasting may be necessary. The specific method(s) chosen would be dependent upon the conditions encountered at the time of construction.

Columbia Gulf has prepared a Blasting Plan, which would be followed by Columbia Gulf and its contractors. As with the MXP, contractors would be required to submit a site-specific blasting plan to Columbia Gulf for approval prior to blasting activities. The blasting precautions and procedures previously addressed for the MXP, including pre- and post-blasting surveys, would also be applicable to the GXP. Potential impacts associated with blasting activities would be minor and temporary.

4.1.5 Conclusion

4.1.5.1 Mountaineer XPress Project

The MXP impacts on geology would be highly localized and limited primarily to the period of construction. These potential impacts would occur in areas of shallow bedrock, where blasting may be required, or where construction occurs on steep slopes that would be highly susceptible to landslides. Construction on steep slopes would require contouring of the slope for safe construction practices and to accommodate heavy equipment.

Columbia Gas would implement permanent drainage controls on steep slopes, or other landslide-prone areas, to help stabilize the construction work areas. Columbia Gas would also implement its Blasting Plan and ECS to minimize the potential impacts from performing construction on steep slopes and any blasting that would occur. Overall, impacts related to topography and existing geological conditions from the construction and operation of the MXP are anticipated to be minor and temporary.

4.1.5.2 Gulf XPress Project

The GXP effects on geology would be highly localized and limited primarily to the period of construction. These impacts would occur in areas of karst terrain or areas with shallow bedrock where blasting may be required. At sites where karst topography is determined to be a potential hazard, Columbia Gulf would construct foundations that are supported by competent bedrock to mitigate the risk of foundation disturbance due to seismic activity or sinkhole development. To minimize the potential impacts from blasting, Columbia Gulf would implement measures contained in its ECS and Blasting Plan. Overall, impacts related to topography and existing geological conditions from the construction and operation of the GXP are anticipated to be minor and temporary.

4.2 SOILS

At the broadest scale, soil interpretations in the United States are based on Major Land Resource Areas (MLRA).

The MXP facilities are located entirely in the Central Allegheny Plateau (MLRA No. 126). The physiography of this MLRA is characterized by a dissected plateau with narrow valleys and ridgetops separated by long and steep side slopes. The dominant soil orders are Alfisols, Ultisols, and Inceptisols, which are characterized as shallow to very deep, skeletal to clayey soils with a mesic (moderate) temperature regime, an udic (high or humid) moisture regime, and mixed mineralogy (USDA NRCS, 2006).

The GXP facilities would be located within six MLRAs recognized by the NRCS: Western Allegheny Plateau, Kentucky Bluegrass, Highland Rim and Pennyroyal, Nashville Basin, Southern Coastal Plain, and Southern Mississippi River Alluvium. A general summary of each MLRA crossed by GXP sites is provided in table 4.2-1.

Table 4.2-1
MLRA Characteristics within the GXP Area

MLRA	Aboveground Facility	Landforms	Soil Characteristics
Western Allegheny Plateau (No. 124)	Morehead Compressor Station, Leach C Meter Station, Grayson Compressor Station	Narrow, level valley floors, rolling ridgetops, and hilly to steep ridge slopes.	Soils generally are moderately deep to very deep, excessively drained to somewhat poorly drained, and loamy.
Kentucky Bluegrass (No. 121)	Paint Lick Compressor Station	Gently rolling terrain with some isolated hills and ridges.	Soils are shallow to very deep, generally well drained, and loamy or clayey.
Highland Rim and Pennyroyal (No. 122)	Goodluck Compressor Station, Clifton Junction Compressor Station	Low, rolling hills, upland flats, and narrow valleys.	Soils are moderately deep to very deep, moderately well drained or well drained, and loamy or clayey.
Nashville Basin (No. 123)	Cane Ridge Compressor Station	Steep slopes between narrow, rolling ridgetops, and narrow valleys.	Soils are moderately deep to very deep, well drained, clayey, and formed in limestone residuum.
Southern Coastal Plain (No. 133A)	New Albany Compressor Station	Nearly level and gently undulating valleys and gently sloping to steep uplands.	Soils are very deep, somewhat excessively drained to poorly drained, and loamy.
Southern Mississippi River Alluvium (No. 131A)	Holcomb Compressor Station	Level or depressional to very gently undulating alluvial plains, backswamps, oxbows, natural levees, and terraces.	Soils are very deep, poorly drained and somewhat poorly drained, and loamy or clayey.

Source: USDA NRCS, 2006

In addition, soil types and characteristics in the MXP and GXP areas were identified and assessed using the SSURGO database. The SSURGO database is a digital version of the original county soil surveys developed by the NRCS for use with geographic information systems (GIS). The SSURGO database is linked to an attribute database that gives the proportionate extent of the component soils and their properties for each soil map unit. SSURGO attribute data consist of physical properties, chemical properties, and interpretive groupings. Attribute data can apply to the whole soil (e.g., hydric soils, prime farmland soils, and slope class) or to layer data for soil horizons (e.g., texture and permeability). The soil attribute data can be used in conjunction with spatial data to describe soils in a particular area. The SSURGO database provides the most detailed level of publicly available soils information for natural resource planning and management.

The SSURGO database was queried to determine the physical and chemical properties for the soil types disturbed by the MXP and GXP facilities. The following soil characteristics and limitations were evaluated for the MXP and GXP: erosion potential (wind and water), revegetation potential, designation as prime farmland, compaction potential, stony and rocky soils, depth to shallow bedrock, hydric soils, topsoil depth, and soil contamination. Additional information about the soils was obtained from the Official Soil Series Descriptions (Soil Survey Staff, 2015a).

4.2.1 Soil Disturbance

Activities associated with the construction of pipeline and facility infrastructure for the MXP and GXP, such as clearing, grading, trench excavation, backfilling, and the movement of construction equipment, affect soil resources. Clearing removes protective vegetation cover and exposes soil to the effects of wind and rain, which increase the potential for soil erosion and sedimentation of surface waters and wetlands. Grading, spoil storage, and equipment traffic can compact soil, thus reducing porosity and increasing runoff potential. Information regarding impacts from non-jurisdictional facilities for both MXP and GXP is discussed in section 1.4.

4.2.1.1 Mountaineer XPress Project

A breakdown of the land requirements by acreage, including total construction impacts by facility type and permanent operational impacts is included in section 2.3.1.

Columbia Gas would use 41 contractor yards and 95 staging areas for the storage of materials and equipment necessary for MXP construction. Approximately 471 acres of soil would be temporarily disturbed through the use of staging areas and contractor yards for the MXP. Preparation of these areas would consist of minor grading and leveling. Once construction is complete, the staging areas and contractor yards would be restored to pre-construction conditions and uses or in accordance with landowner agreements.

A total of 283 access roads would be used for construction and operation of the MXP facilities. Existing access roads may require widening or improvements to accommodate construction equipment, or new access roads may need to be constructed. As detailed in table 2.3-1, approximately 274 acres of soils would be temporarily affected by the use, maintenance of, improvements to, or construction of access roads for the new MXP-100 and MXP-200 pipelines and SM80 pipeline replacement segments. An additional 3.5 acres would be permanently impacted by access roads used for facility operations.

To avoid or minimize impacts on soils during MXP construction, Columbia Gas would implement the soil mitigation measures outlined in its ECS. Columbia Gas' ECS adopts and incorporates the requirements included in FERC's Plan and Procedures with some modifications as discussed in section 2.4, as well as many of the environmental standards established in the WVDEP's 2006 *West Virginia Erosion and Sediment Control Best Management Practice Manual*. Columbia Gas' ECS meets and/or exceeds West Virginia-specific environmental requirements, which are typically as stringent as FERC's Plan and Procedures.

4.2.1.2 Gulf XPress Project

Approximately 198 acres of soil would be temporarily disturbed during construction of the GXP facilities. Of this acreage, approximately 82 acres would be permanently disturbed for project operation. Table 4.2-2 provides additional information about the extent of soil disturbance for each GXP facility.

Table 4.2-2
Soil Disturbance for the GXP Facilities a/

Aboveground Facility	State	Construction Impacts (acres)	Permanent Impacts (acres)
New Aboveground Facilities b/			
Morehead Compressor Station	KY	17.2	11.3
Paint Lick Compressor Station	KY	30.2	10.1
Goodluck Compressor Station	KY	25.7	14.0
Cane Ridge Compressor Station	TN	23.0	10.4
Clifton Junction Compressor Station	TN	29.0	16.1
New Albany Compressor Station	MS	26.4	10.4
Holcomb Compressor Station	MS	33.3	9.2
Existing Aboveground Facilities b/			
Leach C Meter Station	KY	1.4	0.0
Grayson Compressor Station	KY	11.9	0.0
	Total	**198.1**	**81.6**

a The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the sum of the addends.
b Includes the temporary and permanent access road impacts at each of the facilities.

To minimize or avoid potential impacts on soils during GXP construction, Columbia Gulf would implement the measures in its ECS, as well as state and local regulations or guidelines.

4.2.2 Erosion Potential

Erosion is a natural process in which surface soils are worn away, typically by wind or water, but which can be accelerated by human disturbance. Factors such as soil texture, structure, slope, vegetation cover, rainfall intensity, and wind intensity can influence the degree of erosion. Soils prone to erosion are typically bare or sparsely vegetated, non-cohesive, fine textured, and located on moderate to steep slopes. Soils typically more resistant to erosion occupy low relief areas, are well vegetated, and are well structured with high percolation rates. Clearing, grading, and equipment movement can accelerate the erosion process. Without adequate protection, these activities can result in topsoil loss, reduced soil fertility, and erosion of sediment into sensitive areas, including wetlands and surface waters.

Highly erodible soils were identified based on three soil parameters present in the SSURGO database that are directly related to the susceptibility of a soil to erosion by water or wind: land capacity subclass, slope, and wind erodibility group (WEG). Map units with a land capacity subclass designation of 4e through 8e, which are considered to have severe to extreme erosion limitations for agricultural use, and/or an average slope greater than 8 percent, were identified as susceptible to water erosion. Wind erodibility was assessed based on WEG designations. A WEG is a grouping of soils that have similar surface-soil properties affecting their resistance to being blown, including texture, organic matter content, and aggregate stability. Soils in WEG 1 and 2 include sandy-textured soils with poor aggregation that are particularly susceptible to wind erosion.

4.2.2.1 Mountaineer XPress Project

Approximately 3,021 acres (84 percent) of the soils that would be disturbed by MXP activities are susceptible to water erosion. Only about 2 acres of soils to be disturbed by MXP activities are classified as highly susceptible to wind erosion (see table 4.2-3).

We received comment during scoping regarding concerns with the potential for erosion resulting in impacts on soil stability and soil integrity. To limit soil erosion and sedimentation, Columbia Gas would implement a site-specific E&SC Plan and its ECS for each MXP facility. Some of the measures include the following:

- Temporary and permanent erosion controls, including interceptor diversions and sediment filter devices (e.g., straw bales, super silt fences, erosion control blankets, seed, and mulch) would be installed following initial ground disturbance, and as required.
- Temporary erosion control devices would be inspected near the end of each work day or within 24 hours of each storm event of 0.5 inch of rain or greater to monitor proper functioning.
- Any devices damaged beyond functioning would be repaired promptly.
- Temporary erosion and sediment control measures would be removed after final site stabilization or after they are no longer needed.

As outlined in the ECS, final grading would be completed within 20 calendar days (10 days in residential areas) of backfilling, weather and soil conditions permitting. Permanent erosion control devices would be installed during final grading. When conditions require a delay, the time frame would not start until conditions are suitable for grading. Should unsuitable soil conditions persist, or be expected to persist, for more than 10 calendar days, final grading and restoration would be delayed and the EI would record the conditions and require the installation of temporary stabilization measures. In no case would final grading be delayed beyond the end of the next recommended seeding season. If final grade can be established, but conditions are not ideal for permanent seeding, the EI would specify the application of temporary stabilization measures (including temporary seeding and mulching) and may also consider a concurrent application of final seed mix and mulch. Typical upland grading methods would be used on steep slopes to restore the areas of disturbance.

Table 4.2-3
Acreage of Various Soil Characteristics Affected by the MXP Facilities a/, b/

Pipeline Facility	Total Acreage c/	Prime Farmland d/	Hydric Soils d/	Compaction Prone e/	Highly Erodible		Revegetation Concerns h/	Rocky i/	Shallow to Bedrock j/
					Water f/	Wind g/			
New Pipeline Facilities									
MXP-100	2,648.3	130.8	8.9	10.8	2,415.5	0.0	2,414.0	2,433.9	2,332.8
MXP-200	63.2	5.0	0.0	0.0	57.9	0.0	57.9	56.9	54.1
Subtotal	**2,711.5**	**135.8**	**8.9**	**10.8**	**2,473.4**	**0.0**	**2,471.9**	**2,490.8**	**2,386.9**
Replacement Pipeline Facilities									
SM80 Line	3.9	<0.1	0.0	0.0	3.9	0.0	3.9	3.9	3.2
SM80 Loop Line	3.1	0.0	0.0	0.0	3.1	0.0	3.1	3.1	2.7
Subtotal	**7.0**	**<0.1**	**0.0**	**0.0**	**7.0**	**0.0**	**7.0**	**7.0**	**5.9**
Access Roads									
MXP-100	245.5	17.5	0.5	0.8	221.6	0.0	221.3	235.9	212.2
MXP-200	26.3	1.6	0.0	0.0	24.5	0.0	24.2	24.5	23.3
SM80 Line	0.3	0.1	0.0	0.0	<0.1	0.0	<0.1	0.2	0.0
SM80 Loop Line	2.1	0.5	0.0	0.0	1.6	0.0	1.6	2.1	1.3
Subtotal	**274.2**	**19.7**	**0.5**	**0.8**	**247.7**	**0.0**	**247.2**	**262.7**	**236.8**
New Aboveground Facilities									
MXP-100 Tie-in with LEX	2.8	0.0	0.0	0.0	2.8	0.0	2.8	2.8	1.7
Sherwood Compressor and Regulator Station	29.7	9.4	0.0	0.0	20.4	0.0	20.4	14.7	14.7
MXP-200 Tie-in with Line 1983	0.7	0.1	0.0	0.0	0.6	0.0	0.6	0.6	0.6
White Oak Compressor Station	16.6	0.0	0.0	0.0	16.7	0.0	16.7	16.7	16.7
Mount Olive Compressor Station	31.3	0.0	0.0	0.0	29.6	0.0	29.6	29.6	29.0
Ripley Regulator Station	0.8	0.5	0.0	0.0	0.3	0.0	0.3	0.3	0.2
Saunders Creek Regulator Station	10.7	0.0	0.0	0.0	10.7	0.0	10.7	10.7	10.7
MXP Valve Sites	2.1	0.2	0.0	0.0	2.6	0.0	2.6	2.7	2.6
Subtotal	**94.7**	**10.2**	**0.0**	**0.0**	**83.7**	**0.0**	**83.7**	**78.1**	**76.2**
Existing Aboveground Facilities									
Lone Oak Compressor Station l/	10.3	0.0	0.0	0.0	10.3	0.0	10.3	10.3	7.8
Ceredo Compressor Station	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 4.2-3
Acreage of Various Soil Characteristics Affected by the MXP Facilities a/, b/

Pipeline Facility	Total Acreage c/	Prime Farmland d/	Hydric Soils d/	Compaction Prone e/	Highly Erodible		Revegetation Concerns h/	Rocky i/	Shallow to Bedrock j/
					Water f/	Wind g/			
Elk River Compressor Station m/	7.4	5.6 k/	0.0	0.0	1.0	0.0	1.0	1.0	1.0
Subtotal	**32.0**	**5.6**	**0.0**	**0.0**	**11.3**	**0.0**	**11.3**	**11.3**	**8.8**
Staging Areas and Contractor Yards									
Staging Areas	211.4	73.5	4.5	4.5	115.9	0.0	115.9	133.9	102.5
Contractor Yards	259.3	56.9	1.2	2.7	82.4	1.7	61.7	85.8	43.0
Subtotal	**470.7**	**130.4**	**5.7**	**7.2**	**198.3**	**1.7**	**177.6**	**219.7**	**145.5**
Total a/	**3,590.1**	**301.7**	**15.1**	**18.8**	**3,021.4**	**1.7**	**2,998.7**	**3,069.6**	**2,860.1**

Sources: Soil Survey Staff, 2015a and 2015b

a The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the sum of the addends.
b The values in each facility area do not add up to the total acreage because the soils may occur in more than one characteristic class or may not occur in any class listed in the table.
c Includes all land disturbance activities associated with project workspace. Specifically, the tie-ins and compressor stations contain the total permanent facility area and additional temporary workspace acreage associated with these facilities.
d As designated by the NRCS. Prime farmland includes those soils that are considered prime if a limiting factor is mitigated (e.g., artificial drainage).
e Soils in somewhat-poor-to-very-poor drainage classes with surface textures of sandy clay loam and finer.
f Soils in land capability subclasses 4E through 8E and soils with an average slope greater than 8 percent.
g Soils with a WEG classification of 1 or 2.
h Soils with a surface texture of sandy loam or coarser that are moderately well to excessively drained, and soils with an average slope greater than 8 percent.
i Soils with one or more horizons that have a cobbley, stony, bouldery, channery, flaggy, very gravelly, or extremely gravelly modifier to the textural class and/or contain greater than 5 percent by weight rocks larger than 3 inches.
j Soils identified as having bedrock within 60 inches of the soil surface.
k Although the majority of the soils associated with the Elk River Compressor Station site are considered prime farmland, the site is currently being used for industrial purposes. No significant conversion of land currently being used for agricultural purposes is anticipated.
l Approved compressor station proposed by Columbia Gas under the LXP (Docket No. CP15-514-000).
m Pending compressor station proposed by Columbia Gas under the WBX Project (Docket No. CP16-38-000).

4.2.2.2 Gulf XPress Project

Approximately 47 acres (24 percent) of the soils that would be affected by the GXP facilities are considered susceptible to erosion by water (see table 4.2-4). None of the soils that would be affected by the facilities have a WEG classification of 2 or less and, therefore, none are considered highly wind-erodible.

To minimize or avoid potential impacts due to soil erosion and sedimentation, Columbia Gulf would implement the measures in its ECS, as well as state and local regulations or guidelines. Some of these measures include the following:

- Temporary slope breakers would be installed across the GXP suction/discharge pipeline rights-of-way, as necessary, to slow the velocity of runoff and move water offsite.
- Permanent slope breakers, typically earthen berms, would be installed across the suction/discharge rights-of-way, as necessary, during final grading.
- Sediment barriers (e.g., silt fences, straw bales, and straw logs) would be used to protect surface waters and roadways, as necessary, by controlling the movement of sediment on the sites and by preventing the transport of sediment offsite.
- Mulch consisting of straw, hay, erosion-control fabric, or other equivalent, would be used to protect the soil surface from water and wind erosion and optimize soil moisture for successful revegetation.
- Wind erosion and fugitive dust emissions would be controlled by applying water to exposed work areas.

Temporary erosion controls would be installed following initial ground disturbance and maintained throughout construction. Columbia Gulf would attempt to complete final cleanup and installation of permanent erosion control measures in an area within 20 days after final grading in that area, weather and soil conditions permitting. In no case would restoration of an area be delayed beyond the next available seeding season.

During construction, the effectiveness of temporary erosion control devices would be monitored by Columbia Gulf's EIs and Environmental Health and Safety Staff. The effectiveness of revegetation and permanent erosion control devices would be monitored by Columbia Gulf's operating personnel during the operation and maintenance of each aboveground facility. Temporary erosion control devices would be maintained until the site is revegetated successfully. Following successful revegetation of construction areas, temporary erosion control devices would be removed.

Table 4.2-4
Acres of Soil Characteristics Affected by GXP Facilities a/, b/

Facility	Total Acres	Prime Farmland c/	Hydric Soils c/	Compact. Prone d/	Water Erosion e/	Wind Erosion f/	Revegetation Concerns g/	Rocky h/	Shallow Bedrock i/
New Aboveground Facilities j/									
Morehead Compressor Station	17.2	17.2	0.0	9.5	0.0	0.0	0.0	17.2	16.7
Paint Lick Compressor Station	30.2	17.0	0.0	0.0	13.2	0.0	13.2	30.2	13.2
Goodluck Compressor Station	25.7	11.4	0.0	0.0	14.0	0.0	14.0	20.4	0.3
Cane Ridge Compressor Station	23.0	15.2	0.0	0.0	7.8	0.0	7.8	0.2	23.0
Clifton Junction Compressor Station	29.0	5.8	0.0	0.0	9.1	0.0	22.8	16.9	18.2
New Albany Compressor Station	26.4	23.7	0.0	9.3	0.0	0.0	0.0	0.0	0.0
Holcomb Compressor Station	33.3	21.1	12.3	33.3	0.0	0.0	0.0	0.0	0.0
Subtotal	**184.7**	**111.3**	**12.3**	**52.1**	**44.1**	**0.0**	**57.8**	**84.8**	**71.4**
Existing Aboveground Facilities j/									
Leach C Metering Station	1.5	0.9	0.0	0.9	0.6	0.0	0.6	0.1	0.6
Grayson Compressor Station k/	11.9	9.6	0.0	0.0	2.3	0.0	2.3	2.3	0.2
Subtotal	**13.4**	**10.5**	**0.0**	**0.9**	**2.9**	**0.0**	**2.9**	**2.4**	**0.8**
Total	**198.1**	**121.8**	**12.3**	**53.0**	**47.0**	**0.0**	**60.7**	**87.2**	**72.2**

Sources: Soil Survey Staff, 2016a and 2016b

a The area affected includes the permanent facility site, temporary workspace, and additional temporary workspace. The soils in the table do not include areas of open water.
b The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the sum of the addends. The values in each row do not add up to the total acreage for each facility because the soils may occur in more than one characteristic class or may not occur in any class listed in the table.
c As designated by the NRCS. Prime farmland includes those soils that are considered prime if a limiting factor is mitigated (e.g., through artificial drainage).
d Soils in somewhat-poor-to-very-poor drainage classes with surface textures of sandy clay loam and finer.
e Soils in land capability subclasses 4E through 8E and soils with an average slope greater than 8 percent.
f Soils with a WEG classification of 1 or 2.
g Soils with a surface texture of sandy loam or coarser that are moderately well to excessively drained, and soils with an average slope greater than 8 percent.
h Soils with one or more horizons that have a cobbley, stony, bouldery, channery, flaggy, very gravelly, or extremely gravelly modifier to the textural class and/or contain greater than 5 percent by weight rocks larger than 3 inches.
i Soils identified as having bedrock within 60 inches of the soil surface.
j Includes the temporary and permanent access roads (totaling approximately 2.2 acres) at each of the facilities.
k Pending compressor station proposed by Columbia Gulf under the Rayne XPress Project (Docket No. CP15-539-000).

4.2.3 Revegetation Potential

The revegetation potential of soils is based on several characteristics including topsoil thickness, soil texture, available water-holding capacity, susceptibility to flooding, soil temperature, pH, and salinity. Soils that are somewhat excessively or excessively drained have less water to aid in the germination and eventual establishment of new vegetation. Coarser-textured soils also have a lower water-holding capacity following precipitation, which can result in moisture deficiencies in the root zone creating unfavorable conditions for many plants. In addition, steep slopes make the establishment of vegetation difficult due to high runoff potential.

Plant species that can invade natural areas and displace native species are called invasive species. Noxious weeds are plants officially deemed destructive to agriculture, wildlife, property, recreation, and public health. These plants tend to out-compete other plant species and therefore could possibly cause environmental harm. Construction activities include clearing of surface vegetation and grading the ground surface within the designated construction work areas. Removal of plants and disturbance to root systems would occur during this process. Indirect impacts from this activity may include increased exposure to elements such as wind, sun, and precipitation, which could alter plant viability and reproduction. Plants not adapted to different environmental conditions may not survive, while some plants may experience increased growth or reproduction due to altered exposure.

4.2.3.1 Mountaineer XPress Project

Clearing and grading of soils with poor revegetation potential can result in a lack of adequate vegetation following construction and restoration of the MXP pipeline right-of-way. This could cause increased erosion, a reduction in wildlife habitat, and adverse visual impacts. For the MXP, soils with limited potential for the reestablishment of vegetation were identified by querying the SSURGO database for component soil series that have (1) a surface texture of sandy loam or coarser and are moderately well to excessively drained, and/or (2) an average slope greater than 8 percent.

Approximately 3,000 acres (84 percent) of the soils that would be disturbed by the MXP are characterized as having revegetation concerns. Prompt, successful restoration and revegetation are important for maintaining productivity by preserving topsoils and protecting the underlying soil from potential damage, such as erosion. In accordance with its ECS, Columbia Gas would implement measures to create a favorable environment for the re-establishment of vegetation. Restoration would begin within 6 days of final grading, weather and soil conditions permitting. Fertilizer and lime would be disked into the soil (except rocky soils) to a depth of 3 to 4 inches to prepare the seedbed. In rocky soils, fertilizer and lime may be incorporated into the soil with tracked equipment. Seeding and mulching of the construction work area would promptly follow seedbed preparation. To minimize the loss of soil, the mulch would be checked to verify it is adequately anchored. Mulch tackifiers may be used as an alternative, but liquid mulch binders would not be used within 100 feet of wetlands or waterbodies. Additionally, during temporary restoration, mulching on slopes greater than 8 percent and within 100 feet of waterbodies and wetlands would be applied at a rate of 6,000 pounds per acre. Columbia Gas would seed areas to be revegetated in accordance with written recommendations for seed mixes, rates, and dates obtained from the appropriate soil conservation authorities or land management agencies as

outlined in Columbia Gas' ECS. Revegetation in non-agricultural areas would be considered successful if, upon visual survey, the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed lands.

In addition, Columbia Gas would mitigate for invasive plants and noxious weeds by using BMPs identified by agencies or based on MXP-specific requirements, and would work in accordance with its ECS to minimize the spread of these species on all project-related disturbed areas.

4.2.3.2 Gulf XPress Project

For GXP, soils with limited potential for the reestablishment of vegetation were identified by querying the SSURGO database for component soil series that (1) have a surface texture of sandy loam or coarser, (2) are moderately well to excessively drained, and (3) have an average slope greater than 9 percent.

Approximately 31 percent (60.7 acres) of the soils affected by the GXP facilities were identified as having a poor revegetation potential based on the surface texture, drainage class, and slope. Of the approximately 198 acres of soil disturbance that would be required for construction of the GXP aboveground facilities, about 117 acres would be revegetated (i.e., areas that are not paved, graveled, or covered by buildings). Those facilities that would require some revegetation and have soils with poor revegetation potential include the Paint Lick, Goodluck, Cane Ridge, and Clifton Junction compressor stations.

Successful restoration and revegetation is important to protect the underlying soil from potential damage, such as erosion. Columbia Gulf would promote the rapid, successful establishment of vegetation on areas requiring revegetation as described in its ECS. Following final grading and cleanup, Columbia Gulf would condition the temporary construction areas for planting, including the preparation of a seedbed and the application and incorporation of soil amendments at rates agreed to by the land-managing agency or as specified in writing by an appropriate soil conservation authority. Columbia Gulf has initiated consultations with the NRCS District Conservationists for each of the GXP facilities. These consultations are ongoing; final correspondence would be filed with the Commission upon receipt. Columbia Gulf would seed areas in accordance with written recommendations for seed mixes, rates, and dates obtained from the appropriate soil conservation authorities or land-managing agencies.

Columbia Gulf conducted noxious and invasive weed surveys at each of the facility sites. The results of this survey and further discussion is available in section 4.5.5.2 and table 4.5-8.

4.2.4 Prime Farmland

According to the NRCS, prime farmland soils are classified as those best suited for the production of food, feed, forage, fiber, and oilseed crops (Soil Survey Division Staff, 1993). This designation includes cultivated land, pasture, woodland, or other lands that are either used for food or fiber crops or are available for these uses. Urbanized land and open water are excluded from prime farmland. Prime farmland typically contains few or no rocks, is permeable to water and air, is not excessively erodible or saturated with water for long periods, and is not subject to frequent

or prolonged flooding during the growing season. Soils that do not meet the above criteria may be considered prime farmland if the limiting factor is mitigated (e.g., by draining or irrigating).

4.2.4.1 Mountaineer XPress Project

Approximately 8 percent (302 acres) of the lands that would be disturbed by the MXP (including rights-of-ways, aboveground facilities, access roads, contractor yards, and temporary staging areas) are classified as prime farmland (see table 4.2-3). To limit mixing of the soil horizons or incorporation of additional rock into the topsoil, topsoil segregation would be performed within pipeline rights-of-way and TWS that would be revegetated. Topsoil segregation would not occur in areas that would be permanently occupied by the aboveground facilities. Topsoil would be segregated from the subsoil and would be replaced in the proper order during final grading. Implementation of proper topsoil segregation would promote post-construction revegetation success, thereby minimizing loss of vegetation productivity and the potential for long-term erosional issues.

4.2.4.2 Gulf XPress Project

Because the GXP would permanently alter the land use at each new compressor station site, protecting the soil productivity for crop production is not a concern. However, topsoil segregation would be performed in TWS that would be revegetated to limit the loss of topsoil or the mixing of topsoil with other soil horizons.

4.2.5 Compaction Potential

Soil compaction occurs when the soil structure is modified and the bulk density is increased, resulting in a reduction in the porosity and moisture-holding capability of the soil and potentially increased runoff. Construction equipment traveling over wet or saturated soils can disrupt soil structure, reduce pore space, and cause compaction. The degree of compaction depends on the soil texture and moisture content. Fine-grained soils with poor drainage characteristics have the greatest propensity for compaction. Soil compaction can limit revegetation potential by hindering seed germination, root establishment, and water uptake by plants. Compaction-prone soils were identified by querying the SSURGO database for soil components that have (1) a surface texture of sandy clay loam or finer, and (2) a drainage class of somewhat poorly, poorly, or very poorly drained.

4.2.5.1 Mountaineer XPress Project

Approximately 19 acres (0.5 percent) of the soils that would be disturbed by MXP activities are prone to compaction. The susceptibility of the soils to compaction would be dependent on the soil moisture content during construction. Columbia Gas would minimize compaction impacts in soft or saturated soils by using the measures outlined in its ECS. Columbia Gas would test topsoil and subsoil for compaction at regular intervals in agricultural and residential areas disturbed by construction activities. Where compaction has been identified, Columbia Gas would use deep tillage implements, such as a paraplow, prior to topsoil replacement. In addition to tilling, arrangements may be made with landowners to plant and plow under a “green manure” crop, such as alfalfa, to improve soil structure and reduce bulk density. Construction activities may also be restricted during unusually wet conditions, as necessary, to limit compaction and rutting.

4.2.5.2 Gulf XPress Project

Approximately 53 acres (27 percent) of the soils that would be affected by the GXP are prone to compaction. Compaction would only be a concern in TWS that would be revegetated. Columbia Gulf would minimize compaction and rutting impacts in TWS by using measures outlined in its ECS during construction in soft or saturated soils. In addition, Columbia Gulf's EIs could recommend restricted construction activities during unfavorable conditions (e.g., wet weather) to further reduce the potential for compaction and rutting. Compaction impacts would be mitigated through the use of deep tillage operations during restoration activities using a paraplow or similar implement. In areas where topsoil segregation occurs, plowing with a paraplow or other deep tillage implement to alleviate subsoil compaction would be conducted before replacement of the topsoil.

4.2.6 Stony and Rocky Soils

Introducing stones and other rock fragments into surface soil layers may reduce the soil moisture-holding capacity (resulting in a reduction in soil productivity) and inhibit revegetation efforts. Soil fragments at the surface and in the surface layer may be encountered during grading, trenching, and backfilling. Soils with significant quantities of rock were identified by querying the SSURGO database for component soil series that have one or more soil horizons that (1) have a cobbley, stony, bouldery, shaly, channery, flaggy, very gravelly, or extremely gravelly modifier to the textural class and/or (2) contain greater than 5 percent (by weight) of rocks larger than 3 inches.

4.2.6.1 Mountaineer XPress Project

About 3,070 acres (86 percent) of the soils that would be disturbed by MXP construction activities are characterized as stony or rocky soils. The introduction of subsoil rocks into agricultural topsoil would be minimized by segregating topsoil from trench spoil and returning topsoil as the surface layer during cleanup and restoration. Columbia Gas would make diligent efforts to remove excess rock from at least the top 12 inches of soil, to the extent practicable, in cultivated and rotated croplands, hayfields, pastures, and residential areas, as well as other areas agreed upon between the landowner or land-managing agency and Columbia Gas. In other locations, Columbia Gas would remove excess rocks greater than 4 inches in size from surface soils disturbed by construction such that the size, density, and distribution of rock on the construction right-of-way would be similar to adjacent non-right-of-way areas. Columbia Gas' ECS regarding removal of rock greater than 4 inches in size is inconsistent with the 2013 version of FERC's Plan, therefore, **we recommend:**

- **Prior to construction, Columbia Gas should file with the Secretary, for review and approval by the Director of OEP, a modified version of its ECS (section II.I.1) that is consistent with the 2013 version of FERC's Plan at section V.A.4.**

4.2.6.2 Gulf XPress Project

Approximately 87 acres (44 percent) of the soils that would be disturbed by the GXP facilities are considered stony or rocky soils. For those areas that would be revegetated following

construction activities at the facility sites, Columbia Gas would make diligent efforts to remove excess rock from at least the top 12 inches of soil, to the extent practicable, to facilitate revegetation. Columbia Gas would remove excess rocks greater than 4 inches in size from surface soils disturbed by construction such that the size, density, and distribution of rock in the construction area would be similar to adjacent non-construction areas. Columbia Gulf's ECS regarding removal of rock greater than 4 inches in size is inconsistent with the 2013 version of FERC's Plan, therefore, **we recommend:**

- **Prior to construction, Columbia Gulf should file with the Secretary, for review and approval by the Director of OEP, a modified version of its ECS (section II.I.1) that is consistent with the 2013 version of FERC's Plan at section V.A.4.**

4.2.7 Depth to Shallow Bedrock

Construction through soils with shallow bedrock could result in the incorporation of bedrock fragments into surface soils. Shallow-to-bedrock soils were identified by querying the SSURGO database for component soil series that have a bedrock contact within 60 inches of the soil surface. The analysis also identified whether the near-surface bedrock is lithic (hard/unweathered) and could require blasting to excavate (see sections 2.4.1.5 and 4.1.4.9), or is paralithic (soft/weathered) and could likely be ripped and dug without blasting.

4.2.7.1 Mountaineer XPress Project

Approximately 2,860 acres (80 percent) of the soils that would be disturbed by MXP activities contain bedrock within 60 inches of the surface. If paralithic bedrock is encountered at depths less than 60 inches along the MXP pipeline corridor, bedrock removal would be attempted using conventional excavation or other methods. If dense, lithic bedrock without fractures is encountered and conventional excavation or other methods are ineffective, blasting may be required.

Where lithic rock is encountered during construction, Columbia Gas' construction contractor would attempt to use hydraulic hammers or other mechanical methods to fragment the rock, where feasible. Rock that is not returned to the trench is considered construction debris, unless approved for use as mulch or for some other use on the construction work area by the landowner or land-managing agency. Disposal of excess rock debris would be in accordance with Columbia Gas' ECS and applicable regulatory requirements. Should Columbia Gas have to dispose of excess rock, an approved landfill or alternate permitted location would be used.

4.2.7.2 Gulf XPress Project

Approximately 72 acres (36 percent) of the soils that would be disturbed by GXP activities contain bedrock within 60 inches of the surface. If paralithic (soft) bedrock is encountered at depths less than 60 inches at a facility site, bedrock removal would be attempted using conventional excavation or other methods. If dense, lithic bedrock is encountered and conventional excavation or other methods are ineffective, blasting may be required.

4.2.8 Hydric Soils

Hydric soils are those that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions and support the growth and regeneration of hydrophytic vegetation (FR, 1994). These soils are typically found in areas with a high mean water table and wetlands; however, agricultural lands can contain hydric soils that are no longer saturated due to managed hydrology for crop development.

Due to extended periods of saturation, hydric soils can be prone to compaction and rutting. In addition, high groundwater levels associated with hydric soils can create a buoyancy hazard for pipelines.

4.2.8.1 Mountaineer XPress Project

Approximately 15 acres (0.4 percent) of the soils that would be affected by MXP construction are considered hydric. If high groundwater levels are encountered in hydric soil areas, creating a buoyancy hazard for pipelines, buoyancy control measures would be implemented to maintain the pipeline at the required depth.

4.2.8.2 Gulf XPress Project

Approximately 12 acres (6 percent) of the soils that would be affected by the GXP facilities are considered hydric. Along with hydrophytic vegetation and wetland hydrology, hydric soils are one of the three parameters required to be present for an area to be designated as a wetland under USACE methodology. Information about wetlands within the GXP work areas is provided in section 4.4.

4.2.9 Topsoil Depth

During construction activities, topsoil and subsoil can be disturbed as a result of topsoil removal, grading, trench excavation, and by heavy equipment moving along the right-of-way and within approved construction workspaces. The potential mixing of topsoil or surface soil with the subsoil from these activities could result in a reduction in soil productivity.

4.2.9.1 Mountaineer XPress Project

Topsoil depths were quantified for MXP by querying the organic matter content of the surface soil horizons. Near-surface soils with 2 percent or more organic matter were considered topsoil. Topsoil thicknesses were then assigned to one of five classes: 0 to 3 inches, 3 to 6 inches, 6 to 12 inches, 12 to 18 inches, and greater than 18 inches. Table 4.2-5 provides a summary of topsoil depths along the MXP pipeline routes.

Table 4.2-5
Topsoil Depths along the MXP Pipeline Routes a/, b/

Pipeline Facility	Total Mileage	Topsoil Thickness (inches) c/				
		0-3	>3-6	>6-12	>12-18	>18
New Pipeline Facilities						
MXP-100	164.3	15.3	127.1	21.8	0.1	0.0
MXP-200	6.0	0.3	5.3	0.4	0.0	0.0
X59M1 Line	0.1	0.1	<0.1	0.0	0.0	0.0
Subtotal	**170.4**	**15.7**	**132.4**	**22.2**	**0.1**	**0.0**
Replacement Pipeline Facilities						
SM80 Line	0.2	0.0	0.2	0.0	0.0	0.0
SM80 Loop Line	0.2	0.0	0.2	0.0	0.0	0.0
Subtotal	**0.4**	**0.0**	**0.4**	**0.0**	**0.0**	**0.0**
Total a/	**170.7**	**15.7**	**132.8**	**22.0**	**0.1**	**0.0**

Sources: Soil Survey Staff, 2015a and 2015b

a The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the sum of the addends.
b The mileages calculated are based on the soils crossed by the pipeline centerlines.
c Topsoil includes all surface horizons with 2 percent or more organic matter content.

To limit mixing of the soil horizons or incorporation of additional rock into the topsoil, Columbia Gas would segregate topsoil (as specified in its ECS) in trench and spoil storage areas, actively cultivated or rotated croplands, pastures, hayfields, residential areas, and in other areas agreed upon between the landowner and Columbia Gas. Topsoil would be segregated, as appropriate, from the subsoil and would be replaced in the proper order during backfilling and final grading. Columbia Gas' ECS regarding topsoil segregation is inconsistent with the 2013 version of FERC's Plan, in that it does not include managed pasture and all cultivated or rotated croplands, therefore, **we recommend:**

- **Prior to construction, Columbia Gas should file with the Secretary, for review and approval by the Director of OEP, a modified version of its ECS (section II.D.2) that is consistent with the 2013 version of FERC's Plan at section IV.B.1.a.**

In deep soils where the topsoil is greater than 12 inches, at least 12 inches of topsoil would be segregated. In soils with fewer than 12 inches of topsoil, the entire topsoil layer would be segregated, when possible. As described in Columbia Gas' ECS, segregated topsoil would not be used for padding the pipe, constructing temporary slope breakers or trench plugs, improving or maintaining roads, or as fill material. The topsoil would be stockpiled separately from all subsoil and would be replaced last (as the surface layer) during backfilling and final grading. In residential areas, topsoil replacement would be an acceptable alternative to topsoil segregation. Implementation of proper topsoil segregation would promote post-construction revegetation success, thereby minimizing the loss of crop productivity and the potential for long-term problems with erosion. Upon completion of construction activities, all MXP workspaces would be returned, to the extent practicable, to pre-construction contours. All disturbed areas would be stabilized during final grading and restoration. If final restoration is delayed due to weather or soil

conditions, Columbia Gas would install temporary erosion control measures to minimize erosion and sediment transport until final grading and restoration can occur.

4.2.9.2 Gulf XPress Project

Topsoil depth was not evaluated for the GXP because the majority of disturbed areas would be overlain by permanent facilities, and the soil profile may be significantly altered by the addition of surface fill material to increase ground elevation, the addition of aggregate to provide a suitable foundation surface, or mixing with a stabilizer (e.g., cement or lime) to increase strength and cohesion. Where feasible, topsoil would be removed during grading from those areas where permanent facilities would be constructed. In areas used for TWS, Columbia Gulf would strip and windrow up to 12 inches of available topsoil for spreading across the TWS during site cleanup and restoration.

4.2.10 Soil and Spill Contamination

Contamination from spills or leaks of fuels, lubricants, and coolant from construction equipment can adversely affect soils. However, the impacts of such contamination are typically minor because of the low frequency and volumes of spills and leaks and the effectiveness of cleanup measures. Measures to reduce potential impacts on soils from spills of fuels and hazardous materials are addressed in Columbia Gas' and Columbia Gulf's ECSs and Spill Prevention, Control, and Countermeasure Plans (SPCC Plans).

4.2.10.1 Mountaineer XPress Project

Potential sources of soil contamination, including hazardous waste sites, underground storage tanks, production wells, and gathering lines, were identified near the MXP facilities. Additional information on subsurface mines in the MXP vicinity is presented in section 4.1.

A review of the EPA's Envirofacts database identified three facilities permitted to generate, transport, treat, or dispose of hazardous waste within 0.25 mile of MXP work spaces. The facilities include a hospital, a material fabricating business, and a technical school. None of the facilities have reported an uncontrolled release to the environment. An additional site is 0.3 mile northwest of MP 77 in Ritchie County. The site is hydraulically down-gradient of the MXP; therefore, it is unlikely that contamination from the site would affect soil in the MXP work area.

A review of the WVDEP's Leaking Underground Storage Tank (LUST) database identified two contaminated sites within 0.25 mile of MXP facilities (WVDEP, 2015c). One LUST site is approximately 0.2 mile west of MP 160.3. Columbia Gas reviewed the WVDEP LUST database and identified a confirmed petroleum release at the facility in 1991, with completed cleanup reported in 2003. The site is estimated to be down-gradient from MXP facilities. Due to the distance, gradient, and site history, this site is unlikely to have contributed to soil contamination in the MXP work area.

The second LUST site is approximately 0.1 mile east of MP 18.2 in Wetzel County, West Virginia. Based upon a review of the WVDEP database, petroleum releases were confirmed to have occurred in 1995 and 1998. Cleanup activities are reported to have been completed in 1998 and 2001, respectively. The site is estimated to be located hydraulically up-gradient from the

MXP; however, due to the site history, the site is unlikely to have contributed to soil contamination in the MXP work area.

Other potential sources of soil contamination include nearby production wells and/or gathering lines. Gas, oil, and water well location data were reviewed by Columbia Gas, and 1,658 oil and gas wells (1,015 active wells) were documented within 0.25 mile of proposed MXP work areas; no active oil and gas wells are located within any MXP workspaces. Given the proximity of these wells to the project, drilling mud recirculation pits with residual hydrocarbons that have not been properly remediated before abandonment may potentially occur within the project alignment. If contaminated soils are encountered during construction, Columbia Gas would implement measures outlined in its Unexpected Contamination Discovery Plan (appendix H) that include proper handling, agency notification, and disposal methods. If unexpected contaminated soil is encountered, Columbia Gas would contact the WVDEP and other local agencies, as appropriate, to develop and implement mitigation measures and procedures to address the contamination. Contaminated materials would be characterized, collected, removed from the work site promptly, and disposed of or recycled in a proper manner. Further, spill prevention measures from Columbia Gas' ECS would reduce the potential impacts on soils from spills of hazardous materials used during construction. These measures include regularly inspecting equipment to verify it is in good working order and properly training employees regarding the storage and handling of fuels and other hazardous materials, including spill cleanup procedures.

We received a comment during public scoping asking about the effects of a pipeline traversing a Superfund site. The MXP does not cross any hazardous or contaminated sites listed in the federal or state databases. However, five sites listed in the EPA database were identified within 0.25 mile of MXP facilities (see table 4.2-6).

Table 4.2-6
Hazardous or Contaminated Sites within 0.5 Mile of the MXP

Site Number a/	Type b/	Managing Agency	County	Classification	ID#	Milepost	Distance from Work Area (feet)
1	RCRA	No data records	Ritchie	Unspecified	110007877253	77.4	174
2	RCRA	No data records	Ritchie	Unspecified	110007334517	77.2	249
3	RCRA	No data records	Putnam	Small Quantity Generator	110063001996	147.1	359
4	RCRA	State	Cabell	Unspecified	110020573459	161.4	1,167
5	RCRA	No data records	Doddridge	Unspecified	110012604020	48.7	1,826

a Site names have been withheld since the sites are listed as hazardous waste generators, but are not necessarily contaminated sites.
b RCRA = Resource Conservation and Recovery Act

There is no indication that construction or operation of the MXP would be affected by any of the facilities listed in table 4.2-6. However, if contaminated materials are encountered during construction, Columbia Gas would implement measures outlined in its Unexpected Contamination

Discovery Plan that includes proper handling, agency notification, and disposal methods. In addition, wastes would be collected and removed from the work site promptly and would be disposed in a proper manner and recycled, where appropriate.

4.2.10.2 Gulf XPress Project

None of the GXP facilities would be within 0.25 mile of any hazardous waste sites (AGES, 2015a-g). One hazardous waste generator site owned by Columbia Gulf is 0.3 mile southeast of the existing Leach C Meter Station. While a LUST site was identified approximately 0.8 mile northeast of the proposed New Albany Compressor Station, the distance separating the two areas and the limited extent of the excavation associated with the new facility make it unlikely that contaminated soil would be encountered at the station site.

If contaminated soils are encountered during construction, Columbia Gulf would implement measures outlined in its Unexpected Contamination Discovery Plan (appendix H) that includes proper handling, agency notification, and disposal methods. Additionally, Columbia Gulf would contact state and local agencies, as appropriate, to develop and implement mitigation measures and procedures to address the contamination. Contaminated materials would be characterized, collected, removed from the work site promptly, and disposed of or recycled in a proper manner.

During scoping, we received a comment expressing concern that the Cane Ridge Compressor Station would pollute the ground. Spill prevention measures from Columbia Gulf's ECS would avoid or reduce the potential impacts on soils from spills of hazardous materials used during station construction and operation. These measures include regularly inspecting equipment to verify it is in good working order and properly training employees regarding the storage and handling of fuels and other hazardous materials, including spill cleanup procedures. One of the advantages of natural gas is its gaseous state, meaning it cannot spill; therefore, it cannot contaminate soil, groundwater, or surface waters.

4.2.11 Drain Tiles and Irrigation Systems

Drain tiles are subsurface structures used in agricultural areas to improve the productivity of the land by increasing soil drainage. Excavation activities as well as rutting and/or crushing due to the operation of heavy construction equipment in wet soils can damage tiles.

4.2.11.1 Mountaineer XPress Project

Columbia Gas would implement measures to avoid and/or minimize any potential damage to drainage tiles and restore/repair any damaged tiles to their original or better condition. Prior to construction, Columbia Gas would contact landowners and/or tenants to attempt to locate existing drain tile lines. Identified tile lines would be flagged prior to construction to alert construction crews. During construction, the location of any tile that is damaged, cut, or removed would be marked. Temporary measures would be taken to provide suitable drainage until permanent repairs can be made, as described in the ECS. Qualified drain tile specialists from the MXP area would be employed to conduct or monitor repairs to drain tile systems.

Columbia Gas would also engage landowners and/or tenants in identifying and locating existing irrigation systems and wells. Water flow to irrigation systems would be maintained throughout construction, unless shutoff is coordinated with affected parties. Should any irrigation systems be affected during construction, Columbia Gas would restore/repair the damaged irrigation systems to their original or better condition.

4.2.11.2 Gulf XPress Project

Columbia Gulf is currently not aware of any drain tiles or irrigation systems within its proposed compressor station sites. However, it is possible that drain tiles or irrigation systems are present in areas where the current land use is agricultural. Any drainage tiles or irrigation systems that are present would be permanently disabled or removed as needed for the safe operation of the GXP.

4.2.12 Conclusion

Construction activities such as clearing, grading, trenching, backfilling, and traffic by heavy construction equipment would cause direct impacts on soil resources in the MXP and GXP work areas. Direct impacts could include erosion, compaction, rutting, and reduction of soil quality by mixing topsoil with subsoil or bringing excess rocks to the surface. These soil impacts could also slow the revegetation process in the disturbed areas and disrupt surface and subsurface drainage systems.

4.2.12.1 Mountaineer XPress Project

Construction and operation of the MXP facilities are expected to have a direct but temporary impact on soils from ground-disturbing activities. Table 4.2-3 provides a summary of the soil limitations present in the MXP area.

To minimize impacts on soils during construction, Columbia Gas would implement the mitigation procedures and measures previously mentioned and would follow the BMPs identified in its ECS. After completion of construction, the pipeline corridors and temporary access roads would be returned to pre-construction conditions or in accordance with landowner agreements. Soil impacts within the pipeline rights-of-way and along these access roads would be minor and temporary.

The construction of aboveground facilities would result in approximately 41 acres of permanent impacts on soils. Columbia Gas would use areas within existing fenced facilities or previously disturbed areas adjacent to the facilities for the majority of the modifications and upgrades. Most of the soil impacts at existing aboveground facilities are expected to be minor and temporary. Approximately 30 acres of soil at the Sherwood, White Oak, and Mount Olive Compressor Stations would be permanently converted from agricultural, forested, and open land uses to developed uses. The permanent access roads would result in 3.5 acres of permanent impacts. Permanent access roads are necessary for the safe operation of the MXP facilities.

Preparation of staging areas and contractor yards would consist of minor grading and leveling. Once construction is complete, the acreage within the staging areas and contractor yards would be restored to pre-construction conditions and uses or in accordance with landowner

agreements. Soil impacts are expected to be minor and temporary due to the limited grading activities to level the areas. Unless specified in landowner agreements, any area where aggregate is placed over geotextile fabric (e.g., roadway aprons) would be returned to its original condition during cleanup activities and all materials removed.

During MXP operation, minimal impacts on soil resources are expected beyond occasional ground inspections of the pipeline rights-of-way and the areas occupied by aboveground facilities. Any impacts on soil resources associated with standard operations would be minor and infrequent. Potential impacts from maintenance of the MXP include soil displacement, compaction, and erosion caused by machinery necessary to maintain or repair any portions of the pipelines or aboveground facilities. Impacts would be avoided or minimized by implementation of Columbia Gas' ECS, as applicable to operation.

4.2.12.2 Gulf XPress Project

Construction and operation of the GXP facilities is expected to have a direct but temporary impact on soils from ground-disturbing activities. Table 4.2-4 provides a summary of the soil limitations present in the GXP area.

The degree to which soils are directly affected by construction and operation of GXP facilities would vary depending on the nature of the activities and whether the soils are located in designated TWS or the operational footprint of GXP facilities. The subsurface profile of soils overlain by permanent facilities may be significantly altered by the addition of surface fill material to increase ground elevation, addition of aggregate (e.g., gravel or crushed stone) to provide a suitable foundation surface, or mixing with a stabilizer (e.g., cement or lime) to increase strength and cohesion. Deep excavations and drillings, including those required for pile installation, could disrupt soil profiles. In areas used for TWS, Columbia Gulf would strip and windrow up to 12 inches of available topsoil for spreading across the TWS during site cleanup and restoration.

To minimize impacts on soils during the construction of GXP facilities, Columbia Gulf would implement the mitigation procedures and measures previously mentioned and would follow the BMPs identified in its ECS. After construction has been completed, the TWS would be returned to pre-construction conditions. Soil impacts are expected to be minor and temporary within the TWS due to the minor grading activities to level the areas and placement of gravel over geotextile fabric, all of which would be removed upon completion of the GXP facilities, unless otherwise specified in landowner agreements.

The construction of aboveground facilities and the associated permanent access roads would result in approximately 95 acres of permanent impacts on soils. Permanent access roads are necessary for the safe operation of the GXP facilities.

During operation, minimal impacts on soil resources are expected. Any impacts on soil resources associated with standard operations would be minor and infrequent. Potential impacts from maintenance of the GXP would include soil displacement, compaction, and erosion caused by machinery necessary to maintain or repair any portions of the aboveground facilities. Impacts would be avoided or minimized by implementation of GXP's ECS, as applicable to project operation.

4.3 WATER RESOURCES

4.3.1 Groundwater Resources

4.3.1.1 Aquifers

The MXP is in the Appalachian Plateaus Physiographic Province, which extends over most of West Virginia. Aquifers in this province consist of alternating sequences of fractured sandstone, siltstone, shale, limestone, and coal in Permian-, Pennsylvanian-, and Mississippian-rock formations (McCoy et al., 2015).

The principal aquifers underlying GXP project facilities include the Pennsylvanian, Mississippian, Ordovician, Silurian-Devonian, Mississippian River Valley Alluvial, and the Southeastern Coastal Plain aquifers (USGS, 2003b).

The EPA defines a sole source aquifer (SSA) as an "aquifer that supplies at least 50 percent of the drinking water for its service area" and that has "no reasonably available alternative drinking water sources should the aquifer become contaminated" (EPA, 2016a). In addition to the EPA-designated SSA program, individual states may enact regulations protecting significant aquifer recharge areas, critical areas where excessive use of groundwater poses a threat to the long-term integrity of a water supply source, or preservation areas to protect natural resources, including public water supply (PWS) sources.

4.3.1.1.1 Mountaineer XPress Project

The Upper Pennsylvanian aquifer is the only principal aquifer crossed by the MXP. Pennsylvanian aquifers are characterized by water-yielding sandstones, although coal beds and limestones also yield water (USGS, 1997). The sandstones are not very porous; compaction and cementation during rock formation greatly reduced primary intergranular pore space. Therefore, secondary openings, such as joints, fractures and bedding planes, contain and transmit most of the groundwater in sandstone. Accordingly, the hydraulic conductivity of sandstone aquifers is low to moderate, but because they extend over large areas, these aquifers provide large amounts of water (USGS, 1999). Some of these aquifers, however, are very local in extent, and can be perched and isolated under individual hilltops (Puente, 1985).

Typical depth-to-groundwater ranges from 50 to 300 feet in Upper Pennsylvanian aquifers, and common yields are from 1 to 30 gallons per minute (gpm) (Puente, 1985). As of 2005, total water withdrawals from Pennsylvanian aquifers in West Virginia were approximately 18.3 million gallons per day (Maupin and Barber, 2005). No specific information is available regarding local water withdrawals or aquifer depths along the project route.

Unconsolidated alluvial deposits are also found locally in large-river valleys across the far western portion of West Virginia (Puente, 1985; USGS, 2003b), and the project may cross these aquifers over relatively short distances. Primarily found along the Kanawha and Ohio Rivers, unconsolidated alluvial aquifers supply significant amounts of groundwater for public supply and industrial use (McCoy et al., 2015). Variable yields from these aquifers are dependent on permeability, areal extent, and saturated thickness of the sand and gravel materials and their

proximity to rivers (Puente, 1985; USGS, 1997). Typical depth-to-groundwater ranges from 25 to 100 feet in alluvial aquifers, and they can yield water from 50 to 1,500 gpm (Puente, 1985).

Shallow, surficial groundwaters (the "water table") would be encountered at numerous locations along the route. Small "perched" groundwaters can be encountered on slopes, and the pipeline trench would often be within the water table zone, especially on valley floors and in floodplains. However, the pipeline would not be expected to significantly alter the flow or quality of surficial groundwaters.

According to EPA sources, there are no EPA-designated SSAs in West Virginia (EPA, 2011a). No West Virginia state agency designates SSAs on the state level.

4.3.1.1.2 Gulf XPress Project

Principal aquifers are often multi-layered and may extend underground beyond their mapped boundaries. The mapped boundaries typically represent the extent of the principle aquifer nearest the surface (USGS, 1997). For example, the Mississippian aquifer is exposed as narrow north-south bands across Kentucky and Tennessee, but underlies most of the Pennsylvanian aquifer. Because construction of the seven compressor stations would generally occur within the upper 10 feet of the soil surface, only the mapped principle aquifers nearest the surface are described below. Refer to table 4.3-1 for a summary of each principle aquifer within the project areas.

Table 4.3-1
Aquifers Within the Gulf XPress Project Areas

State/ Facility	Aquifer a/	Geology a/	Range of Depth to Aquifer (feet)	Well Yield (gpm)
Aboveground Facilities (Proposed)				
Kentucky				
Morehead Compressor Station	Mississippian	Sandstone and carbonate	100 to 500	1 to 50
Paint Lick Compressor Station	Silurian-Devonian	Limestone and shale	50 to 200	2 to 300
	Other Rocks	N/A	Unavailable b/	Variable
Goodluck Compressor Station	Mississippian	Limestone	100 to 500	2 to 500
Tennessee				
Cane Ridge Compressor Station	Ordovician	Limestone	50 to 200	5 to 300
Clifton Junction Compressor Station	Southeastern coastal plain	Limestone	3 to 215 c/	Variable
	Other Rocks	N/A	Unavailable b/	Variable
Mississippi				
New Albany Compressor Station	Southeastern coastal plain	Unconsolidated sands, silts, and clays	3 to 215 c/	Variable
Holcomb Compressor Station	Mississippi River Valley Alluvial	Unconsolidated sandstone intermixed with clay and some quartz	25 to 150	50 to 5,000

Table 4.3-1
Aquifers Within the Gulf XPress Project Areas

State/ Facility	Aquifer a/	Geology a/	Range of Depth to Aquifer (feet)	Well Yield (gpm)
Aboveground Facilities (existing)				
Kentucky				
Grayson Compressor Station d/	Pennsylvanian	Shale	75 to 400	1 to 200
Leach C Meter Station	Pennsylvanian	Undivided siltstones	75 to 400	1 to 200

a USGS, 2003b.
b Unavailable – reliable depth to aquifer data are unavailable.
c Potentiometric Map of the Ripley Aquifers in Northeastern Mississippi, August, Mississippi Department of Environmental Quality (MDEQ, 1992).
d Pending compressor station proposed by Columbia Gulf under the Rayne XPress Project (Docket No. CP15-539-000).

In addition to principal aquifers, the project facilities lie within areas mapped as "other rocks." These areas consist of areas underlain by crystalline rocks of minimal permeability. Areas mapped as other rocks are considered minor aquifers.

There are no SSAs in Kentucky, Tennessee, or the northern half of Mississippi. The nearest EPA-designated SSA, the Southern Hills Regional Aquifer, is approximately 90 miles southwest of the southernmost project site (Holcomb Compressor Station) in southwestern Mississippi (EPA, 2016b). There are no state-designated aquifers in the GXP areas.

4.3.1.2 Wellhead and Aquifer Protection Areas

Under the Safe Drinking Water Act, as amended, each state is required to develop and implement a Wellhead Protection Program to identify the land and recharge areas contributing to public supply wells and prevent the contamination of drinking water supplies. Programs such as the NPDES are implemented at a state level to protect wellhead areas. The act also requires the development of a broader-based Source Water Assessment Program, which includes the assessment of potential contamination to both groundwater and surface water through a watershed approach.

4.3.1.2.1 Mountaineer XPress Project

In West Virginia, wellhead protection areas (WHPA) are administered by the West Virginia Department of Health and Human Resources (WVDHHR), Bureau for Public Health (WVBPH). The WVBPH oversees West Virginia's Wellhead Protection Program, as well as the state's Source Water Assessment Program, which set standards and implement programs that aid in the protection of areas that contribute groundwater or surface water to a PWS system. Columbia Gas consulted with the WVDHHR to obtain location data for WHPAs within 3 miles of the MXP pipeline centerlines. Four WHPAs were identified within the 3-mile search radius of the MXP-100 and are summarized in table 4.3-2 (WVDHHR, 2016a).

Table 4.3-2
Wellhead Protection Areas within 3 Miles of the Mountaineer XPress Project

Facility Associated with WHPA a/ (County)	Public Water System Identification	Closest Milepost	Wellhead Protection Area	Distance from Workspace b/ (feet)
New Pipeline Facilities				
MXP-100				
Doddridge	WV9909004	50.7	Doddridge County Park Well #1	144
Jackson	WV9918002	113.8	Roane-Jackson Technical Center Well #1	725
	WV9918002	113.8	Roane-Jackson Technical Center Well #2	590
	WV9918002	113.8	Roane-Jackson Technical Center Well #3	500
Pipe/Contractor Yards				
Yard 116				
Marshall	WV3302611	--	Moundsville – Well 8	15,513
Marshall	WV3302611	--	Moundsville – Well 9	15,513
Marshall	WV3302611	--	Moundsville – Well 11	15,513
Marshall	WV3302611	--	Moundsville – Well 12	15,513
Marshall	WV3302611	--	Moundsville – Well 12A	15,513
Marshall	WV3302611	--	Moundsville – Well 13	15,513
Marshall	WV3302611	--	Moundsville – Well 14	15,513
Marshall	WV3302611	--	Moundsville – Well 15	15,513
Yard 128				
Jackson	WV3301804	--	Cottageville PSD Well 1	3,696
Jackson	WV3301804	--	Cottageville PSD Well 2	3,696
Jackson	WV9918012	--	Century Aluminum of WV Deep Well No. 9	9,567
Jackson	WV9918012	--	Century Aluminum of WV Deep Well No. 8	10,065
Jackson	WV9918011	--	Constellium Rolled Products LLC Deep Well 9	9,567
Jackson	WV9918011	--	Constellium Rolled Products LLC Deep Well 8	10,065
Yard 122				
Wood	WV3305410	--	Union Williams PSD Well 1	7,991
Wood	WV3305410	--	Union Williams PSD Well 1	7,991
Wood	WV3305410	--	Union Williams PSD Well 1	7,991
Yard 137				
Wood	WV9954007	--	Chemours Company–Washington Works Well #331	5,428
Wood	WV9954007	--	Chemours Company–Washington Works Well #332	5,748
Wood	WV9954007	--	Chemours Company–Washington Works Well #336	5,015

a No WPAs were identified within 3 miles of the MXP-200 pipeline, compressor stations, or SM80 and SM80 Loop replacement sections.
b No WPAs are crossed by the project facilities. Distance listed in the table is the distance from the edge of the nearest project workspaces to the edge of the well buffer area.

The closest WHPA to the MXP-100 corridor is the Doddridge County Park Well #1, located near the proposed project work area at MP 50.7. The project workspace is approximately 90 feet outside of the designated 500-foot well buffer area, and the project centerline is approximately 170 feet outside of the buffer zone. MXP also passes near three WHPAs at approximately MP 113.8, where the edge of the closest wellhead protection buffer is approximately 640 feet away from the project workspace. All three WHPAs at MP 113.8 are associated with wells at the Roane-Jackson Technical Center.

Columbia Gas would minimize the potential for impacts on wellhead and source water protection areas. While these areas are largely avoided by the proposed route, Columbia Gas' general construction practices (including specific techniques for blasting, installation of trench breakers, trench dewatering, equipment refueling, and hazardous materials storage) as specified in its ECS and SPCC Plan would provide additional security for wellhead and source water protection areas.

4.3.1.2.2 Gulf XPress Project

No WHPAs or Source Water Protection Areas are within 3 miles of the project facilities in Kentucky, and no WHPAs were identified within 3 miles of the compressor station sites in Tennessee. Four PWS wells were identified within 3 miles of the New Albany station site in Mississippi, including PWS well 730008-1, 730008-2, 730008-3, and 730013-1 (MDEQ, 2016b). All of them are greater than 2 miles from the site.

4.3.1.3 Water Supply Wells and Springs

Water supply wells can be public wells, serving a larger population and managed through a water provider or supplier, or private wells, providing a limited number of connections and permitted privately.

Springs result when an aquifer is filled to the point that water overflows onto the land surface. The amount of water flowing from springs depends on many factors, including the size of caverns within the rock, water pressure in the aquifer, size of the spring basin, and amount of rainfall. Springs can range in size from intermittent seeps to huge pools discharging hundreds of millions of gallons daily (USGS, 2015b). Relative to springs, seeps have a lower flow rate and generally emerge over a larger, less-defined area.

4.3.1.3.1 Mountaineer XPress Project

Columbia Gas consulted with the WVDHHR to obtain location data for PWS wells within 150 feet of project workspaces. Additionally, Columbia Gas sought to identify private supply wells through landowner discussions and civil survey. The respective county health departments were also consulted regarding well records, but little information was available. The current results are summarized in table 4.3-3. All active wells[23] listed in table 4.3-3 are assumed to produce water for human consumption and would be treated as such during construction. As

[23] "Active wells" are those in table 4.3-3 not listed as abandoned or plugged.

surveys and landowner discussions progress, Columbia Gas continues to determine whether wells identified within 150 feet of project workspaces are potable water sources.

Table 4.3-3
Private Water Supply Wells Within 150 Feet of the Mountaineer XPress Project

Facility / County	Nearest Approximate Milepost	Well Use	Distance (feet) and Direction from Workspace
Pipeline Facilities a/			
MXP-100			
Marshall	5.2	Unknown **b**/	33, SW
	5.2	Unknown **b**/	43, SW
Wetzel	14.1	Unknown **b**/	40, N
	19.3	Abandoned **c**/	14, W
	24.4	Abandoned **c**/	48, SW
	24.4	Abandoned **c**/	43, SW
	24.4	Abandoned **c**/	41, SW
	24.4	Abandoned **c**/	45, SW
Doddridge	38.2	Pending **d**/	141, SE
	39.5	Human consumption	12, NE
	41.4	Pending **d**/	1, E
	41.4	Pending **d**/	7, E
	41.4	Pending **d**/	8, E
	41.4	Pending **d**/	2, E
Ritchie	71.1	Unknown b/	16, N
	76.0	Human consumption	10, SW
	80.5	Pending **d**/	94, SE
Calhoun	83.7	Pending **d**/	1, NW
Wirt	90.0	Pending **d**/	10, SW
	90.0	Pending **d**/	5, E
	90.0	Pending **d**/	11, E
	90.0	Pending **d**/	4, E
	92.3	Pending **d**/	14, W
	94.1	Plugged **e**/	Within workspace
Roane	107.2	Human consumption **f**/	Within workspace
	107.3	Unknown **b**/	36, N
	108.5	Human consumption	6, N
	110.4	Pending **d**/	120, W
	110.5	Unknown **b**/	54, NW
Jackson	111.1	Unknown **b**/	18, S
	113.2	Unknown **b**/	110, W
	124.3	Unknown **b**/	Within workspace
	124.3	Unknown **b**/	Within workspace
	124.7	Unknown **b**/	4, E
Putnam	134.5	Unknown **b**/	33, N
	134.5	Unknown **b**/	36, N

Table 4.3-3
Private Water Supply Wells Within 150 Feet of the Mountaineer XPress Project

Facility / County	Nearest Approximate Milepost	Well Use	Distance (feet) and Direction from Workspace
	134.5	Unknown **b**/	23, N
	134.5	Unknown **b**/	26, NW
	146.1	Unknown **b**/	9, NE
Cabell	156.5	Pending **d**/	4, NW
	157.4	Abandoned **c**/	35, W
	160.5	Pending **d**/	39, W
	164.3	Pending **d**/	90, SW
	164.3	Pending **d**/	33, SW
	164.3	Pending **d**/	86, SW
	164.3	Pending **d**/	30, SW
	164.3	Pending **d**/	Within workspace **g**/
	164.3	Pending **d**/	Within workspace **g**/
MXP-200			
Doddridge	6.0	Abandoned **c**/	Within workspace **g**/

a None of the SM80 Line and SM80 Loop Line facilities are within 150 feet of a known private well.
b Either the county health department was unable to identify the use of the well or was unable to search county records for private water well use. Columbia Gas would assume the well is used for potable purposes and implement appropriate precautions during construction.
c Field data indicate this well has been abandoned.
d Consultation with county health departments regarding use of private wells is ongoing.
e Field data indicate that this well has been plugged.
f Field data indicate that this well is hand dug, approximately 24 feet deep.
g Well is on property either owned or leased by Columbia Gas.

In West Virginia, springs commonly mark the intersection of the water table with a valley wall. Low-permeability rocks retard the vertical movement of water, forcing lateral movement in permeable layers until water discharges as a spring (Puente, 1985). Localized seeps are common throughout the project area; however, most are low-flowing, ephemeral, or seasonal in surface discharge. Data identifying known seeps with a flow of greater than or equal to 100 gpm are available as a GIS layer from the West Virginia GIS Technical Center. During the 2015 and 2016 field seasons (June to October 2015 and April to October 2016), Columbia Gas' environmental field teams conducted surveys along a 300-foot-wide survey corridor that was centered over the proposed pipeline centerline, a 100-foot-wide corridor centered over proposed access roads, and the construction footprints at proposed aboveground facility sites. Based on a review of the publicly available data, no springs crossed by the project reach a 100 gpm flow rate (West Virginia GIS Technical Center, 1986). Seventy-eight seeps were identified within the pipeline workspaces during field surveys. Most were frequently found along stream banks and hill slopes and did not supply notable flow.

Columbia Gas would perform pre- and post-construction monitoring for well yield and water quality for private wells within 150 feet of construction workspaces if requested by the landowner. If testing results indicate the integrity of any water supply well has been impacted during construction, Columbia Gas would provide a temporary water supply source and

compensate the landowner for repairs, installation of a new well, or other options as agreed upon with the landowner. As discussed in section 4.8.1.3, Columbia Gas would implement a landowner complaint resolution process to document and track landowner problems and their resolution.

Columbia Gas has neither completed identification of all private water wells and potable springs in proximity to project work areas, nor has it identified any specific protection measures that would be implemented for wells located inside the construction work areas. Therefore, **we recommend that prior to construction, Columbia Gas should:**

- **file with the Secretary the location of all water wells and potable springs within 150 feet of all areas of disturbance associated with the MXP pipelines and related aboveground facilities;**
- **offer to test all water wells within 150 feet of construction workspaces;**
- **identify measures that would be used to protect the water well at milepost 107.2; and**
- **provide the status (active, abandoned, capped, etc.) of the two water wells located at milepost 164.3 and, if active, identify measures to protect these water wells during construction.**

4.3.1.3.2 Gulf XPress Project

Columbia Gulf consulted with the KDEP, TDEC, and MDEQ to obtain location data for PWS wells within 150 feet of station workspaces. No public wells are located within 150 feet of the project workspaces. Information about private wells and springs near the station sites was obtained through discussions with landowners and field surveys. One private well was identified approximately 32.6 feet south-southwest of the existing Leach C Meter Station. No springs were identified within 150 feet of any project facilities, nor were any springs identified during field surveys at the new compressor station sites.

Columbia Gulf has agreed to perform pre- and post-construction monitoring for well yield and water quality for private wells within 150 feet of the proposed construction workspace if requested by the landowner. If testing results indicate any significant differences in water quality between initial testing and post-construction because of Columbia Gulf's construction activities, Columbia Gulf would compensate the landowner for repairs, installation of a new well, or other options. However, **we recommend prior to construction:**

- **Columbia Gulf should offer to conduct testing of water quality and yield at all water wells within 150 feet of construction workspaces; and**
- **If testing results indicate any decline in water quality Columbia Gulf should provide a temporary water source until a permanent source is available.**

As discussed in section 4.8.1.3, Columbia Gulf would implement a landowner complaint resolution process to document and track landowner problems and their resolution.

4.3.1.4 Contaminated Groundwater

Areas of previous contamination, LUST, and Resource Conservation and Recovery Act/Superfund sites that have potentially degraded or contaminated groundwater near MXP and GXP workspaces are discussed in section 4.2.10.

4.3.1.4.1 Mountaineer XPress Project

Section 4.2.10.1 includes a discussion regarding the presence of existing sites that are permitted to generate, transport, treat, or dispose of hazardous waste. The WVGES All Mining Interactive Map revealed no active surface mining operations in the project vicinity; however, the MXP-100 alignment from MP 1.4-4.9 is within the boundaries of the subsurface McElroy Mine. The McElroy Mine is actively producing coal under WVDEP Permit No. U003383.

Of the four subsurface mines within 0.25 mile of the MXP route, only one has the potential to impact the pipeline facilities. According to Columbia Gas, the McElroy Mine owners have no immediate plans to develop the areas crossed by the MXP route. As further planning occurs with the regional coal companies, Columbia would take the proper steps to coordinate, and implement the appropriate methods to maintain the integrity of the MXP pipeline. If longwall mine-related subsidence were a possibility, Columbia Gas would excavate the pipeline prior to undermining activities. Erosion controls would be installed and maintained until the right-of-way was restored, typically no sooner than 2 months after the pipeline had been fully undermined. (See discussion in section 4.1.2.1.)

4.3.1.4.2 Gulf Xpress Project

Columbia Gulf reviewed federal and state databases to identify contaminated sites, including sites that may have contributed to contaminated groundwater near the GXP facilities. No Superfund or federal Brownfield sites were mapped within 1 mile of the project facilities. Section 4.2.10.2 provides additional details regarding the presence of hazardous waste and LUST sites that were identified within 1 mile of GXP sites.

4.3.1.5 Impacts and Mitigation

Two primary activities could result in adverse impacts on groundwater resources: accidental spills of hazardous liquids used during facility construction or operations, and blasting to fracture rock in the pipeline trench or for construction of aboveground facility foundations. Additional impacts could occur where longwall mining (MXP) or karst topography (GXP) is encountered. Secondary activities (work area clearing and grading; trenching; and trench dewatering) typically result in only temporary and localized impact.

4.3.1.5.1 Mountaineer XPress Project

As described in section 2.4, Columbia Gas would use standard industry practices for construction of the MXP facilities. Clearing, grading, trenching, dewatering, and blasting activities associated with pipeline construction could each temporarily alter overland flow and groundwater recharge or could result in minor fluctuations in groundwater levels and/or increased turbidity. In addition, near-surface soil compaction caused by heavy construction vehicles could

reduce the soil's ability to absorb water. Columbia Gas would implement measures from both its ECS and SPCC Plan to minimize potential impacts on groundwater. For instance, Columbia Gas would:

- pump trench water to nearby vegetated areas where the water would be released to recharge local surficial groundwater sources;
- test for and relieve soil compaction as part of the final recontouring and right-of-way cleanup;
- conduct pre- and post-blasting testing of water wells and springs within 150 feet of the pipeline where blasting has the potential to affect water quality/quantity from domestic or agricultural wells or springs (with landowner permission);
- locate fuel storage at least 200 feet from active private water wells, at least 400 feet from municipal water wells, and outside designated municipal watershed areas; and
- outfit all fuel trucks, pumps, mechanic vehicles, contractor foreman vehicles, and inspector vehicles with spill kits for rapid containment and cleanup of any spills.

During construction, Columbia Gas would control erosion and limit sediment mobilization to disturbed areas within the temporary work areas. After construction is completed, all areas disturbed by construction would be restored to their original contours, as practicable, and revegetated (if not within areas covered by buildings, concrete, asphalt, or aggregate), including topsoil replacement (where applicable) in accordance with Columbia Gas' ECS or landowner agreements.

In areas of steep terrain, trench breakers would be installed in the pipeline trench to restrict groundwater flow along the pipeline. Vegetation restoration and periodic mowing of the pipeline right-of-way would help to control overland flow and restore groundwater recharge. Columbia Gas' SPCC Plan includes measures to avoid or minimize the potential for fuels or other hazardous liquids to contaminate groundwater and provides guidance for the rapid control and cleanup of any spills or leaks.

Columbia Gas would route around existing septic systems and associated leach fields, if possible. If re-routing is not possible, Columbia Gas would work with the landowner to relocate the septic system and compensate the landowner for associated costs and for loss of usable land.

To minimize the chance of accidental spills affecting groundwater resources, Columbia Gas would prohibit construction equipment, vehicles, hazardous materials, chemicals, fuels, lubricating oils, and petroleum products from being parked, refueled, stored, or serviced within a 200-foot radius of any active private water well, and within a 400-foot radius of any public or municipal water well. These buffers would be included in environmental documents prepared prior to construction. Spills would be reported to appropriate regulatory agencies as required. Columbia Gas' ECS and SPCC Plan contain procedures to control, contain, and clean up any released materials during construction. Measures outlined in the SPCC Plan and ECS include, but are not limited to:

- collection and proper disposal of contaminated materials;
- regular inspection of storage areas for leaks;
- replacement of deteriorating containers; and
- use of secondary containment systems around hazardous liquids storage facilities and water pumps.

We have reviewed Columbia Gas' ECS and SPCC Plan and find that these protocols adequately address the storage and transfer of hazardous materials and the response to be implemented in the event of a spill.

Columbia Gas estimates that about 88 percent of the pipeline route crosses bedrock at depths of less than 60 inches where blasting may be required for pipeline installation. Blasting could affect groundwater quality by temporarily changing groundwater levels and increasing groundwater turbidity near the construction right-of-way. Columbia Gas would attempt to utilize specialized excavation methods, including ripping or the use of hydraulic hammers or rock saws, where rock may be encountered during construction. However, blasting may be necessary to achieve the required trench depth if these methods prove to be ineffective or inefficient. Columbia Gas has developed a Blasting Plan to minimize potential adverse impacts on the environment, nearby water sources, structures, or utilities. As stated in this plan, licensed blasting contractors would conduct the blasting activities in accordance with all applicable federal, state, and local regulations. Columbia Gas would obtain all necessary permits prior to initiating blasting activities.

We anticipate that impacts on nearby water wells and springs (such as increases in turbidity) from blasting would be temporary and would likely dissipate shortly after blasting or after a well has been flushed several times. Columbia Gas has committed to contacting affected landowners again regarding the location of any private wells or springs just prior to the start of construction so that a comprehensive list of these features can be compiled. Additionally, Columbia Gas has agreed to test all private water wells within 150 feet of construction workspaces (with landowner consent) for water quality and quantity parameters, including well yield, before and after construction, and provide an alternative water source or a mutually agreeable solution in the event of construction-related impacts.

Proposed compressor, regulator, and tie-in facilities would be in the same general vicinity as the MXP pipelines. The measures Columbia Gas proposes to minimize potential impacts of the pipelines on groundwater (e.g., adherence to the measures included in its ECS and SPCC Plan) would apply to the access roads and pipe/contractor yards, as well. In addition, excavation associated with compressor facilities would be fewer than 6 feet deep in most instances, and therefore impacts on groundwater would be minimal. For these reasons, we do not expect the construction or use of the aboveground facilities to impact groundwater resources.

As discussed in section 2.6.1, Columbia Gas would employ EIs to monitor compliance with its ECS, SPCC Plan, and environmental conditions contained in the Commission's Certificate and as specified in project permits and approvals during construction and restoration. The EIs would have the authority to stop work and order corrective actions for activities that violate the environmental conditions of the Certificate and other permit authorizations.

4.3.1.5.2 Gulf XPress Project

Compressor station construction activities are not likely to impact groundwater resources because construction would involve shallow, temporary, and localized excavation. Tree felling and vegetation removal would only be performed in those areas necessary for installation of structures, piping, property and security fencing, and the access driveways. Temporary erosion and sediment control measures (e.g., silt fencing) would be installed to isolate disturbed areas from surrounding undisturbed areas during construction.

Post-construction, except where cut-and-fill is required, disturbed construction work areas would be graded to match pre-construction contours and drainage patterns. Areas within the permanent compressor station sites that are not encumbered with buildings, structures, or gravel/asphalt would be reseeded with a turf seed mix. TWS would be seeded in accordance with written recommendations for seed mixes, rates, and dates obtained from the appropriate soil conservation authorities. Permanent erosion control measures would be installed in accordance with the ECS. For these reasons, we do not expect the construction or use of the aboveground facilities to impact groundwater resources.

Accidental spills or leaks of hazardous materials associated with vehicle fueling, vehicle maintenance, and construction materials storage would present the greatest potential contamination threat to groundwater resources. Soil contamination resulting from these spills or leaks could continue to add pollutants to the groundwater long after a spill occurs. Implementation of proper storage, containment, and handling procedures would minimize the chance of such releases. Columbia Gulf's ECS and SPCC Plan address the preventative and mitigation measures that would be implemented to avoid or minimize the potential impacts of hazardous material spills during construction. Measures outlined in Columbia's ECS and SPCC Plan include, but are not limited to:

- regular inspection of equipment, containers, and tanks for leaks;
- prohibition of fueling, lubricating activities, and hazardous material storage in or adjacent to sensitive areas;
- use of secondary containment for storage of fuels, oils, hazardous materials, and equipment;
- implementation of emergency response procedures, including spill reporting procedures; and
- use of standard procedures for excavation and off-site disposal of any soils contaminated by spillage.

We have reviewed the Columbia Gulf ECS and SPCC Plan and find that the measures adequately address the storage, handling, and transfer of hazardous materials and the procedures to be implemented in the event of a spill.

Karst geology was identified at several project sites, including the Paint Lick, Goodluck, Cane Ridge, and Clifton Junction Compressor Stations, although signs of active features were not noted. Refueling, hazardous materials storage, and overnight equipment parking within 100 feet

of karst features would be prohibited unless specifically approved by Columbia Gulf's EI/environmental health and safety personnel and additional mitigation measures were implemented (e.g., secondary containment). (See discussion of karst topography in section 4.1.4.7.)

Columbia Gulf anticipates encountering bedrock during construction at several station sites (Moorhead, Paint Lick, Goodluck, Cane Ridge, and Clifton Junction); therefore, blasting may be required if shallow bedrock or boulders cannot be removed by conventional mechanical methods. In these cases, the blasting measures identified in Columbia Gulf's Blasting Plan would be implemented to remove rock from the project workspace. Blasting would be conducted according to guidelines designed to control energy propagation and protect persons and property in the area.

A site-specific blasting plan would be developed for each location where blasting is required. Activities would adhere to federal, state, and local regulations pertaining to blasting and blast vibration limits regarding structures and underground utilities. Care would be taken when blasting near water wells, and blasting within the vicinity of other pipelines would be coordinated with the pipeline operator.

4.3.1.6 Conclusion

4.3.1.6.1 Mountaineer XPress Project

Construction activities are not likely to significantly impact groundwater resources in the long-term because most construction would involve shallow, temporary, and localized excavation. Trench depths are typically less than 10 feet, while the typical depth to groundwater aquifers ranges from 25 feet (alluvial aquifers) to 50 feet (Upper Pennsylvanian aquifers). Shallow, surficial groundwaters (the "water table") would be encountered at numerous locations along the route. Small "perched" groundwaters can be encountered on slopes, and the pipeline trench would often be within the water table zone, especially on valley floors and in floodplains. The pipeline would not be expected to significantly alter the flow or quality of surficial groundwaters. Columbia Gas would avoid or further minimize impacts by using construction techniques described in its ECS, such as using temporary and permanent trench plugs and interceptor dikes. Columbia Gas' use of its Blasting Plan would minimize potential impacts from blasting on groundwater resources. We have also included a recommendation to ensure construction-related impacts on potable wells and springs are adequately minimized.

Following MXP construction, TWS not required for operation of the facilities would be restored as closely as practicable to original contours and revegetated in accordance with the ECS and agency requirements. Restoration and revegetation of exposed soils would return them to pre-construction overland flow and recharge patterns. In accordance with Columbia Gas' SPCC Plan, fuels and other hazardous materials used at compressor stations and other aboveground facilities would be stored in tightly sealed containers and clearly labeled during transportation and storage. Therefore, no significant impacts on groundwater resources would be anticipated from construction or operation of the MXP pipelines, compressor stations, or pipeline ancillary facilities

4.3.1.6.2 Gulf XPress Project

No long-term impacts on groundwater are anticipated from construction or operation of the GXP. Disturbances would be shallow and temporary, erosion controls would be implemented, natural ground contours would be largely restored, and areas of disturbance revegetated. Temporary, minor, and localized impacts could result during trenching activities in areas with shallow groundwater (depth fewer than 10 feet below the ground surface) crossed by the GXP suction/discharge pipeline. The greatest threat posed to groundwater resources would be a hazardous material spill or leak into groundwater supplies. We have reviewed Columbia Gulf's ECS and SPCC Plans and conclude that they adequately address strategies and methods to prevent or limit such contamination should a spill occur. We do not anticipate any significant, long-term impacts on aquifers or groundwater supplies from construction or operation of the project given the relatively shallow excavation depths required for construction.

4.3.2 Surface Water Resources

Waterbodies are characterized as perennial, intermittent, or ephemeral. Perennial waterbodies contain flowing water for all or most of the year. Intermittent waterbodies flow seasonally or following rainfall events. Ephemeral waterbodies flow during or shortly after precipitation events or spring snowmelt. Waterbodies are designated as ponds if the feature is non-flowing.

The MXP is located entirely within the Ohio River Regional Watershed (USGS, 1994). Major rivers within this watershed include the Ohio, Wabash, Allegheny, Monongahela, Kanawha, and New Rivers. Columbia Gas identified surface water resources throughout the project area during field surveys conducted in 2015 and 2016. Survey areas included the pipeline construction corridors, TWS, ATWS, staging areas, pipe yards, and access roads. For areas where access was denied, information was obtained from the USGS National Hydrography Dataset, aerial photography, and other available GIS-based information.

Waterbodies along the MXP also were characterized as "minor," "intermittent," or "major," according to the definitions provided in FERC's Procedures, which base the classification on the width of the water's edge at the time of crossing. Minor waterbodies are less than or equal to 10 feet wide; intermediate waterbodies are between 10 and 100 feet wide; and major waterbodies are greater than 100 feet wide. Table 4.3-4 below provides a summary of the waterbodies crossed by the MXP.

Table 4.3-4
Waterbodies Crossed by the Mountaineer XPress Project a/

Facility	Number of Waterbodies							
	Waterbody Type				FERC Classification			
	Perennial	Intermittent	Ephemeral	Ponds	Major	Intermediate	Minor	Ponds
Pipeline Facilities								
MXP-100	101 (94)	154 (134)	588 (265)	4 (0)	5 (5) b/	83 (81)	756 (408)	4
MXP-200	3 (3)	7 (6)	13 (4)	0	0	5 (5)	18 (8)	0
X59M1 Tie-in	0	0	1 (1)	0	0	0	1 (1)	0
SM80 Line Replacement	0	0	0	0	0	0	0	0
SM80 Loop Line Replacement	0	0	0	0	0	0	0	0
Aboveground Facilities								
Sherwood Compressor Station	0	0	1 c/	0	0	0	1	0
White Oak Compressor Station	0	0	5	0	0	0	5	0
Mt. Olive Compressor Station	0	1	13	0	0	1	13	0
Ripley Regulator Station	0	1 d/	3	0	0	1	3	0
Saunders Creek Regulator Station	0	0	0	0	0	0	0	0
MXP-200 Tie-In with Line 1983	0	0	0	0	0	0	0	0
Lone Oak Compressor Station	0	0	0	0	0	0	0	0
Ceredo Compressor Station	0	0	0	0	0	0	0	0
Elk River Compressor Station	0	0	0	0	0	0	0	0
Ancillary Facilities								
Access Roads	56	72	212	0	0	41	299	0
Pipe Yards and Staging Areas	0	1	7	1	0	0	8	1
Total	**160**	**236**	**843**	**5**	**5**	**130**	**1,107**	**5**

a Numbers represent waterbodies within construction workspaces (but not crossed by the pipeline). Numbers in parentheses are waterbodies crossed by the pipeline centerline.
b The South Fork Hughes River would be crossed twice.
c Access to the Sherwood Compressor and Regulator Station would require installation of a permanent bridge/culvert across an ephemeral waterbody.
d Access to the Ripley Regulator Station would require installation of a permanent bridge/culvert across an intermittent waterbody.

Overall, the centerline of the MXP pipelines would directly cross 417 minor waterbodies, 86 intermediate waterbodies, and 5 major waterbodies. The five major crossings are at the South Fork Hughes River (crossed twice), Little Kanawha River, Spring Creek, and Kanawha River. Columbia Gas has provided a site-specific crossing plan for the Kanawha River, which would be crossed using the HDD method (described in section 2.4.4). For crossing the other three major waterbodies, Columbia Gas proposes to use the dam-and-pump or flume method. In addition to these 508 crossings, another 360 waterbodies would be within the pipeline construction rights-of-way, but not crossed by the pipeline directly.

The GXP would be constructed within three regional watersheds (Ohio, Tennessee, and Lower Mississippi Regions). Columbia Gulf identified surface water resources in the project area during field surveys conducted in 2015. A total of 15 waterbodies could potentially be affected by the project, including 12 ephemeral streams and 3 impoundments/stock ponds. These features and the nearest perennial waterbodies to each of the new compressor stations are identified in table 4.3-5.

Table 4.3-5
Waterbody Features near the Gulf XPress Project a/

State/Facility	On Site Waterbody Feature	Ultimate Disposition	Nearest Perennial Waterbody to Site
Kentucky			
Morehead Compressor Station	2 ephemeral streams, 1 stock pond	All three features would be within both the temporary and permanent workspaces. The portions within the permanent workspace would not be restored.	North Fork Triplett Creek lies adjacent to the east and south boundaries of the site, about 300 feet from the southeast corner of the temporary workspace.
Goodluck Compressor Station	1 ephemeral stream	This feature would be within the temporary workspace. A 25-foot buffer would be established around this feature during construction.	Clay-Lick Creek is about 1,900 feet west of the western boundary of the temporary workspace.
Tennessee			
Clifton Junction Compressor Station	5 ephemeral streams, 2 stock ponds	A 25-foot buffer would be established around one stock pond, while the other stock pond (within the permanent workspace) would not be restored. Routing the access road in this location would limit tree clearing at the site. Three of the five ephemeral streams would be within the permanent workspace. One, crossed by the site access road, would be directed through a culvert during restoration; another would be restored to original contours; while the third would not be restored.	Hardin Creek is about 900 feet south of the southernmost corner of the temporary workspace.
Mississippi			
New Albany Compressor Station	3 ephemeral streams	All three features are within both the temporary and permanent workspaces. One feature, crossed by the site access road, would be directed through a culvert during restoration. The portions of the other two features within the permanent workspace would not be restored.	South Branch Wilhite Creek converges with the Little Tallahatchie River along western boundary of the site.
Holcomb Compressor Station	1 ephemeral stream	This feature would be crossed to access temporary workspace. It would be protected during construction by installing a culvert or temporary bridge.	The Yalobusha River is about 4,400 feet west of the western boundary of the site.

a There are no waterbody features on the existing Leach C Meter Station, the approved Grayson Compressor, or the proposed Paint Lick and Cane Ridge Compressor Station sites.

The following sections describe public water supplies, state water classifications and designated waterbodies, and flood hazard zones. Given the differences between the projects, not all discussion topics are relevant to both projects. For instance, the GXP would have no effect to public water supplies, waterbodies with special designations, impaired streams, or contaminated sediments; additionally, HDD operations are not discussed for the GXP because no perennial waterbodies would be crossed. Furthermore, no GXP facilities would be sited in flood hazard zones.

4.3.2.1 Public Water Supplies

4.3.2.1.1 Mountaineer XPress Project

Columbia Gas consulted with the WVDHHR to obtain location data for public water surface intakes within 3 miles of MXP waterbody crossings. The WVDHHR did not identify any potable water intakes within 3 miles downstream of any MXP crossings. However, the data provided by the WVDHHR identified Zones of Critical Concern (ZCC) and Zones of Peripheral Concern (ZPC) that are considered surface water protection areas in corridors along waterbodies within Source Water Protection Watersheds. The ZCC is based on a protection zone of 5 hours of water travel time above the water intake, while the ZPC is based on a protection zone of 10 hours above the water intake (see table 4.3-6). The ZCCs and ZPCs warrant a more detailed inventory and management due to their proximity to the source water and susceptibility to potential contaminants (WVDHHR, 2016a).

4.3.2.1.2 Gulf XPress Project

As previously noted, the GXP would not cross or otherwise impact any perennial surface waters. No surface water reservoir watersheds would be affected.

4.3.2.2 State Water Classifications and Designated Waterbodies

CWA section 303(d) requires that each state review, establish, and revise water quality standards for all surface waters within each state. State classification systems develop monitoring and mitigation programs to verify that water standards are attained as designated. Waters that fail to meet their designated beneficial use are considered impaired and are listed under a state's 303(d) list of impaired waters.

4.3.2.2.1 Mountaineer XPress Project

Pipeline Facilities

In accordance with the CWA, Columbia Gas reviewed the list of 303(d) Impaired Waters for West Virginia to identify waterbody crossings that may contain contaminated sediments and do not meet designated water quality criteria (WVDEP, 2012; 2014). In total, the pipeline centerlines would cross 49 303(d)-listed impaired stream segments. Most of the 303(d)-listed waterbody impairments are associated with fecal coliform, biological contaminants, bacteria, or iron. Table 4.3-7 provides a list of impaired waterbodies within the project area.

Table 4.3-6
Zones of Critical and Peripheral Concern Crossed by the MXP Pipeline Facilities

Facility Associated with Protection Area County	Surface Water System Name / Intake	ZCC a/ Milepost Range	Number of ZCC Crossings	ZPC a/ Milepost Range	Number of ZPC Crossings	Total Length of ZCC/Total Length of ZPC Crossed (miles)
Pipeline Facilities						
MXP-100						
Marshall and Wetzel Counties	Covestro (formerly Bayer Materials Science, LLC) (Primary Intake)	0.1 – 6.4	10	0.1 – 15.0	22	2.1/4.9
	Sisterville Municipal Water (Primary Intake)	N/A	0	0.1 – 31.6	44	0.0/10.2
Tyler County	Middlebourne Water Works (Intake #1)	N/A	0	32.9 – 35.8	5	0.0/1.0
	Middlebourne Water Works (Intake #2)	N/A	0	32.9 – 35.8	5	0.0/1.0
Doddridge County	Town of West Union	46.0 – 52.8	7	46.0 – 52.8	7	2.5/2.5
Jackson County	City of Ripley	121.6 – 122.0	1	113.2 – 122.5	11	0.4/3.6
Cabell County	Milton Water	155.8 – 163.9	10	155.8 –163.9	10	3.1/3.1
	WVAWC – Huntington District (Intake #1)	N/A	0	155.8 –163.9	10	0.0/2.7
	WVAWC – Huntington District (Intake #2)	N/A	0	155.8 –163.9	10	0.0/2.7
MXP-200						
Doddridge County	Town of West Union	0 – 2.3	4	0 – 6.0	7	1.5/2.3
SM80 Replacement						
Cabell County	WVAWC – Huntington District (Intake #1)	21.0 – 21.2	1	21.0 – 21.2	1	0.2
	WVAWC – Huntington District (Intake #2)	21.0 – 21.2	1	21.0 – 21.2	1	0.2

Sources: WVDHHR, 2016a, 2003 a-c

a ZCC = Zone of Critical Concern; ZPC = Zone of Peripheral Concern

Table 4.3-7
Impaired Waterbodies within the Proposed MXP Workspace

Project Facility/ County a/	Milepost	Stream ID b/	Waterbody Name	Proposed Crossing Method c/	Cause of Impairment d/
MXP-100 Mainline					
Marshall	7.1	smac035	Fish Creek	Dry	Biological
Wetzel	16.9	swzg012c	Rush Run	Dry	Fecal coliform/bacteria
	18.3	swzf014	Little Fishing Creek	Dry	Biological, fecal coliform/bacteria, iron
	24.5	swzg065	Fishing Creek	Dry	Fecal coliform/bacteria, iron
Tyler	34.9	styh001	Indian Creek	Dry	Biological, fecal coliform/bacteria
Doddridge	38.4	sdoi011	McElroy Creek	Dry	Biological, fecal coliform/bacteria, iron
	44.0	sdoc005a	Flint Run	Dry	Fecal coliform/bacteria
	48.7	sdoc020	Buckeye Creek	Dry	Fecal coliform/bacteria
	50.5 e/	sdoh026	Meathouse Fork	Dry	Biological, fecal coliform/bacteria, iron
	51.8	sdog002	Meathouse Fork	Dry	Biological, fecal coliform/bacteria, iron
	54.3	sdog202	Bluestone Creek	Dry	Fecal coliform/bacteria
	56.9	sdoo302	Left Fork Arnold Creek	Open Cut/Wet Trench	Fecal coliform/bacteria
	59.6	sdog014	South Fork Hughes River	Dry	Biological
Ritchie	65.4	srig022	Middle Fork	Dry	Biological
	72.2	sric044	South Fork Hughes River	Dry	Biological
	72.5	sric043	South Fork Hughes River	Dry	Biological
	76.9	sric012	South Fork Hughes River	Dry	Biological
Wirt	87.5	swif053	Straight Creek	Dry	Biological
	94.8	swif001	Little Kanawha River	Dry	Fecal coliform/bacteria, iron
	96.5	swih010	Spring Creek	Dry	Biological, iron
	96.9	swih012	Spring Creek	Dry	Biological, iron
	97.3	swih014	Spring Creek	Dry	Biological, iron
Roane	102.8	sroc030	Left Fork Reedy Creek	Dry	Biological
	108.8 f/	srog021	Buffalo Creek	Open Cut/Wet Trench	Fecal coliform/bacteria
Jackson	113.3 f/	sjaa025b	Little Mill Creek	Dry	Biological, fecal coliform/bacteria, iron
	115.2	sjaa014	Frozencamp Creek	Dry	Biological, fecal coliform/bacteria, iron

Table 4.3-7
Impaired Waterbodies within the Proposed MXP Workspace

Project Facility/ County a/	Milepost	Stream ID b/	Waterbody Name	Proposed Crossing Method c/	Cause of Impairment d/
	118.6	sjah007	Elk Fork	Dry	Biological, fecal coliform/bacteria, iron
	121.8	sjad040	Tug Fork	Dry	Fecal coliform/bacteria, iron
	127.1	sjaf065	Parchment Creek	Dry	Biological, fecal coliform/bacteria, iron
	127.9	sjac055	Wolfe Creek	Dry	Biological, fecal coliform/bacteria, iron
	129.3	sjac001	Thirteenmile Creek	Open Cut/Wet Trench	Fecal coliform/bacteria, iron
	130.4	sjae011b	Peppermint Creek	Dry	Iron
Putnam	137.8 f/	spuc053	Spring Valley Branch	Dry	Iron
	138.4	spuc018	Eighteenmile Creek	Dry	Fecal coliform/bacteria, iron
	138.9	spuc015	Eighteenmile Creek	Dry	Fecal coliform/bacteria, iron
	140.0	spuc029	Eighteenmile Creek	Dry	Fecal coliform/bacteria, iron
	140.3	spuc029	Buffalo Branch	Dry	Iron
	142.8	spub015	Isaacs Branch	Dry	Iron
	147.0	spuf001	Kanawha River	HDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin, fecal coliform/bacteria, polychlorinated biphenyls
	147.6	spui011	UNT of Hurricane Creek	Dry	Iron
	154.8	spug311	Trace Creek	Open Cut/Wet Trench	Fecal coliform/bacteria, iron
Cabell	161.4	scbf019	Indian Fork	Dry	Biological
	163.4	scbh002	Mud River	Dry	Biological, selenium
	163.4	scbh002	Mud River	NA	Biological, selenium
MXP-200 Sherwood Lateral					
Doddridge	1.1	sdog002	Meathouse Fork	Dry	Biological, coliform/bacteria, iron
	2.2	sdog078	Lick Run	Dry	Iron
	3.7	sdoh022	Toms Fork	Dry	Iron
	5.8	sdog008b	Meathouse Fork – Back Channel	Open Cut/Wet Trench	Biological, fecal coliform/bacteria, iron
	5.9	sdog008a	Meathouse Fork	Dry	Biological, fecal coliform/bacteria, iron

Table 4.3-7
Impaired Waterbodies within the Proposed MXP Workspace

Project Facility/ County a/	Milepost	Stream ID b/	Waterbody Name	Proposed Crossing Method c/	Cause of Impairment d/
Access Roads Along the MXP-100					
Marshall					
ARMA007	7.0	smac035	Fish Creek	New culvert	Biological
ARMA008.4	11.0	sami035	Bark Camp Run	New culvert	Biological
Wetzel					
ARWZ017	28.8	swzf319	Buffalo Run	Existing culvert	Biological, fecal coliform/bacteria, iron
ARWZ020	30.1	swzf318	Buffalo Run	Existing culvert	Biological, fecal coliform/bacteria, iron
Tyler					
ARTY002.1	34.9	styf402	Indian Creek	New culvert	Biological, fecal coliform/bacteria
Doddridge					
ARDO003	44.0	sdog369	Flint Run	New culvert	Fecal coliform/bacteria
ARDO009.3	54.5	sdoi204	Bluestone Creek	New culvert	Fecal coliform/bacteria
	54.5	sdoi204	Bluestone Creek	New culvert	Fecal coliform/bacteria
ARDO011	56.2	sdoo313	Left Fork/Arnold Creek	Existing culvert	Fecal coliform/bacteria
Ritchie					
ARRI008	74.9	srif303	Lick Run	New culvert	Fecal coliform/bacteria, iron
	74.9	srif303	Lick Run	New culvert	Fecal coliform/bacteria, iron
Wirt					
ARWI019.6	95.2	NHD	Spring Creek	New culvert	Biological, iron
Roane					
ARRO002	102.8	sroc030	Left Fork Reedy Creek	New culvert	Biological
Jackson					
ARJA001	112.1	sjaf307	Buffalo Creek	New culvert	Biological, fecal coliform/bacteria
ARJA007.9	129.3	sjac001	Thirteenmile Creek	Existing culvert	Fecal coliform/bacteria, iron
Putnam					
ARPU007	136.0	spuk377	Spring Valley Branch	Existing culvert	Iron
ARPU008.1	137.4	spuk357	Spring Valley Branch	New culvert	Iron

Table 4.3-7
Impaired Waterbodies within the Proposed MXP Workspace

Project Facility/ County a/	Milepost	Stream ID b/	Waterbody Name	Proposed Crossing Method c/	Cause of Impairment d/
ARPU009	138.2	NHD	Eighteenmile Creek	New culvert	Fecal coliform/bacteria, iron
ARPU013	142.9	spuk315	Isaacs Branch	New culvert	Iron
	142.9	spuk315	Isaacs Branch	New culvert	Iron
	142.9	spuk312	Isaacs Branch	New culvert	Iron
Access Roads Along the MXP-200					
Doddridge					
ARDO201	3.2	sdog307	Meathouse Fork	New culvert	Biological, fecal coliform/bacteria, iron
	3.2	sdog307	Meathouse Fork	New culvert	Biological, fecal coliform/bacteria, iron
	3.3	sdog307	Meathouse Fork	Existing culvert	Biological, fecal coliform/bacteria, iron
ARDO201.54	4.6	sdog301	Toms Fork	New culvert	Iron

a No waterbodies are within the workspaces for the following facilities: SM80 Line and SM80 Loop Line Replacement; X59M1 Tie-in; proposed Sherwood, White Oak, Mt. Olive, and Ceredo Compressor Stations; approved Lone Oak, and pending Elk River Compressor Stations.

b Stream IDs were assigned by Columbia Gas to each waterbody collected during field surveys. Waterbodies identified as "NHD" represent waterbodies that are based on desktop data from the National Hydrography Dataset.

c N/A indicates construction method is not applicable for features not crossed by the MXP-100 or MXP-200 centerlines. "Dry" refers to a dry-ditch method such as a flume or dam-and-pump crossing.

d WVDEP, 2012.

e Meathouse Fork (sdoh026) would be crossed by the MXP-100 pipeline inbound into Sherwood Compressor and Regulator Station, MXP-100 outbound from the station, and MXP-200 outbound from the station. All three crossings would be installed concurrently and are therefore counted as 1 crossing.

f GIS shapefiles of 303(d) streams indicated that the MXP would not cross these streams. After review of the data, topographic maps, and aerial photography, Columbia Gas indicated that the MXP crosses these streams upstream of the perceived extent of the GIS shapefile.

West Virginia has several systems of designating waterbodies for the protection of water quality and fisheries. Section 47-2-4 of the West Virginia Code of State Regulations ([WVCSR], 2014) outlines an anti-degradation policy that establishes three "tiers" for protecting waters of the state; levels used to maintain quality or existing uses by protecting from activities that have the potential to lower water quality (WVDEP, 2015d). The three tiers are:

- **Tier 1 Protection:** existing water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.
- **Tier 2 Protection:** existing high-quality waters (HQW) must be maintained at their existing high quality unless it is determined necessary to accommodate important economic or social development. HQWs are defined as those waters whose quality is equal to or better than the minimum levels necessary to achieve the national water quality goal uses.
- **Tier 3 Protection:** waters which constitute an outstanding national resource shall be maintained and protected and improved where necessary. Outstanding national resource waters include, but are not limited to, all streams and rivers within the boundaries of Wilderness Areas, all federally designated rivers under the Wild and Scenic Rivers Act, all streams and other bodies of water in state parks which are HQWs or naturally reproducing trout streams; waters in national parks and forests which are HQWs or naturally reproducing trout streams; waters designated under the National Parks and Recreation Act of 1978 as amended, and those waters whose unique character, ecological or recreational value; or pristine nature constitutes a valuable national or state resource.

West Virginia also identifies some streams as HQWs based on their ability to support certain fisheries (WVCSR, 2014; WVDNR, 2001). Streams can also be classified into one of four groups based on their ability and status to support federally and state protected species. These groups and special designations for fisheries in West Virginia are discussed in section 4.6.4.1.

Waterbodies that may be considered sensitive to pipeline construction include, but are not limited to:

- waters that do not meet the water quality standards associated with the state's designated beneficial uses (i.e., 303(d) impaired waters);
- waters that have been designated for intensified water quality management and improvement;
- waterbodies that contain threatened or endangered species or critical habitat (see sections 4.7.4 and 4.7.5);
- waters that support fisheries of special concern (e.g., HQWs, trout streams; see section 4.6.4.1);
- waterbodies that are designated as an outstanding resource water (i.e., Tier 3 waters); and
- waterbodies on or designated to be added to the Nationwide Rivers Inventory (NRI) or a state river inventory.

The MXP does not appear to cross any Tier 3 streams (WVDEP, 2015d). However, the WVDNR has identified four waterbodies in Marshall and Wetzel Counties that have significant

importance as baseline monitoring sites. Based on information provided by the WVDEP, five sites are located near the MXP-100 route; on the Lower Bowman Run (one site), Middle Bowman Run (one site), Upper Bowman Run (two sites), and Lynn Camp Run (one site). The two monitoring sites on Upper Bowman Run are upstream of the pipeline crossing location (MP 6.3), the nearest of which is approximately 0.3 mile upstream. These two locations would not be affected by construction of the project. Of the three remaining monitoring sites, the closest downstream location is approximately 0.5 mile from the Lower Bowman Run crossing (MP 3.5). Columbia would cross these four waterbodies using a dry-ditch crossing technique (see section 2.4.4.2.1), which would reduce the potential for significant downstream sediment transport into the monitoring sites. Columbia Gas would continue to work with the WVDEP regarding crossing methods for these waterbodies and measures to limit the potential impacts on these downstream monitoring sites.

Two rivers listed on the NRI would be crossed by the MXP-100: Little Kanawha River, MP 94.8; and Mud River, MP 163.4. Both crossings are in segments recognized by the NRI as having historic value (National Park Service [NPS], 2011). (See section 4.8.2.4.1.)

Overall, the MXP pipelines and aboveground facilities would cross or disturb 43 sensitive waterbodies. Most are considered sensitive because they are designated HQWs and potential freshwater mussel habitat. In addition to these designations, one is also a public water supply and listed on the NRI (Little Kanawha River) and another is designated for recreation and listed on the NRI (Mud River). Five are designated solely as potential habitat for freshwater mussels and three are designated solely as HQWs. Additionally, construction of the Ripley Regulator Station would disturb Grasslick Run, an intermittent stream identified as potential freshwater mussel habitat, where a culvert would be installed for the permanent access road.

4.3.2.2.2 Gulf XPress Project

The GXP would have no impact on waterbodies with special designations or impaired streams.

4.3.2.3 Flood Hazard Zones

According to FEMA, Zones A and AE2 areas have a 1 percent annual chance of a flood event. These areas are known as the base flood or 100-year-flood. Zone X areas, also known as the 500-year-flood, have a 0.2 percent annual chance of a flood event (FEMA, 2016).

4.3.2.3.1 Mountaineer XPress Project

As would be expected for a linear project, MXP pipelines would cross FEMA identified flood hazard zones at multiple locations along the 170-mile corridor. However, none of the aboveground facilities would be within a FEMA flood hazard zone.

4.3.2.3.2 Gulf XPress Project

Because Columbia Gulf selected sites for its compressor stations to avoid flood hazard zones, there would be no floodplain impacts from construction of the GXP.

4.3.2.4 Impacts and Mitigation

4.3.2.4.1 Mountaineer XPress Project

Project construction could impact surface waters in several ways. Clearing and grading of streambanks, instream trenching, trench dewatering, and backfilling could result in modification of aquatic habitat, increased sedimentation, turbidity, decreased dissolved oxygen concentrations, releases of chemical and nutrient pollutants from sediments disturbed by trenching, and introduction of chemical contaminants such as fuel and lubricants.

The clearing and grading of streambanks could expose soil to erosional forces and would reduce riparian vegetation along the cleared section of the waterbody. The use of heavy equipment for construction could cause compaction of near-surface soils, an effect that could result in increased runoff entering surface waters in the immediate vicinity of the construction right-of-way. Increased surface runoff could transport sediment into surface waters, resulting in increased turbidity levels and increased sedimentation rates in the receiving waterbody. Disturbances to stream channels and streambanks could also increase the likelihood of scour after construction.

Long-term impacts associated with pipeline operations and maintenance would be relatively minor. Columbia Gas would stabilize streambanks within 24 hours of completion of construction and revegetate following installation of the pipeline. Post-construction vegetation maintenance would be limited to the permanent rights-of-way pursuant to the Columbia Gas' ECS.

Dry-Ditch Stream Crossings

As shown in table 4.3-7, the MXP centerlines would make 49 crossings of streams listed as impaired on the West Virginia 303(d) list (WVDEP, 2014). No impaired waterbodies were identified in association with the SM80 Line or SM80 Loop Line Replacements, or the proposed compressor station sites. All the impaired streams to be crossed (except for the Kanawha and Mud Rivers) have been degraded by contaminates that typically may be found in areas where wastewater treatment facilities are absent or inadequate (fecal coliform, bacteria, biological) and where mining is common (iron). Dioxin and polychlorinated biphenols (in the Kanawha River) are "legacy" contaminates, resulting from the improper disposal of manufacturing wastes at some time in the past. (Legacy contaminants show little degradation even decades after their release to the environment.) Fecal coliform and bacteria typically predominate the water column while dioxin and biphenols bind strongly to sediments.

Columbia Gas would mitigate impacts on water quality by conducting most crossings of perennial streams greater than 10 feet wide (intermediate and major streams) as dry-ditch crossings, i.e., by dam-and-pumping to move the stream around the work area or using flumes to carry waterbody flow across the workspace. Columbia Gas intends to work with its contractors to determine which dry-ditch crossing technique is most efficient, constructible, and protective based on the site conditions at the time of construction. The exception would be at the Kanawha River, where the HDD method would be used. See section 2.4.4.2 for a description of wet, dry, and HDD crossing methods. Thus, water quality impacts would be largely limited.

Because a dry-ditch crossing allows for trenching and backfill activities to occur under relatively dry conditions, it minimizes the re-suspension of polluted sediments, limits downstream

sedimentation, and avoids disruption to water flow (which minimize impacts on downstream fish). Temporary construction-related impacts would be limited primarily to short periods of increased turbidity (during the assembly of the upstream and downstream dams before trenching begins, and following installation of the pipe when the dams are removed and flow across the restored work area is re-established).

During construction, the open trench may accumulate water, either from the seepage of groundwater or from precipitation. Where dewatering is necessary, Columbia Gas would pump the trench water into well-vegetated uplands and/or filter bags, as described in its ECS. This would prevent heavily silt-laden water from flowing into any adjacent waterbodies or wetlands.

Following construction, waterbody beds and banks would be restored to pre-construction contours and spoil excavated from the stream bottom used as trench backfill. This would also minimize changes to the instream habitat at the crossing site.

Columbia Gas would minimize impacts on waterbodies during construction by implementing the construction and mitigation procedures contained in its ECS, which include:

- limiting clearing of vegetation between ATWS and the edge of the waterbody to preserve riparian vegetation;
- constructing the crossing as close to perpendicular to the waterbody as site conditions allow;
- maintaining adequate flow rates throughout construction to protect aquatic life and prevent the interruption of existing downstream uses;
- locating equipment parking areas, equipment refueling areas, concrete coating activities, and hazardous material storage areas at least 100 feet from surface waters;
- requiring construction across waterbodies to be completed as quickly as possible;
- requiring temporary erosion and sediment control measures to be installed across the entire width of the construction right-of-way after clearing and before ground disturbance;
- requiring maintenance of temporary erosion and sediment control measures throughout construction until streambanks and adjacent upland areas are stabilized;
- requiring bank stabilization and reestablishment of bed and bank contours and riparian vegetation after construction;
- limiting post-construction maintenance of vegetated buffer strips adjacent to streams; and
- implementing the SPCC Plan if a spill or leak occurs during construction.

Once the pipeline is installed across a waterbody, measures to stabilize and restore streambanks and the crossing approach disturbed by construction are important to rehabilitating the integrity of the crossing site. Based on WVDEP's recommendations, proper measures should be planned beforehand and implemented as part of the crossing completion, therefore **we recommend <u>prior to construction</u> Columbia Gas should file with the Secretary, for review and written approval from the Director of OEP:**

- **a waterbody crossing restoration plan to restore all intermediate and major waterbody crossing sites using natural design techniques such as:**
  - **repopulating streambanks in areas of project-related disturbance with local willow cuttings and shallow-rooted containerized native stock; and**
  - **avoiding the use of riprap or concrete "blankets" except where absolutely necessary.**

  Columbia Gas should develop this restoration plan in consultation with the WVDEP, WVDNR, and other appropriate state and federal agencies, and include a provision that requires Columbia Gas to monitor the results of these efforts until revegetation is successful (based on adjacent undisturbed areas).

Finally, we note that in a letter dated September 21, 2016, the USFWS expressed concern with Columbia Gas' proposal to cross McElroy Creek (MP 38.4), the South Fork Hughes River (five crossings; MP 59.6 to 76.9), Spring Creek (three crossings; MP 96.5 to 97.3), the Little Kanawha River (MP 94.7), and Meathouse Fork (five crossings: MXP-100 at MPs 50.5 and 51.8; and MXP-200 at MPs 1.1, 5.8, and 5.9), all of which contain suitable habitat for the federally endangered snuffbox and/or clubshell mussel. Although Columbia Gas proposes to cross these streams using a dry-ditch method, the USFWS' West Virginia Field Office determined that the combined effects of the project "could result in adverse effects to federally listed mussels and their habitat" and recommended "avoiding or drastically minimizing the number of crossings to these streams by seeking an alternative route…" (USFWS, 2016c). This issue is addressed in section 4.7.

HDD Crossing

Columbia Gas proposes to use the HDD crossing method to install the MXP-100 beneath the Kanawha River. Where subsurface conditions are appropriate, an HDD is used to avoid impacts on the waterbody by eliminating any disturbance to the streambed or banks. Although the HDD method is typically effective at protecting the resource, an inadvertent return of drilling fluid (a mixture of nontoxic bentonite clay and water) could occur if the fluid seeps from the drill hole to the ground surface or into the waterbody. In general, the potential for inadvertent surface returns is highest near the HDD entry and exit locations when the drill bit is working nearest the surface. However, an inadvertent return is dependent on numerous factors including substrate characteristics, head pressure of the drilling fluid, topography, elevation, and subsurface hydrology.

To minimize the potential for an inadvertent return of drilling fluid, Columbia Gas would implement measures identified in its HDD Inadvertent Return Contingency Plan (appendix G), which describes procedures to monitor, avoid, contain, and clean up any inadvertent drilling fluid return. Measures used to control the seepage of drilling fluid from the hole may include adding thickening agents to the fluid (e.g., additional bentonite, cottonseed hulls, or other non-hazardous materials) or reducing the fluid circulation pressure. If fluid seepage could not be controlled, drilling would be suspended until the cause could be determined. If needed, the hole may be abandoned and a new drill location established.

Borings conducted as part of the HDD geotechnical evaluation at the Kanawha River found sandy/silty soils to a depth of 45 to 60 feet overlying a shale/sandstone layer to about 100 feet. While under the riverbed, the bore hole would average about 80 feet deep. This would place the bore well within the shale/sandstone layer, which was found to have a compressive strength ranging from 4,000 to 9,000 pounds per square inch. Such conditions appear highly favorable for a successful HDD. However, if drilling fluid found a path to migrate from the hole to the waterbody (an underwater release), Columbia Gas' HDD Inadvertent Return Contingency Plan states only that the fluid circulation pumps would be stopped temporarily or the pressure would be decreased (essentially the same steps to be taken for an inadvertent return in an upland area). While we are satisfied with Columbia Gas' HDD Inadvertent Return Contingency Plan to mitigate potential impacts of an upland area inadvertent return, the plan presents no insight into how a release from underneath the river (directly into the water) would be discovered or what Columbia Gas would do following such a discovery to limit impact on the river. Therefore, **we recommend that**:

- **Prior to the end of the draft EIS comment period, Columbia Gas should file with the Secretary a revised HDD Inadvertent Return Contingency Plan containing specific measures to monitor for, identify, and respond to an inadvertent release directly into the Kanawha River during the HDD crossing. Columbia Gas should develop these measures in consultation with the WVDEP and other appropriate West Virginia state agencies.**

Open-Cut Crossings

As previously noted, Columbia Gas plans to cross most intermediate and major perennial waterbodies as dry-ditch crossings. However, the vast majority of the waterbodies crossed by the pipeline routes are "minor," i.e., less than 10 feet wide. These streams would be crossed by open-cutting. This technique is used because the potential impacts on water quality of open-cutting minor streams is typically not significant. Where streams are substantial (carry significant flow) and contain sensitive resources or have other valued attributes, alternative dry-crossing or HDD methods are considered to avoid or mitigate potential impacts.

Overall, the MXP-100 and MXP-200 pipelines would cross about 411 waterbodies by open-cutting. These streams are almost exclusively ephemeral or intermittent, "minor" (less than 10 feet wide), and classified as warmwater fishery habitat. Assuming they contain flowing water at the time of construction, the primary impacts would be limited to turbidity and sedimentation. Given the flow regimes of minor waterbodies, these impacts would be limited in duration and extent, and not be considered significant. Nevertheless, Columbia Gas would conduct all minor stream crossing activities (trenching, pipeline installation, backfill, and streambed contour restoration) within 24 hours, thereby limiting the duration of active stream disturbance. Any intermediate waterbodies (10 to 100 feet wide) to be open-cut would be crossed in 48 hours unless site-specific conditions make completion infeasible.[24]

[24] Columbia Gas plans to open cut only one intermediate perennial waterbody, an unnamed tributary of Peppermint Creek, at MP 130.8.

Blasting

Blasting may be required along the pipeline route and within streams. Instream blasting has the potential to injure or kill aquatic organisms, displace organisms during blast-hole drilling operations, and temporarily increase stream turbidity. Chemical by-products from the blasting materials could also be released into the water column. Columbia Gas developed a Blasting Plan to minimize potential adverse impacts on the environment, nearby water sources, structures, and utilities. Licensed blasting contractors would conduct blasting activities in accordance with all applicable federal, state, and local regulations. Columbia Gas would obtain all necessary permits and agency approvals if blasting were required within streams.

Flooding

Seasonal and flash flooding hazards are a potential concern where the pipeline would cross or be near major streams and small watersheds. (See discussion of flash-flooding in section 4.1.4.8.) Although flooding itself does not generally present a risk to pipeline facilities, bank erosion and/or scour could expose the pipeline or cause sections of pipe to become unsupported. All pipeline facilities would be designed and constructed in accordance with the USDOT regulations at 49 CFR 192. These regulations include specifications for installing the pipeline in a navigable river, stream, or harbor with a minimum cover of 48 inches in soil or 24 inches in consolidated rock between the top of the pipe and the underwater natural bottom (as determined by recognized and generally accepted practices) (49 CFR 192.327(a)). Burial at these depths is considered sufficient to minimize potential impacts from scour during flood events.

In addition, Columbia Gas would implement several mitigation measures within floodplains to minimize potential impacts from flood events. These measures include:

- clearing only the vegetation needed for safe construction of the pipeline;
- installing and maintaining erosion and sediment control structures;
- installing a concrete coating or concrete weights on the pipeline within waterbodies and/or floodplains to control buoyancy;
- restoring floodplain contours and waterbody banks to their pre-construction condition; and
- conducting post-construction monitoring to ensure successful revegetation.

Compressor and Regulator Stations, Tie-ins

Construction of the new compressor stations (and, to a limited degree, activities at the existing and pending stations), regulators, and tie-ins would have similar potential impacts as overland pipeline construction although on a more limited scale because the activities would be confined to relatively small, discrete locations.

No perennial waterbodies are present on any of the station or tie-in sites; however, permanent access would require one ephemeral and one intermittent feature to be crossed at the Sherwood Compressor and Ripley Regulator Stations, respectively. Columbia Gas would install a culvert or bridge at each location.

In addition, several ephemeral and one intermittent waterbody would be disturbed during construction of the White Oak and Mt. Olive Compressor Stations, and the tie-in with Line X59M1 (at the Ripley Regulator Station) and Line 1983 (at the terminus of the MXP-200). Waterbodies within permanent station work spaces (or areas to be recontoured) would not be restored. This would include 4 of the 5 ephemeral drainages at White Oak, 10 of the 13 ephemerals at Mt. Olive, and all 3 of the ephemeral drainages at the Ripley Regulator Station. For waterbodies temporarily affected by construction (including one intermittent channel at Mt. Olive), Columbia Gas would restore the channels to their original contours and revegetate the banks in accordance with its ECS.

During construction, sediment from earth-disturbing activities would be contained within the facility site. Disturbed areas would be surrounded by temporary erosion controls; while runoff is expected, implementation of measures in Columbia Gas' ECS would prevent heavily silt-laden water from leaving the site. No impaired or otherwise designated waterbodies would be affected by construction or operation of these MXP facilities.

Access Roads and Construction Staging Areas

Access roads associated with pipeline construction would require 41 intermediate and 299 minor waterbody crossings. Of these, 56 waterbodies are perennial, 72 are intermittent, and 212 are ephemeral. Fifteen of the perennial crossings would involve waters considered sensitive, based on designations of HQW and/or potential freshwater mussel habitat. Access roads crossing sensitive waters would require the placement of new culverts (12 crossings) or use of existing culverts (4 crossings). Only culverts and crushed stone would be used at waterbody crossings. All pipeline/staging area access roads would be temporary. Following MXP construction, access roads would be graded and left intact for the landowners' benefit or removed and the area restored as specified in Columbia Gas' ECS.

Surveys of the pipeyards and staging areas identified potential disturbances to one intermittent and seven ephemeral streams, and one pond. Columbia Gas would avoid these features where practicable. At locations where impacts are unavoidable (e.g., where bridges or culverts are required to access or use the sites), Columbia Gas would implement procedures from its ECS and conditions from applicable permits. Following construction, all pipeyards and staging areas would be restored in accordance with the ECS, agency requirements, and landowner stipulations.

Hazardous Material Spills

Accidental spills and leaks of hazardous materials associated with vehicle refueling or maintenance, and the storage of fuel, oil, and other fluids could contaminate a waterbody downstream of the release point and have an immediate effect to aquatic resources. To avoid or minimize potential impacts associated with spills or leaks of hazardous liquids, Columbia Gas would implement procedures from its ECS and SPCC Plan including:

- restricting the location of refueling (at least 100 feet from a wetland or waterbody) and bulk petroleum storage facilities;
- the use of secondary containment structures for stored petroleum products;

- inspecting equipment daily for leaks;
- restricting the transport of potentially hazardous materials to the construction work area; and
- specifying measures to immediately contain and clean up spills.

Implementation of Columbia Gas' ECS and SPCC Plan would adequately address the storage and transfer of hazardous materials and petroleum products, and the appropriate response in the event of a spill.

Hydrostatic Testing and Dust Control

Columbia Gas would verify the integrity of its pipelines before placing them into service by conducting hydrostatic testing. About 43.1 million gallons of water would be required to hydrostatically test all pipeline segments (see table 4.3-8).

As practicable, hydrostatic test water would be transferred between test segments to minimize the total volume of test water needed. Following testing, the test water would be discharged into well-vegetated upland locations adjacent to the construction work area, in accordance with permit conditions and Columbia Gas' ECS.

Columbia Gas also would use municipal sources, local wells, and/or surface water sources for dust control. During extremely dry conditions, the construction work area would be sprayed with water to reduce fugitive dust in residential areas. All appropriate permits and authorizations required would be obtained prior to conducting any dust control activities.

Withdrawal of the volumes of water needed for hydrostatic testing could temporarily affect the recreational and biological uses of the source waters if the diversions constituted a substantial percentage of the source's total flow or volume. Columbia Gas would minimize the potential effects of water withdrawals from surface water and groundwater sources by adhering to the measures in its ECS, and to any additional state and federal conditions. For instance, the ECS stipulates:

- water would be drawn from local sources (streams, ponds, public water supplies) in a manner that would minimize impacts on the environment and other existing users, while maintaining adequate stream flow;
- withdrawals would maintain adequate flow rates to protect aquatic life and provide water for downstream withdrawals by existing users;
- water from state-designed HQWs or exceptional value waters or streams utilized as public water supplies would not be used unless other water sources are not readily available and the appropriate federal, state, or local agency permits its use;
- all required federal, state, and local approvals for the withdrawal and/or discharge of hydrostatic test water would be obtained prior to such activities; and
- all approval/permit conditions must be complied with, which may include notifying the appropriate state agency of withdraw/discharge, collection of samples in accordance with

permit conditions where required, and discharging in a manner to meet all discharge parameters where required.

We note that Columbia Gas proposes to take almost 2.5 million gallons of hydrostatic test water from Grasslick Run, a stream characterized as intermittent at MP 124.46 (see table 4.3-8). Depending on the time of year and the rainfall budget, using this waterbody as source of hydrostatic test water may not be possible. Therefore, **we recommend:**

- **Prior to the end of the draft EIS comment period, Columbia Gas should file with the Secretary:**
  - **a. An alternative stream/source of hydrostatic test water for Grasslick Run, an intermittent stream at milepost 124.46; and**
  - **b. Identification of the specific permit or approval(s) applicable to Columbia Gas' proposed hydrostatic test water withdrawals for the MXP, and the status of the permit/approval(s).**

Additionally, in order to more accurately assess potential impacts on the other hydrostatic test water sources identified in table 4.3-8, **we recommend:**

- **Prior to the end of the draft EIS comment period, Columbia Gas should file with the Secretary:**
  - **a. the flow regime (cubic feet per unit of time) for each waterbody where Columbia Gas will withdraw hydrostatic test water at the time of the year when hydrostatic testing is anticipated; and**
  - **b. specific measures (including rates and durations of withdrawal) which Columbia Gas would implement to protect instream habitat and downstream uses for each stream.**

Table 4.3-8
Mountaineer XPress Project Water Requirements for Hydrostatic Testing a/

Spread	Test Segment No.	Milepost	Approximate Fill Volume (gallons)	Waterbody	Flow Regime	Water Quality Classification/Use Categories b/
1	1	0.75	197,582	Big Tribble Creek	Perennial	B1
	2	6.25	1,449,936	Upper Bowman Creek	Perennial	B1
	3	7.20	249,266	Fish Creek	Perennial	B1, HQW
	4	11.47	1,124,041	Lynn Camp Run	Perennial	B1
	5	16.72	1,405,005	Rush Run	Perennial	B1
	6	18.32	399,680	Little Fishing Creek	Perennial	B1, HQW
2	1	24.40	1,602,481	Fishing Creek	Perennial	B1, HQW
	2	26.20	474,196	Piney Fork	Perennial	B1
	3	34.19	2,105,595	Lefthand Fork	Perennial	B1
	4	38.41	1,111,827	McElroy Creek	Perennial	B1, HQW
3	1	44.17	1,445,506	Flint Run	Perennial	B1, HQW
	2	50.54	1,749,923	Meathouse Fork	Perennial	B1, HQW

Table 4.3-8
Mountaineer XPress Project Water Requirements for Hydrostatic Testing a/

Spread	Test Segment No.	Milepost	Approximate Fill Volume (gallons)	Waterbody	Flow Regime	Water Quality Classification/Use Categories b/
4	1	51.80	332,270	Meathouse Fork	Perennial	B1, HQW
	2	54.30	658,606	Bluestone Creek	Perennial	B1, HQW
	3	59.56	1,386,423	South Fork Hughes River	Perennial	B1, HQW
	4	65.40	1,537,786	Middle Fork	Perennial	B1
	5	71.43	1,587,720	Slab Creek	Perennial	B1, HQW
	6	72.25	216,859	South Fork Hughes River	Perennial	B1, HQW
	7	73.24	260,945	Jesse Cain Run	Perennial	B1
5	1	76.90	964,061	South Fork Hughes River	Perennial	B1, HQW
	2	78.80	500,540	Leatherbark Creek	Perennial	B1, HQW
	3	82.02	847,421	Twomile Run	Intermittent	B1
	4	87.51	1,446,434	Straight Creek	Perennial	B1, HQW
	5	94.76	1,910,353	Little Kanawha River	Perennial	A, B1, HQW
6a	1	97.76	790,781	Robert Run	Perennial	B1
	2	102.81	1,329,224	Left Fork Reedy Creek	Perennial	B1, HQW
	3	105.78	783,446	Saltblock Run	Perennial	B1
	4	113.31	1,982,949	Little Mill Creek	Perennial	B1, HQW
	5	115.21	502,191	Frozencamp Creek	Perennial	B1
6b	1	124.46	2,437,160	Grasslick Run	Intermittent	B1
7	1	127.20	720,644	Parchment Creek	Perennial	B1
	2	137.82	2,796,979	Spring Valley Branch	Perennial	B1
	3	147.00	2,419,177	Kanawha River	Perennial	HQW
8	1	160.73	3,617,571	Lee Creek	Perennial	B1
	2	163.50	729,225	Mud River	Perennial	B1, C, HQW

a Except for Twomile Run (MP 82.02), all waterbodies listed would be used as sources of hydrostatic test water and a potential discharge locations for spent test water. For the Twomile Run test segment (spread 5, segment 3), water would be obtained from a municipal or other source (e.g., private well) or from an adjacent test section. Hydrostatic test water discharges would be directed into dewatering structures located in upland areas and in accordance with applicable permit conditions.

b West Virginia State Water Quality Classifications:
Category A - Public Water; Category B1 - Warmwater Fishery; Category C - Water Contact Recreation (WVCSR, 2014). State Water Quality Classifications were determined using West Virginia Code of State Regulations, Title 47, Series 2. High Quality Water (HQW) - Streams listed as HQW by the WVDNR (*West Virginia High Quality Streams 6th edition*), or receive annual stockings of trout but do not support year-round trout populations.

4.3.2.4.2 Gulf XPress Project

There are no waterbodies at the Paint Lick and Cane Ridge Compressor Station sites. As noted, no perennial waterbodies would be crossed at any of the GXP facilities. Columbia Gulf would implement the measures included in its ECS, which incorporates FERC's Procedures, to minimize impacts on the ephemeral waterbodies and ponds present on several of the sites.

Construction at the existing Leach C Meter Station could affect one ephemeral stream and one impoundment/stocked pond. The pond and the ephemeral stream are in areas proposed as temporary workspace. Columbia Gulf would install erosion controls around the pond and maintain a 25-foot-wide buffer during construction. Additionally, Columbia Gulf would maintain flow of the ephemeral stream across the work area during construction and would restore the waterbody to preconstruction contours following construction.

Construction of the Morehead Compressor Station could affect one impoundment/stock pond as well as two ephemeral waterbodies. The pond and the two ephemeral waterbodies are within areas proposed as temporary and permanent workspace. The portions of these features within permanent workspace would not be restored.

Construction of the Goodluck Compressor Station could potentially affect an ephemeral waterbody located within the TWS; however, Columbia Gulf would establish a 25-foot buffer around this feature to avoid impacts during construction.

Construction of the Clifton Junction Compressor Station would potentially affect two impoundment/stock ponds and five ephemeral waterbodies. Both ponds are within areas proposed as temporary and permanent workspace. A 25-foot buffer would be maintained around one of the ponds to avoid impacts during construction. The other pond is within the access road workspace; it would be graded and not restored following construction. (Routing the access road in this location would limit tree clearing at the site.) Of the five ephemeral waterbodies impacted during construction, three are within an area proposed as permanent workspace. The forth would be crossed by a permanent access road and directed through a culvert upon restoration, and the fifth would be restored to preconstruction contours following construction.

Construction of the New Albany Compressor Station would potentially affect three ephemeral waterbodies. The three drainages are within areas proposed as temporary and permanent workspace. The portion of one stream crossed by the permanent access road would be directed through a culvert upon restoration. The portions of the other two drainages within the permanent workspace would not be restored.

We received a comment during public scoping regarding concerns with the potential for upstream impacts due to construction within proximity of the ephemeral drainage that crosses the Holcomb Compressor Station site. The Holcomb Compressor Station site is bisected by an ephemeral drainage that would be crossed to provide access to TWS north of the feature. Columbia Gulf would mitigate impact on this drainage by installing erosion controls and a temporary bridge or culvert during construction. The temporary crossing would be removed during site restoration. One commenter expressed concern that construction activities might impede flow in this ephemeral drainage, causing it to back-up onto the commenter's property. Columbia Gas would install a bridge (or culvert) across the feature and implement its ECS, therefore, we conclude that impact on the flow capacity of this drainage would be avoided.

We received a number of comments about potential impacts from the proposed Cane Ridge Compressor Station on the nearby Mill Creek, which lies southeast of the site and is separated from the site by Barnes Road and either undeveloped forest or a residential subdivision and Columbia Gulf's existing right-of-way. At its nearest point, the site boundary is about 400 feet

from Mill Creek. This distance extends from a point east of Columbia Gulf's existing right-of-way directly to the creek (and across undeveloped forest and Barnes Road). Another measurement from the compressor station proper to the creek extends almost 1,100 feet and crosses undeveloped forest, Barnes Road, a large residential parcel, and Columbia Gulf's right-of-way before encountering Mill Creek (see figure 4.3-1). Given the distance between the site and Mill Creek, there is little to no potential for construction or operation of the compressor station to impact Mill Creek. This includes impacts from spills or equipment leaks, which, due to the nature of the equipment involved, would be minor and addressed by use of Columbia Gulf's SPCC Plan (discussed further, below).

During construction, sediment from earth-disturbing activities would be contained within the site. Disturbed areas would be surrounded by temporary erosion controls. While runoff is expected, implementation of measures in Columbia Gulf's ECS would prevent heavily silt-laden water from leaving the site. Runoff leaving the site would also be naturally filtered by the lands between the site and Mill Creek. Once site restoration is complete, runoff would be directed to an on site pond for infiltration into the ground.

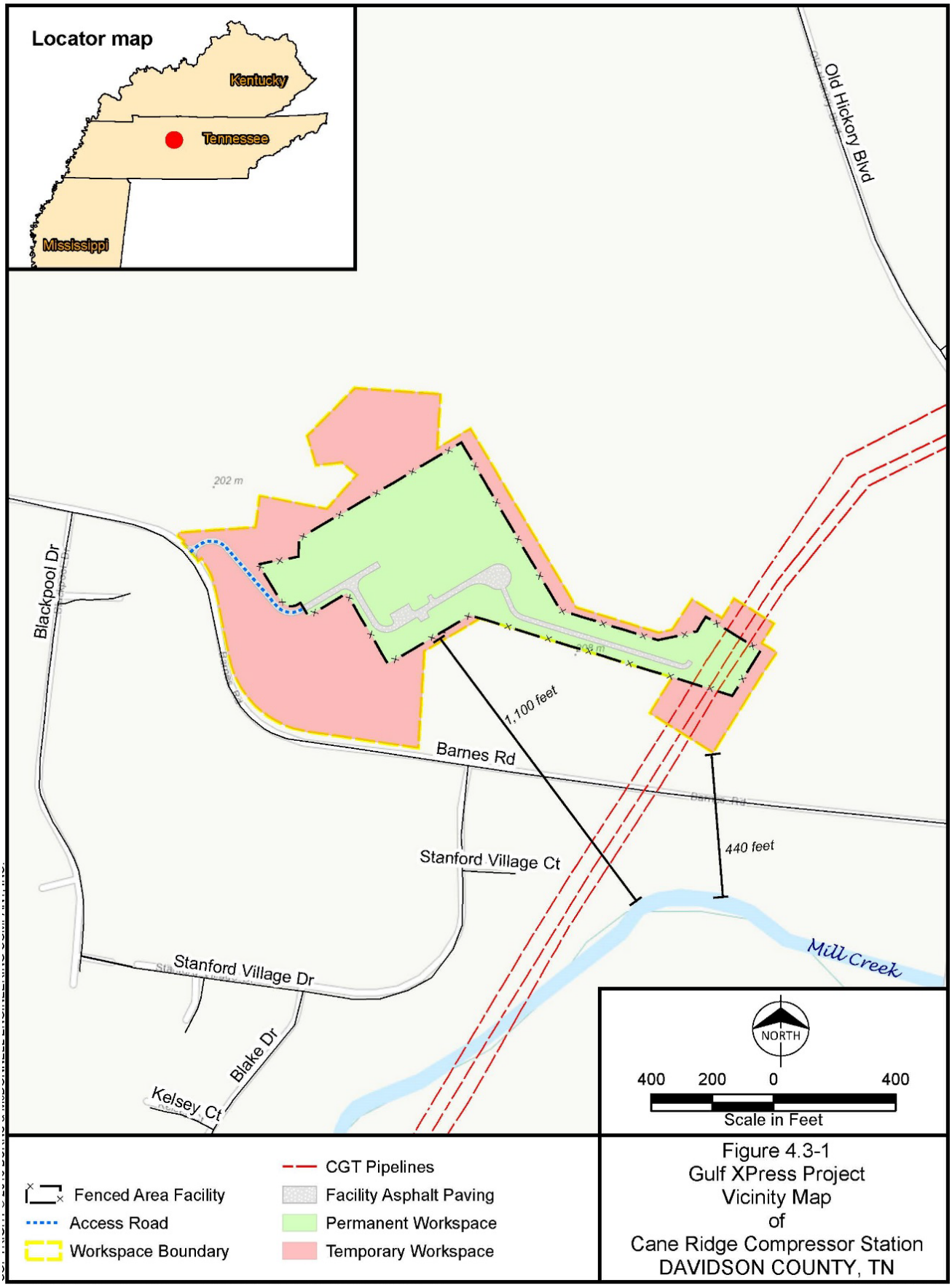


Figure 4.3-1
Gulf XPress Project
Vicinity Map
of
Cane Ridge Compressor Station
DAVIDSON COUNTY, TN

Access Roads and Construction Staging Areas

The access roads associated with the GXP are all related to construction of the new compressor stations; no new access would be needed at the existing Leach C Meter and approved Grayson Compressor Station. Permanent access roads to the new compressor stations would be 20 feet wide and paved, and would vary in length. Construction staging at the new compressor stations would be integral to each site and would occupy the temporary work areas until final grading and site cleanup; no separate "yards" would be required.

Access roads to most of the compressor station sites would be of limited length; from about 300 feet at the Goodluck site to 1,200 feet at the Paint Lick site. Most cross former agricultural/cultivated land or pasture. The exception is the Clifton Junction site, where the access road would extend about 1,800 feet along a circuitous route to limit impact on the heavily forested land that surrounds the site.

Our review of Columbia Gulf's proposal regarding access roads and the treatment of ephemeral drainages and stock ponds found that with implementation of its ECS, appropriate consideration for limiting or avoiding impact on surface waters would be exercised and that no significant impact would result.

Hazardous Material Spills

A potential impact during construction and operation of GXP facilities would be a leak or spill of a hazardous liquid (e.g., fuels, lubricant, and oil associated with internal combustion machinery). Because no perennial streams cross any of the new station sites, direct impact on surface waters from construction and operation of the new facilities would be remote. More likely, a spill or leak would only contaminate a small patch of exposed soil. During facility construction and operation, Columbia Gulf would implement procedures from its ECS and SPCC Plan to avoid or minimize impacts associated with spills or leaks of hazardous liquids, such as:

- requiring that hazardous liquid materials are appropriately contained with dikes and impervious linings;
- routinely inspecting machinery for leaks;
- refueling equipment at least 100 feet from streams, ponds, or wetlands;
- outfitting vehicles with appropriate-sized spill kits and sufficient tools and material to take immediate measure to stop leaks and contain/clean up spills; and
- collecting contaminated soils and absorbent materials used during cleanup in impervious bags or drums, isolating these materials, and sending them off-site to a licensed disposal facility.

Once construction is complete, the volume of hazardous liquids stored on site would be limited. Nevertheless, Columbia Gulf's SPCC Plan contains measures for isolating fuel storage from the environment, fueling and servicing vehicles, and procedures to guide employees in the proper storage, handling, and disposal of hazardous liquids. Implementation of Columbia Gulf's

ECS and SPCC Plan would adequately address the storage and transfer of hazardous materials and petroleum products, and provide an appropriate response in the event of a spill.

Hydrostatic Testing and Dust Control

Hydrostatic testing would be required to verify the integrity of the GXP facilities including the associated suction and discharge pipelines connecting the new compressors with Columbia Gulf's system. Columbia Gulf would follow guidelines set forth in its ECS during any hydrostatic testing and comply with any relevant state permit requirements including the NPDES – One-Time Hydrostatic Test Water Discharge Authorization in Kentucky and a Hydrostatic Test Water Discharge General Permit in Tennessee and Mississippi.

Municipal water would be trucked to each facility from a commercial source or an on site well would supply water for hydrostatic testing. The amount of water needed for hydrostatic testing at each facility is identified in table 4.3-9. Overall, about 1.4 million gallons of water would be required. Columbia Gulf would attempt to re-use hydrostatic test water at multiple facilities to minimize the volume of water used and may re-use the water for fugitive dust mitigation, as needed. Any remaining water would be discharged on site in accordance with Columbia Gulf's ECS and applicable permits.

Columbia Gulf would implement fugitive dust control measures proactively, as needed to protect both construction workers and the public. Its primary tool for dust control would be water sprays (or suitable biodegradable, water-soluble chemicals) to control dust from earth-moving, material stockpiles, use of unpaved roads or work areas, demolition activities, etc. Measures would be implemented based on a visual determination of need and to prevent fugitive dust from being carried off the construction site.

On site discharges would only be made into a well-vegetated upland area; into storage tanks for disposal elsewhere; into a body of water or drainage; or through a sediment filter device to filter out particulate matter before allowing the water to infiltrate through the soil. These practices are typical, and are effective for avoid or limiting impact on nearby surface waters. Because water for dust control would be obtained from the same source(s) as hydrostatic test water (i.e., trucked in from commercial sources or on site wells), there would be no impact on nearby surface waters.

Table 4.3-9
Gulf XPress Project Water Requirements for Hydrostatic Testing

State/Facility	Approximate Water Requirement (gallons)	Locations of Water Withdrawals/Discharges
Kentucky		
Pending Grayson Compressor Station a/	5,000	Commercial Source/On site
Existing Leach C Meter Station	2,500	Commercial Source/On site
Morehead Compressor Station	165,000	Commercial Source/On site
Paint Lick Compressor Station	150,000	Commercial Source/On site
Goodluck Compressor Station	175,000	Commercial Source/On site
Tennessee		
Cane Ridge Compressor Station	275,000	Commercial Source/On site
Clifton Junction Compressor Station	250,000	Commercial Source/On site

Table 4.3-9 Gulf XPress Project Water Requirements for Hydrostatic Testing		
State/Facility	**Approximate Water Requirement (gallons)**	**Locations of Water Withdrawals/Discharges**
Mississippi		
New Albany Compressor Station	155,000	Commercial Source/On site
Holcomb Compressor Station	178,000	Commercial Source/On site
a Pending compressor station proposed by Columbia Gulf under the Rayne XPress Project (Docket No. CP15-539-000).		

4.3.2.5 Conclusion

4.3.2.5.1 Mountaineer XPress Project

No long-term impacts on surface water quality or quantity are anticipated to result from construction of the proposed project. Columbia Gas would not significantly or permanently affect any designated water uses; it would bury the pipeline beneath the bed of all waterbodies, implement erosion controls, and restore the streambanks and streambed contours as close as practical to pre-construction conditions. Virtually all flowing streams (including those containing sensitive mussel species) would be crossed using a dry-ditch method. This would largely avoid or limit impacts on water quality and aquatic species, even when crossing waterbodies identified as impaired. Columbia Gas would implement the measures contained in its ECS for the project during construction to minimize instream impacts including erosion controls and revegetation of disturbed areas. We have also recommended several measures to reduce impacts on surface water resources. Additionally, Columbia Gas would implement measures contained in its ESC and SPCC Plan to avoid contamination from spills of fuels and other hazardous materials.

Operation of the project would not impact surface waters, unless maintenance activities involving pipe excavation and repair in or near streams are required in the future. If maintenance activities are required, Columbia Gas would employ protective measures like those proposed for use during construction. Thus, we conclude that any impacts derived from maintenance would be short-term and similar to those discussed above for the initial pipeline construction.

4.3.2.5.2 Gulf XPress Project

No impacts on surface waters are anticipated to result from construction and operation of the seven new compressor stations. Through consultation with the USACE, Columbia Gulf would determine the jurisdictional status of water features at its compressor station sites, and would avoid or mitigate impacts as required by permit conditions. Columbia Gulf would implement BMPs, as specified in its ECS, and would revegetate temporary work areas not encumbered by permanent facilities after construction.

During station operations, very limited volumes of fuels, lubricants, and other hazardous materials would be present. Preventive measures outlined in Columbia Gulf's ECS and SPCC Plan would be implemented and would be adequate to reduce this concern to less-than-significant levels. During maintenance activities, Columbia Gulf would employ protective measures similar to those proposed for use during construction. Therefore, we conclude that any impacts derived

from operation and maintenance activities would be limited and similar to those discussed above for the initial project construction.

4.4 WETLANDS

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (USACE, 1987). Wetlands serve important biological, physical, and chemical functions, including providing wildlife habitat, food, recreation opportunities, flood control, and water quality improvement.

The Cowardin classification system (Cowardin et al., 1979) was utilized to classify wetland types. Wetlands crossed by the projects are classified as palustrine (freshwater wetland) and are further defined by their dominant vegetation layer (emergent, scrub-shrub, or forested), as follows:

- **Palustrine Forested Wetlands:** Palustrine forested wetlands (PFO) in the project areas are dominated by trees and shrubs at least 20 feet tall with a tolerance to a seasonally high water table. PFO wetlands typically have a mature tree canopy with a diverse range of understory and herbaceous community structure and species. Wetland tree species identified in project work areas are dominated by hardwoods such as yellow poplar, sycamore, maple, and ash.
- **Palustrine Scrub-Shrub Wetlands:** Palustrine scrub-shrub wetlands (PSS) are dominated by shrubs and saplings less than 20 feet tall. Shrub species identified in project work areas include willows, dogwoods, maples, and pawpaws.
- **Palustrine Emergent Wetlands:** Palustrine emergent wetlands (PEM) are characterized by erect, rooted, herbaceous plants suited to growing in wet conditions. Vegetation may also include mosses and lichens. In the project areas, these wetlands include wet meadows (including hay fields). Emergent wetland species identified in project work areas include common rush, grasses, smartweeds, sedges, cattails, and Japanese stiltgrass (an invasive species).

In the project areas, wetlands are regulated at both the federal (USACE) and state (WVDEP for MXP; KDEP, TDEC, and MDEQ for GXP) levels. Under section 404 of the CWA, the USACE is authorized to issue permits for activities that would result in the discharge of dredge or fill material to, or the dredging of, waters of the Unites States, such as wetlands. Under section 401 of the CWA, states are required to certify that proposed dredging or filling of waters of the United States meets state water quality standards.

4.4.1 Existing Wetlands

4.4.1.1 Mountaineer XPress Project

MXP facilities are within the USACE Pittsburgh District in northern West Virginia (15.3 miles) and the USACE Huntington District in central and southern West Virginia (149 miles for MXP-100, 6 miles for MXP-200, and 0.4 mile for the SM80 Loop and SM80 Loop Replacements).

Columbia Gas identified and delineated wetlands along an approximately 300-foot-wide corridor centered over the proposed pipeline centerlines from June through October 2015, and completed surveys for remaining areas not surveyed in 2015 and route modifications in 2016. The wetland delineation encompassed all areas required for installation of the pipelines (i.e., construction rights-of-way, TWS, ATWS, staging areas, and access roads) as well as the compressor stations and other aboveground facilities. The survey included 164.3 miles of the MXP-100 corridor between Columbia Gas' LEX tie-in point in Marshall County, West Virginia, and the interconnect site with the Columbia Gas SM System in Cabell County, West Virginia. The survey also included the 6-mile-long Sherwood Lateral (MXP-200) corridor from the Sherwood Compressor Station in Doddridge County to the existing Columbia Gas T-System Line 1983; the 0.4-mile-long SM80 corridors (SM80 Loop and SM80 Loop Replacements) in Cabell County; three new compressor station sites in Doddridge, Calhoun, and Jackson Counties; and some ATWS, all in West Virginia. The existing Ceredo Compressor Station in Wayne County and the pending Elk River and approved Lone Oak station sites in Kanawha and Marshall Counties, respectively, were previously surveyed as part of separate Columbia Gas projects.

The wetland boundaries were identified and delineated in accordance with the *1987 Corps of Engineers Wetlands Delineation Manual* and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0)* (USACE, 1987; 2012) accompanied by the *National Plant List: 2014* (Lichvar et al., 2014), and the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al., 1979).

In support of its application for a CWA section 404 permit, Columbia Gas submitted a Wetland and Waterbody Delineation Report (July 2016) to the USACE that detailed its survey methodologies and initial assessments of wetlands and waterbodies in the MXP footprint. Wetland impacts were identified in both the Pittsburgh and Huntington Districts.

4.4.1.2 Gulf XPress Project

The GXP facilities are within the USACE Louisville, Nashville, and Vicksburg Districts.

All wetlands that may be affected by construction of the GXP compressor stations were delineated in accordance with the current federal methodology, and characteristics of each wetland identified in the project areas were documented in accordance with the *Corps of Engineers Wetlands Delineation Manual* and the *Regional Supplements to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0) and Eastern Mountains and Piedmont Region (Version 2.0)* (USACE, 1987, 2010, and 2012). Surveys were conducted in July 2015 at eight locations involving multiple sites in three states. Most of the survey emphasis was on the delineation of wetland and waterbody features, and included both preferred and alternative sites for the GXP facilities. Prior to conducting the field review, project biologists evaluated existing data including National Wetlands Inventory (NWI) maps, the National Hydrography Dataset, and various digital county soil surveys. All field-collected spatial data, including wetland and waterbody boundaries, sampling points, and invasive species locations, were collected using global positioning system (GPS) technology.

The approved Grayson Compressor Station site in Carter County, Kentucky was surveyed as part of the Rayne XPress survey area, and no wetlands or waterbodies were found to exist at the site. All modifications to the Grayson station would be within previously disturbed areas owned by Columbia Gulf and used for the existing station construction.

Ten wetlands within the survey footprint at five project sites were identified. Environmental surveys identified one PEM wetland at the Leach C Meter Station site (W-BOA-001), three PEM wetlands at the Morehead Compressor Station (W-ROA-001, W-ROA-007, and W-ROA-008), one PEM wetland at the Paint Lick Compressor Station site (W-GAA-001), four PEM wetlands at the New Albany Compressor Station site (W-UNA-001, W-UNA-002, W-UNA-003, and W-UNA-008), and one PEM/PFO wetland at the Holcomb Compressor Station site (W-GRA-003). Columbia Gulf would avoid impacts on wetlands at the Paint Lick Compressor Station and the Holcomb Compressor Station. Construction impacts at the Leach C, Morehead, and New Albany sites are discussed in section 4.4.2.2.

4.4.2 Wetland Impacts and Mitigation Measures

4.4.2.1 Mountaineer XPress Project

Construction of MXP facilities would have temporary and permanent impacts on wetlands within project workspaces. We received comment during scoping regarding the minimization of wetland impacts from the MXP. Columbia Gas would minimize wetland impacts through implementation of wetland construction and restoration guidelines described in its ECS, which integrates FERC's Procedures, and are intended to avoid wetland impacts to the extent practicable, minimize the area and duration of disturbance, and enhance wetland revegetation after construction. After construction, Columbia Gas would restore wetlands to pre-construction contours to the extent practicable, and return excavated soil from the trench to its original horizon within the wetland to maintain hydrologic characteristics. PEM wetlands would be fully restored onsite, with no long-term impacts anticipated. Long-term temporary and permanent impacts would occur within PFO wetlands, as trees would be permanently removed from the permanent rights-of-way, which would be mowed or otherwise cleared periodically to maintain them in an herbaceous state. These impacts on PFO wetlands would be minimized by allowing the portions of the right-of-way used for construction and not maintained as part of the permanent pipeline corridor to revegetate to pre-construction conditions; however, regrowth of PFO wetlands could take several decades.

Within its permanent 50-foot-wide easement, Columbia Gas would further reduce its impact on PFO wetlands by maintaining only a 30-foot-wide corridor, with selective removal of trees within 15 feet of the pipeline. Additionally, right-of-way maintenance would be limited to a 10-foot-wide herbaceous strip centered over the pipeline through wetlands, which would allow for growth of PSS wetland habitats in the remainder of the easement. Compensatory mitigation would be provided by Columbia Gas for unavoidable impacts to PSS and PFO wetlands as a part of its permitting through the USACE (see section 4.4.3). A summary of wetland impacts is provided table 4.4-1.

Table 4.4-1
Summary of Wetlands Affected by the Mountaineer XPress Project

Pipeline Facility	Classification	Crossing Length (feet)	Construction Impacts (acres)	Operational Impacts (acres) a/
MXP-100	PEM	3,009	5.0	0.0
	PSS	125	0.3	<0.1
	PFO	312	0.6	0.1
MXP-200	PEM	82	0.1	0.0
	PSS	3	<0.1	<0.1
	PFO	22	<0.1	<0.1
White Oak Compressor Station	PEM	--	<0.1	<0.1 b/
Contractor / Pipe Yards	PEM	156	1.4	0.0
Access Roads	PEM	24	0.2	0.0
	Project Total	**3,733**	**7.6**	**0.2**

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

a Operational impacts are associated with PSS and PFO wetlands. Operational requirements allow a 10-foot-wide corridor centered over the pipeline to be maintained in an herbaceous state, and for the removal of trees within 15 feet on either side of the pipeline. To determine conversion impacts on PSS wetlands, a 10-foot-wide corridor centered over the pipeline was assessed. A 30-foot-wide corridor centered over the pipeline was assessed for PFO wetlands. Because the easement would be maintained in an herbaceous (emergent) state, there would be no operational impacts on PEM wetlands.

b Wetland would be permanently altered by grading.

Overall, the MXP would impact 7.6 acres of wetlands through construction activities associated with the pipeline rights-of-way, TWS, ATWS, access roads, staging areas, and the aboveground facilities. Most of impacts would be within PEM wetlands and would be temporary and short-term. Construction of the pipeline facilities would temporarily impact 5.1 acres of PEM and 0.3 acre of PSS wetlands within the construction rights-of-way. Another 1.6 acres of PEM would be temporarily impacted by use of the project contractor/pipe yards and access roads. Less than 0.1 acre of PSS wetlands would be permanently converted to and maintained as PEM due to pipeline operations and maintenance activities. In addition, 0.6 acre of PFO wetlands would be impacted by construction activities, of which less than 0.2 acre would be within the permanent easement and permanently converted to and maintained as PEM wetlands (i.e., in an herbaceous state).

A PEM wetland was identified within the construction footprint of the proposed White Oak Compressor Station. Construction and operation of the compressor station would result in less than 0.1 acre of permanent impacts on this wetland.

Eight PEM wetlands totaling 1.4 acres were identified within the MXP contractor/pipe storage yards. These wetlands would be temporarily disturbed, but the wetlands would be restored to pre-construction conditions following construction. Based on a review of aerial imagery, all of the wetlands associated with contractor/pipe storage yards appear to be within areas that undergo routine mowing or are in areas where soils are previously disturbed from other industrial operations.

The MXP would require 283 temporary and permanent access roads for the construction and operation of the project. Columbia Gas would construct 56 new access roads, including new facility access roads, and has identified 226 existing private roads that it would use during

construction. Project surveys identified PEM wetlands on access roads in 5 counties that would be affected by construction, totaling less than 0.2 acre of wetland impacts.

To minimize the overall area and duration of wetland disturbance, reduce the amount of wetland soil disturbance, and enhance wetland restoration following construction, Columbia Gas would determine the method of pipeline construction within each wetland based on soil stability and saturation at the time of construction, as discussed in section 2.4.4.1. Construction activities would also be conducted in accordance with Columbia Gas' ECS and as described in section 2.4.4.1. Columbia Gas would mitigate for unavoidable wetland impacts by implementing the procedures specified in its ECS, and by complying with the conditions of its pending section 404 and 401 permits. Specific measures Columbia Gas would implement from its ECS to mitigate impacts on wetlands include:

- limiting the construction rights-of-way width to 75 feet through wetlands (unless alternative, site-specific measures are requested by Columbia Gas and approved by FERC and other applicable agencies);
- locating ATWS at least 50 feet away from wetland boundaries (unless alternative, site-specific measures are requested by Columbia Gas and approved by FERC and other applicable agencies);
- limiting the operation of construction equipment within wetlands to only equipment essential for clearing, excavation, pipe installation, backfilling, and restoration;
- operating equipment on timber mats in wetlands to prevent the compaction and rutting of wetland soils that are not excessively saturated (deeply inundated);
- removing woody stumps only from areas directly above the trenchline, or where they would create a safety hazard, to facilitate the re-establishment of woody species by existing root structures;
- restricting grading in wetlands to the area directly over the trenchline, except where necessary for safety;
- segregating topsoil from the trench in non-saturated wetlands and returning topsoil to its surface location during backfilling to avoid changes in subsurface hydrology and to promote re-establishment of the original plant community by replacing the seed bank found in the topsoil;
- installing temporary and permanent erosion and sediment control devices, and re-establishing vegetation on adjacent upland areas, to avoid erosion and sedimentation into wetlands;
- installing trench breakers or trench plugs at boundaries of wetlands, or sealing the trench bottom, as necessary, to prevent draining of wetlands;
- returning graded areas to their preconstruction contours to the extent practicable, and returning excavated soil from the trench within the wetlands back to its original soil horizon to maintain hydrologic characteristics;
- prohibiting the storage of chemicals, fuels, hazardous materials, or lubricating oils within 100 feet of a wetland;

- prohibiting parking and/or fueling of equipment within 100 feet of a wetland unless the EI determines there is no reasonable alternative, and appropriate steps (such as a secondary containment structure) are taken; and
- dewatering the trench into a sediment filtration device, such as geotextile filter bag, to minimize the potential for erosion and sedimentation.

If bedrock is encountered in wetland trenches, the type of bedrock would determine the method of excavation. Blasting could affect wetlands by causing a fissure in the confining layer that would drain the wetland. Blasting could also result in a wetland conversion through the introduction of a new water source. Columbia Gas has prepared and would implement a Blasting Plan that identifies procedures for the use, storage, and transportation of explosives consistent with safety requirements defined by federal, state, and local agency regulations. Impacts on wetlands due to blasting would be addressed as part of the compensatory mitigation for the project.

In addition, Columbia Gas would develop a project-specific wetland restoration plan, as needed, in consultation with the appropriate federal and state agencies. Following construction, Columbia Gas would verify that all disturbed areas successfully revegetated. Revegetation would not be considered successful until:

- vegetation is at least 80 percent of either the cover documented for the wetland prior to construction, or at least 80 percent of the cover in adjacent wetland areas that were not disturbed by construction;
- the plant species composition is consistent with early successional wetland plant communities in the affected ecoregion; and
- invasive species and noxious weeds are absent, unless they are abundant in adjacent areas that were not disturbed by construction.

In accordance with its ECS (and FERC's Procedures), Columbia Gas would conduct routine wetland monitoring for a minimum of 3 years (or until revegetation is successful) and submit annual reports to the Commission on the status of wetland restoration and vegetation growth. Where revegetation is not successful at the end of 3 years, Columbia Gas would develop and implement remedial revegetation plans, in consultation with a professional wetland ecologist, to actively revegetate any wetland, continue revegetation efforts, and file annual reports until wetland revegetation is successful.

4.4.2.2 Gulf XPress Project

Construction of the GXP facilities would temporarily impact 0.12 acre of PEM wetlands. Impacts on these wetlands would be temporary and short-term (a nominal amount of PEM would be permanently affected at the Morehead and New Albany compressor stations), and the wetlands would be restored to pre-construction contours and conditions. To further reduce impacts, construction activities would be conducted in accordance with Columbia Gas' ECS, including interceptor diversions and/or sediment barriers along a slope or the edge of a wetland, as necessary, to prevent sediment flow into the wetland. Additionally, the placement of equipment mats to allow construction vehicles to cross wetlands with minimal impact would be employed during construction, as needed. Table 4-4.2 provides a summary of wetland impacts at each GXP facility.

Table 4.4-2
Wetland Impacts Resulting from the Gulf XPress Project

State/Facility/Wetland Identification Number	Classification	Construction Impacts (acre)	Operation Impacts (acre)
Kentucky			
Leach C Meter Station			
W-BOA-001	N/A	0.02	0.00
Grayson Compressor Station			
None	N/A	N/A	N/A
Morehead Compressor Station			
W-ROA-001	PEM	<0.01 **a**/	<0.01 **b**/
Paint Lick Compressor Station			
None	N/A	N/A	N/A
Goodluck Compressor Station			
None	N/A	N/A	N/A
Tennessee			
Clifton Junction Compressor Station			
None	N/A	N/A	N/A
Cane Ridge Compressor Station			
None	N/A	N/A	N/A
Mississippi			
New Albany Compressor Station			
W-UNA-001	PEM	N/A **c**/	N/A **c**/
W-UNA-002	PEM	0.03 **a**/	N/A
W-UNA-003	PEM	0.03 **a**/	<0.01 **d**/
W-UNA-008	PEM	0.03 **a**/	N/A
Holcomb Compressor Station			
W-GRA-003	PEM	N/A **c**/	N/A **c**/
	Project Total	**0.12**	**<0.02**

a Temporary workspace
b Access road
c Identified wetland but avoided
d Permanent workspace

4.4.3 Compensatory Mitigation

Mitigation is the process of restoring, creating, enhancing, or preserving resources to off-set unavoidable impacts on streams or wetlands that result from a specific permit authorization issued by a regulatory agency, such as the USACE. Columbia Gas and Columbia Gulf planned the projects so that they would avoid impacts on aquatic resources where possible; however, when impacts on streams and wetlands cannot be avoided, mitigation will generally be required. According to the USACE, and based on the objectives of the CWA, there are three main methods for achieving satisfactory compensatory mitigation:

- in-lieu fee program,
- onsite mitigation, and
- mitigation banking.

An in-lieu fee program may be used as a form of compensatory mitigation when determined acceptable by participating agencies. In general, the project proponent pays a fee to

the USACE or state agency, and the fee is ultimately be used towards state or regional programs designed to enhance or protect aquatic/wetland resources. The fee is determined by the agencies and is typically based on the amount and type of project impact.

Onsite mitigation is when an applicant implements compensatory measures at the site of the impact or at a different location within the same watershed. The applicant is responsible for the implementation, monitoring, and success of the mitigation project.

Finally, mitigation banking is the purchase of mitigation credits from an agency-approved mitigation bank. The credits required are determined by calculations based on the quantity and type of unavoidable impacts on wetlands, streams, or other aquatic resources. A mitigation bank is a wetland, stream, or other aquatic resource area that has been or is in the process of being restored, created, enhanced, or in some circumstances, preserved.

4.4.3.1 Mountaineer XPress Project

Columbia Gas states that it would prepare a compensatory wetland mitigation plan for project impacts from crossing Waters of the United States, with assistance from the USACE District offices and WVDEP, as necessary. Mitigation ratios for unavoidable impacts on Waters of the United States would be determined by the USACE and applied towards calculating the amount of compensatory mitigation credits needed to compensate for both PFO and PSS wetland conversions. Where available, purchase of mitigation bank credits to mitigate impacts would be the preferred option. If mitigation bank credits are unavailable for purchase, or to make up the balance of credits needed, participation in an In-lieu Fee Program would be used to satisfy remaining compensatory mitigation requirements.

4.4.3.2 Gulf XPress Project

Wetland impacts at the Morehead and New Albany Compressor Station sites would be approved under the USACE Nationwide Permit Program and would not require compensatory mitigation.

4.4.4 Conclusion

4.4.4.1 Mountaineer XPress Project

By implementing construction and mitigation measures outlined in Columbia Gas' ECS, completing compensatory mitigation as determined by the USACE and other appropriate agencies, and complying with federal and state permit conditions, we conclude that the MXP would not result in any significant impacts on wetlands.

4.4.4.2 Gulf XPress Project

Wetland impacts from construction and operation of the GXP would likely be authorized under the USACE Nationwide Permit Program. A very small amount of wetland impacts at the Morehead and New Albany Compressor Station sites would be unavoidable, but with implementation of the BMPs in Columbia Gulf's ECS, would not be significant.

4.5 VEGETATION

4.5.1 Existing Vegetation Resources

The locations of the MXP and GXP project areas can be defined using multiple methodologies, including watersheds (and subwatersheds), geographic areas, physiographic provinces, Major Land Resource Areas, and ecoregions. Vegetation resources in the United States can be described by ecoregions, which are distinct natural communities based on regional geology, landforms, soils, vegetation, climate, land use, wildlife, and hydrology characteristics (EPA, 2016d). The degree of impact on vegetation from the projects would depend on the type of vegetation affected, whether impacts would be temporary or permanent, the rate at which the vegetation would regenerate after construction, and the area and frequency of vegetation maintenance conducted during project operation.[25]

4.5.1.1 Mountaineer XPress Project

The MXP would be constructed entirely within the Western Allegheny Plateau ecoregion (EPA, 2016d), which is characterized by a mosaic of forests, developed land, farms, coal mines, and oil and gas fields. The soils in this ecoregion support Appalachian Oak Forest, dominated by white and red oak, and Mixed Mesophytic Forest, which supports sugar maple, beech, basswood, and oak. It has rounded hills and is relatively rugged; most farms and agricultural activities are concentrated in the valleys.

The MXP would cross through three major natural upland vegetation cover types: forested land, agricultural land, and open land. Various classes of vegetation exist within each upland vegetation cover type, as shown in table 4.5-1 (LANDFIRE, 2016).

[25] The focus of this section is on upland vegetation resources. Wetland vegetation, wildlife, protected species, and developed land are not discussed in this section. Wetland vegetation cover types are described in section 4.4. Discussion of the wildlife common to these vegetation cover types is provided in section 4.6. Threatened, endangered, and special status plant species are discussed in section 4.7. Developed land includes residential, commercial, and industrial lands; roadways; and mining operations. Developed land, discussed in section 4.8, is generally devoid of native vegetation and provides little habitat value.

Table 4.5-1
Upland Vegetation Cover Types Affected by the Mountaineer XPress Project

Class Name a/	System Location and Description a/	Acres b/		Total Acres b/	Miles Crossed b/
		Temporary	Permanent (Operation)		
Forests					
Allegheny-Cumberland Dry Oak Forest and Woodland	Dry hardwood forests mainly on nutrient-poor or acidic soils. Dominant species include white oak (*Quercus alba*), southern red oak (*Q. falcata*), chestnut oak (*Q. montana*), and scarlet oak (*Q. coccinea*), with some red maple (*Acer rubrum*), pignut hickory (*Carya glabra*), and mockernut hickory (*C. tomentosa*). Small stands of shortleaf pine (*Pinus echinata*) and/or Virginia pine (*P. virginiana*) may occur near escarpments or following fire. Eastern white pine (*P. strobus*) may be prominent in some stands where fire has not occurred.	335.2	184.4	519.6	28.8
Appalachian Hemlock - Northern Hardwood Forest	Conifer or hardwood forests dominated by northern hardwoods including sugar maple (*Acer saccharum),* yellow birch (*Betula alleghaniensis)*, and American beech (*Fagus grandifolia).* These trees either form a canopy or mix with eastern hemlock (*Tsuga canadensis)* or eastern white pine. Other common and sometimes dominant trees include oaks (*Quercus spp.*), most commonly northern red oak (*Q. rubra*), tulip tree (*Liriodendron tulipifera*), black cherry (*Prunus serotina*), and sweet birch (*Betula lenta*).	130.9	57.6	188.5	9.4
Central Appalachian Rocky Oak and Pine Woodland	Open or patchy dry wooded hilltops and outcrops or rocky slopes that are mostly nutrient poor with a history of fire. Bedrock is generally granitic or has acidic lithology. Pitch pine *(Pinus rigida)* and Virginia pine are characteristic and often mixed with xerophytic oaks and American chestnut sprouts. Some areas have a fairly well-developed heath shrub layer or a grass layer.	1.0	0.1	1.1	<0.1
Central Interior and Appalachian Floodplain Forest	Floodplain forests dominated by silver maple (*Acer saccharinum),* eastern cottonwood *(Populus deltoides),* river birch *(Betula nigra),* sugarberry *(Celtis laevigata),* sweet gum *(Liquidambar styraciflua), and* willows (*Salix* spp.), especially black willow (*S. nigra)* in the wettest areas, and American sycamore (*Platanus occidentalis)*, with green ash (*Fraxinus pennsylvanica),* American elm *(Ulmus americana),* tulip tree*,* swamp chestnut oak (*Quercus michauxii),* and bur oak (*Q. macrocarpa)* in more well-drained areas. Understory species are mixed and include shrubs, such as buttonbush (*Cephalanthus occidentalis),* roughleaf dogwood *(Cornus drummondii)*, and pawpaw (*Asimina triloba)*, sedges (*Carex* spp.) and grasses such as eastern bottlebrush grass (*Elymus hystrix),* Canada wildrye *(E. canadensis),* and Indian woodoats *(Chasmanthium latifolium*) which sometimes form savanna-like vegetation. Gravel bars may be dominated by young black willow, American sycamore, or river birch.	57.4	19.4	76.8	3.0

Table 4.5-1
Upland Vegetation Cover Types Affected by the Mountaineer XPress Project

Class Name a/	System Location and Description a/	Acres b/		Total Acres b/	Miles Crossed b/
		Temporary	Permanent (Operation)		
Central Interior and Appalachian Riparian Forest	Small floodplains and shores along moderate to very high gradient river channels that lack a broad, flat floodplain. Flooding, substrate deposition, and rapidly draining conditions affects vegetation composition. Vegetation is often a mosaic of forest, woodland, shrubland, and herbaceous communities. Common trees include river birch, American sycamore, and box elder (*Acer negundo*), tulip tree, sweet gum, red maple, sugarberry, green ash, swamp chestnut oak, and cherrybark oak (*Quercus pagoda)*. Common shrubs include hazel alder (*Alnus serrulata),* buttonbush, silky dogwood *(Cornus amomum),* northern spicebush *(Lindera benzoin),* coastal plain willow *(Salix caroliniana),* other willows, and eastern poison ivy (*Toxicodendron radicans)*.	0.7	0.2	0.9	<0.1
Central Interior Highlands Calcareous Glade and Barrens Woodland	Moderate to steep slopes and steep valleys on primarily southerly to westerly facing slopes. Limestone and/or dolomite bedrock typify this system with shallow, moderately to well-drained soils interspersed with rocks. These soils often dry out during the summer and fall, and then become saturated during the winter and spring. Fire is the primary natural dynamic. Stunted woodlands primarily dominated by chinquapin oak (*Quercus muehlenbergii)* interspersed with eastern redcedar (*Juniperus virginiana)* occur on variable-depth-to-bedrock soils.	0.1	0.1	0.2	<0.1
Eastern Cool Temperate Urban Deciduous, Evergreen, and Mixed Forest	Forests in low to moderately urbanized settings with unnatural combinations of primarily native species with substantial amounts of species alien to the area.	14.0	5.3	19.3	0.8
Managed Tree Plantation – Northern and Central Hardwood and Conifer Plantation Group – Introduced Upland Vegetation - Treed	Plantations - Areas where establishment of forests or reforestation is occurring. Even-aged, regularly spaced forest stands from planting and/or seeding within a plantation. Individual trees are generally greater than 15 feet tall and are dominated by evergreen species. Introduced Upland Vegetation – Treed areas that are spontaneous, self-perpetuating and dominated by introduced species that are not the result of planting, cultivation, or human maintenance.	44.0	27.4	71.4	4.6

Table 4.5-1
Upland Vegetation Cover Types Affected by the Mountaineer XPress Project

Class Name a/	System Location and Description a/	Acres b/		Total Acres b/	Miles Crossed b/
		Temporary	Permanent (Operation)		
Northeastern Interior Dry-Mesic Oak Forest	Oak-dominated forest system that occurs in dry-mesic flat to gently rolling, occasionally steep slopes. Located midslope to toeslope, transitioning to very dry systems on upper slopes and ridges. This forest type typically has a closed canopy although there may be areas of patchy canopy. Dominant species include northern red oak, white oak, eastern black oak *(Quercus velutina)*, and scarlet oak. Other less important trees include hickories (*Carya* spp.) and chestnut oak. Frequent associates include red maple and sweet birch. Sprouts of American chestnut may occur where formerly a common tree. Local areas of calcareous bedrock may support forests typical of richer soils that support sugar maple and/or chinquapin oak.	259.3	118.5	377.8	19.1
Ruderal Forest-Northern and Central Hardwood and Conifer	Forests resulting from man-made disturbance. Includes unnatural combinations of native and non-native species.	20.7	10.4	31.1	1.6
South-Central Interior Mesophytic Forest	Highly diverse, predominantly deciduous forests on deep and enriched soils in non-montane settings. Located in somewhat protected landscape positions such as coves or lower slopes. Dominant species include sugar maple, American beech, tulip tree, American linden, northern red oak, cucumber tree *(Magnolia acuminata)*, and eastern black walnut (*Juglans nigra)*. Eastern hemlock may also be present. The herbaceous layer may have abundant spring ephemerals.	858.2	444.3	1,302.5	71.6
Agriculture					
Eastern Cool Temperate Pasture and Hayland	Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops. Pasture and hay vegetation accounts for greater than 20 percent of the total vegetation.	344.1	107.8	452.0	16.7
Eastern Cool Temperate Row Crop – Close Grown Crop	Cropland with greater than 20 percent vegetation that is generally drill-seeded or broadcast with wheat, oats, rice, barley, flax, corn, soybeans, vegetables, tobacco, and cotton. Cropland may also include orchards and vineyards or areas that are tilled.	6.0	1.6	7.6	0.3
Open Lands					
Barren	Areas with generally less than 15 percent vegetation cover located on bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits, and other accumulations of earthen material.	0.8	0.1	0.9	<0.1
Eastern Cool Temperate Urban Herbaceous and Shrubland	Areas of lawn grasses and shrubs commonly within single-family housing units, parks, and golf courses. Vegetation is planted in developed settings for recreation, erosion control, or aesthetics.	69.7	15.1	84.9	2.4

Table 4.5-1
Upland Vegetation Cover Types Affected by the Mountaineer XPress Project

Class Name a/	System Location and Description a/	Acres b/		Total Acres b/	Miles Crossed b/
		Temporary	Permanent (Operation)		
Recently Burned Herbaceous and Grass Cover	Recently burned areas that were previously dominated by grasses or forbs that are in the process of regenerating. Species composition may be different than pre-fire conditions.	4.2	0.0	4.2	<0.1
Recently Logged – Herbaceous and Grass Cover	Areas dominated by herbaceous ground cover following tree harvesting.	4.2	1.4	5.6	0.2
Ruderal Upland Herbaceous	Areas with unnatural combinations of non-native and native herbaceous vegetation resulting from man-made disturbance.	5.0	2.8	7.8	0.3

a Class name, location, and description were obtained from LANDFIRE (LANDFIRE, 2016). LANDFIRE data are different from the data used to calculate total vegetation and land use impacts for the project (as reported in table 4.8-1). Thus, the totals for different vegetation cover types in this table may not reflect the totals in table 4.8-1.

b Acreages and miles in this table have been rounded for presentation purposes. Thus, the totals may not reflect the exact sum of the addends in all cases.

As shown in table 4.8-1 (section 4.8), the largest natural upland cover type that would be affected by the MXP is forest (2,327.8 acres). Below, we provide a detailed breakdown of the MXP impacts on specific forest systems. LANDFIRE data (2016) were analyzed in order to characterize the MXP construction and operation impacts on each of these different forest systems. Forested land systems that provide greater than 5 percent cover include South-Central Interior Mesophytic Forest (1,302.5 acres), Allegheny-Cumberland Dry Oak Forest and Woodland (519.6 acres), Northern Interior Dry-Mesic Oak Forest (377.8 acres), and Appalachian Hemlock – Northern Hardwood Forest (188.5 acres). The next largest natural upland cover type that the MXP would cross is agricultural land (459.5 acres, 17.0 miles), primarily comprised of Eastern Cool Temperate Pasture and Hayland (452.0 acres). The smallest natural upland cover type that the MXP would cross is open land (132.0 acres, 2.8 miles), primarily composed of Eastern Cool Temperate Urban Herbaceous and Shrubland (84.9 acres). In total, about 3,590 acres would be affected by the MXP (about 2,516 acres temporarily impacted and about 1,074 acres permanently impacted).[26]

4.5.1.1.1 Pipeline Facilities

The primary impact of pipeline construction would be the cutting, clearing, and/or removal of about 2,641 acres (sum of pipeline and ATWS construction impacts on forested, agricultural, and open land from table 4.8-1 in section 4.8) of existing vegetation, of which about 2,094 acres is forest.

Construction in forested lands would remove the tree canopy over the entire width of the construction right-of-way, which would change the structure and environment of the underlying area. In areas where the MXP corridor is adjacent existing rights-of-way, clearing would result in moving an existing edge outward, rather than creating newly fragmented forested habitat. Forested lands within the maintained right-of-way would be permanently converted to an herbaceous cover type. The regrowth of shrubs and trees within the TWS would reduce the edge effect and provide connectivity between adjacent forested tracts to some extent (Tewksbury et al., 2002), but it may take decades before the TWS areas resemble the forest vegetation that was present before construction.

In addition, soils that were previously shaded by the tree canopy would receive increased amounts of light, which could lead to drier soils and higher soil temperatures. Trees on the edge of the right-of-way might be subject to mechanical damage to trunks and branches, and root impacts from soil disturbance and compaction, all of which could result in the decreased health and viability of some trees and root systems. Some edge trees that were previously within dense forested stands may also lack stability following removal of adjacent supporting trees, which could result in increased susceptibility to wind damage.

Most impacts on agricultural lands would be temporary to short-term, as these areas are disturbed annually to produce crops and would typically return to their previous condition shortly following construction, cleanup, and restoration. Columbia Gas would maintain topsoil

[26] These impact acreages are referring to areas that support vegetation. Developed land is not included in the vegetation impact numbers. Developed land within the project areas includes residential, commercial, and industrial lands; roadways; and mining operations.

segregation throughout all construction activities in agricultural lands to mitigate impacts on subsequent crop production and maintain a minimum cover depth of 48 inches between the soil surface and the top of the pipeline. Lands currently dominated by herbaceous growth would revegetate quickly, often within one or two growing seasons after seeding and otherwise typically within 3 years, depending on several factors. Cleared scrub-shrub vegetation would likely require 3 to 5 years to regain its woody composition. This process would involve transitioning through several successional stages.

Impacts associated with disturbances to vegetation could also include increased soil compaction and erosion, increased potential for the introduction and establishment of non-native and invasive and noxious species, and a local reduction in available wildlife habitat (see section 4.6.1). Columbia Gas would implement erosion control measures as described in its ECS. Erosion control measures may include sediment barriers (silt fence, staked hay or straw bales, compacted earth, sand bags, or other appropriate materials), interceptor diversions (temporary slope breakers), and sediment filter devices. During clearing activities, Columbia Gas would mow non-woody vegetation to ground level and cut and remove woody vegetation and stumps, as necessary. Columbia Gas would fell trees and other woody material into the right-of-way, then chip and remove the debris. At the request of individual landowners, Columbia would stack the tree-length cut timber on the landowner's property for landowner use. Following construction, Columbia Gas would seed all previously vegetated workspaces disturbed by construction in accordance with its ECS and landowner agreements, and would include any additional recommendations from the NRCS and the WVDEP, as applicable.

During operations, Columbia would mow up to a 50-foot-wide permanent right-of-way no more than once every 3 years; however, a 10-foot-wide strip may be mowed more frequently to facilitate routine inspections and emergency access. Maintenance activities (permanent operational impacts) would result in impacts on about 1,040.6 acres (sum of permanent operational impacts on forested, agricultural, and open land from table 4.8-1 in section 4.8) of vegetated lands, including almost 810 acres of forest, 164 acres of agricultural land, and 68 acres of open land. Given that the permanently maintained facilities would be considered "developed land" and maintained in an herbaceous state, the 1,041 acres of vegetated land would be converted to developed land for the life of the project. Due to the predominantly rural nature of the project area, construction would cross many forested lands. However, Columbia Gas routed the pipeline to minimize vegetation impacts where feasible, and would further minimize impacts on vegetation by adherence to its ECS.

4.5.1.1.2 Aboveground Facilities

Construction of the aboveground facilities would disturb about 91 acres (sum of construction impacts on forested, agricultural, and open land from table 4.8-1 in section 4.8) of overall vegetation, including about 50 acres of forest land, 36 acres of agricultural land, and 5 acres of open land. Columbia Gas would construct the MLVs, pig launcher/receivers, and two tie-ins within the permanent pipeline easement. Because the MLVs would be built primarily within the pipeline construction right-of-way, additional vegetation impacts would be minimal. The MXP includes modifications and upgrades to existing facilities within fenced areas or within previously disturbed areas adjacent to existing facilities. Limited temporary and permanent impacts on vegetation would occur at these existing locations and are not considered significant. Temporary

impacts on vegetation within the construction work areas would be similar to those described for the pipeline facilities. Columbia Gas would stabilize, seed, and allow the TWS areas used during construction to revegetate.

Permanent vegetation impacts would include conversion of about 19 acres of upland forest, 17 acres of agricultural land, and 4 acres of open land to developed land. Most permanent upland forest impacts (9 acres) would occur at the Mount Olive Compressor Station site.

4.5.1.1.3 Pipe Yards and Staging Areas

The pipe yards and staging areas would impact about 214 acres of agricultural land, 94 acres of open land, and almost 45 acres of forest. During construction, contractors would use off-right-of-way areas for office trailers, parking, vehicle maintenance, and storage of materials and equipment. Columbia Gas has identified temporary staging areas, pipe yards, and contractor yards and is in the process of obtaining landowner permissions to use these areas. Following construction, all staging areas and pipe yards would be restored to preconstruction conditions in accordance with Columbia Gas' ECS or per landowner agreements. No seeding would occur in actively cultivated cropland without landowner approval.

4.5.1.1.4 Access Roads

Columbia Gas would use approximately 182 acres (sum of construction impacts on forested, agricultural, and open land from table 4.8-1 in section 4.8) for temporary access roads during construction activities; 2 acres (sum of permanent operational impacts on forested, agricultural, and open land from table 4.8-1 in section 4.8) of permanent access roads would be used during operation. Temporary disturbance associated with all access roads would total about 182 acres (sum of temporary construction impacts on forested, agricultural, and open land from table 4.8-1 in section 4.8) of land, of which about 138 acres is forested land, 14 acres is agricultural land, and 30 acres is open land.

All access roads, whether existing or new, would generally be 25 feet wide, with additional modifications to accommodate turning radius improvements. Appropriate drainage structures would be installed per the ECS or applicable permit requirements. Columbia Gas anticipates that most existing private access roads would require widening or improvements for construction activities, which may involve clearing or trimming of select trees. After construction has been completed, access roads would be restored in accordance with landowner agreements and applicable permits, or used for permanent access to accommodate operations for the facility.

Impacts on vegetation would be comparable to those described for the pipeline, including the potential for soil compaction and erosion, establishment of invasive species, and fragmentation of interior forested tracts. Following construction, Columbia Gas would restore and seed any previously vegetated areas affected by construction of the temporary access roads according to its ECS or landowner agreements. During operations, only one access road would be required, permanently converting 1.4 acres to developed lands.

4.5.1.2 Gulf XPress Project

The GXP would be constructed within four ecoregions, as shown in table 4.5-2.

Table 4.5-2
Ecoregions Associated with the Gulf XPress Project Facility Locations

Ecoregion	Facility	Region Characteristics
Western Allegheny Plateau	Existing Leach C Meter Station, approved Grayson Compressor Station, and new Morehead Compressor Station	Forested land, agricultural land, and developed land (USGS, 2014). The forest is mostly mixed oak and mixed temperate forests that still exist today on most of the remaining rounded hills. Dairy, livestock, and general farming, as well as residential developments, are concentrated in the valleys.
Interior Plateau	New Paint Lick, Goodluck, Cane Ridge, and Clifton Junction Compressor Stations	Open valleys, hills, and plains (USGS, 2014). Relatively flat and fertile lowlands, which include the Bluegrass area of central Kentucky and the Nashville Basin in central Tennessee. Oak-hickory stands are the most common forest type, although mixed stands of red cedar and hardwoods grow on many of the rockier sites and limestone glades. Blue-stem prairie is the most common grassland.
Southeastern Plains	New Albany Compressor Station	Irregular, relatively flat plains of the ecoregion are covered by a mosaic of cropland, pasture, forest, and wetland. Long growing seasons and abundant rainfall, but the relatively poor sandy soils limit agricultural competitiveness with many other regions. Natural forests of pine, hickory, and oak once covered most of the ecoregion; much of the natural forest cover has been replaced by heavily managed timberlands.
Mississippi Alluvial Plains	New Holcomb Compressor Station	Impenetrable forested floodplain broken in places by dense cane thickets or prairie terraces above the flood lines. Over 80 percent of the forests have been cleared and replaced by agricultural crops such as cotton and soybeans. In addition, thousands of miles of levees and ditches have been constructed to control flooding and drain wetlands for agriculture.

Source: EPA, 2010 and USGS, 2014

The GXP would be in three natural upland vegetation cover types: forested land, agricultural land, and open land. Various classes of vegetation exist within each upland vegetation cover type. Information on the various classes of vegetation (e.g., descriptions, acreages, miles crossed) is provided in table 4.5-3 (LANDFIRE, 2016).

Table 4.5-3
Upland Vegetation Cover Types Affected by the Gulf XPress Project

Class Name a/	System Location and Description a/, b/	Acres b/		Total Acres b/
		Temporary	Permanent (Operation)	
Forests				
Allegheny-Cumberland Dry Oak Forest and Woodland	See Table 4.5-1 for class location and description.	0.1	0.7	0.8
Central Interior and Appalachian Floodplain Forest	See Table 4.5-1 for class location and description.	<0.1	<0.1	<0.1
Central Interior and Appalachian Riparian Forest	See Table 4.5-1 for class location and description.	<0.1	<0.1	<0.1
Eastern Cool Temperate Urban Deciduous, Evergreen, and Mixed Forest	See Table 4.5-1 for class location and description.	0.4	0.0	0.4
Introduced Upland Vegetation - Treed	Introduced Upland Vegetation – Treed areas that are spontaneous, self-perpetuating, and dominated by introduced species that are not the result of planting, cultivation, or human maintenance.	<0.1	<0.1	<0.1
South-Central Interior Mesophytic Forest	See Table 4.5-1 for class location and description.	0.7	4.0	4.7
East Gulf Coastal Plain Northern Loess Bluff Forest	Steep bluffs mapped as Jackson formation bordering the northern portion of the eastern edge of the Mississippi River Alluvial Plain. Mesic forests tree species found in bottomland habitats are abundant or even dominant in non-flooded uplands. Bluffs provide habitat for plant species more common in the north. Species composition changes from north to south. Dominant species may include American beech (*Fagus grandifolia*), sweet gum, tulip tree, and white oak. Other characteristic species may include cucumber tree, red mulberry (*Morus rubra*), cherryback oak and littlebrownjug (*Hexastylis arifolia*).	<0.1	<0.1	<0.1
Gulf and Atlantic Coastal Plain Floodplain Forest	Floodplain forests associated with broad gradients of river size, soil nutrient levels and flood frequency ranging from semipermanent to intermittent. Major geomorphic features include natural levees, point bars, meander scrolls, oxbows, and sloughs. Species include hardwoods and other trees, shrubs and herbaceous vegetation tolerant of flooding. Typical trees include bald cypress (*Taxodium distichum*), water tupelo (*Nyssa aquatica*), silver maple, American sycamore, eastern cottonwood, box elder, and black willow. Giant cane (*Arundinaria gigantea*) is a common understory plant. Woody vines are commonly present. Shrubs and small trees include hazel alder, American hornbeam (*Carpinus caroliniana*), buttonbush, coastal sweetpepperbush (*Clethra alnifolia*), stiff dogwood (*Cornus foemina*), green hawthorn (*Crataegus viridis*), eastern swampprivet (*Forestiera acuminata*),	0.5	0.0	0.5

Table 4.5-3
Upland Vegetation Cover Types Affected by the Gulf XPress Project

Class Name a/	System Location and Description a/, b/	Acres b/		Total Acres b/
		Temporary	Permanent (Operation)	
	possumhaw (*Ilex decidua*), Virginia sweetspire (*Itea virginica*), wax myrtle (*Morella cerifera*), planertree (*Planera aquatica*), dwarf palmetto (*Sabal minor*), and gulf Sebasian-bush (*Sebastiania fruticosa*). Vines may include Alabama supplejack (*Berchemia scandens*) and saw greenbrier (*Smilax bona-nox*). Herbaceous species may include smallspike false nettle (*Boehmerica cylindrica*), hirsute sedge (*Carex complanata*), white edge sedge (*C. debilis*), greater bladder sedge (*C. intumescens*), cypress swamp sedge (*C. joorii*), whitegrass (*Leersia virginica*), Virginia water horehound (*Lycopus virginicus*), climbing hempvine (*Mikania scandens*), and narrow pumegrass (*Saccharum baldwinii*).			
Lower Mississippi River Flatwoods	Forests, prairies, and woodlands on Pleistocene terraces in the Mississippi Alluvial Plain. These features are higher in elevation than floodplains but have poor internal drainage and runoff. These areas have very wet conditions in winter and spring and very dry in the summer. Based on the moisture regime, the vegetation communities range from willow oak (*Quercus phellos*) flats to post oak (*Q. stellata*) flats to prairies. Trees include both upland and lowland species, ranging from post oak to overcup (*Q. lyrata*) oak.	0.1	0.0	0.1
Southern and Central Appalachian Cove Forest	Mesophytic hardwood or hemlock-hardwood forests on acidic bedrock in sheltered topographic positions. This forest type includes a mosaic of acidic and rich covers that may be identified by individual plant communities. Characteristic canopy species include yellow buckeye (*Aesculus flava*), sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*), American basswood (*Tilia americana*), tulip tree, mountain silverbell (*Halesia tetraptera*), eastern hemlock, American beech, cucumbertree, and mountain magnolia (*Magnolia fraseri*).	<0.1	<0.1	<0.1
Southern Appalachian Low-Elevation Pine Forest	Shortleaf pine- and Virginia pine-dominated forests on ridgetops, upper and midslopes, as well as lower elevations in the Southern Appalachians such as mountain valleys. Stands are dominated by shortleaf pine, Virginia pine, or pitch pine (*Pinus rigida*). Hardwoods may be abundant and may include southern red oak, swamp chestnut oak (*Quercus prinus*), scarlet oak, pignut hickory, and red maple. The shrub layer may include Blue Ridge blueberry (*Vaccinium pallidum*), black huckleberry (*Gaylussacia baccata*), or other acid-tolerant species. The herbaceous layer is typically sparse but may include narrowleaf silkgrass (*Pityopsis graminifolia*) and Virginia tephrosia (*Tephrosia virginiana*).	0.1	0.4	0.5
Southern Interior Low Plateau Dry-Mesic Oak Forest	Hardwood-dominated forests along ridgetops and slopes with various aspects. Oaks and hickories may dominate this forest. Swamp chestnut oak, post oak, blackjack oak (*Quercus marilandica*), scarlet oak, chinquapin oak (*Q. muehlenbergii*), and Shumard's oak (*Q. shumardii*) are typical in drier more acidic	3.8	4.9	8.7

Table 4.5-3
Upland Vegetation Cover Types Affected by the Gulf XPress Project

Class Name a/	System Location and Description a/, b/	Acres b/		Total Acres b/
		Temporary	Permanent (Operation)	
	substrates. In more mesic conditions, white oak, black oak (*Q. velutina*) or southern red oak may be dominant. Understories are typically dominated by shrubs and small trees. Specific species are dependent on directional aspect, soil, and moisture.			
Southern Ridge and Valley/Cumberland Dry Calcareous Forest	Dry to dry-mesic calcareous forests on a variety of topographic and landscape positions including ridgetops and midslopes. These forests are typically dominated by oak and hickory species. Sometimes pines and/or eastern red cedar (*Juniperus virginiana*) are a key component. These forests are successional and have developed after repeated cutting, clearing, and cultivation of original forests.	0.3	0.3	0.6
Agriculture				
Eastern Cool and Warm Temperate Pasture and Hayland	Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops. Pasture and hay vegetation accounts for greater than 20 percent of the total vegetation.	52.4	48.5	100.9
Eastern Cool and Warm Temperate Row Crop – Close Grown Crop	Cropland with greater than 20 percent vegetation that is generally drill-seeded or broadcast with wheat, oats, rice, barley, flax, corn, soybeans, vegetables, tobacco, and cotton. Cropland may also include orchards and vineyards or areas that are tilled.	42.7	18.2	60.9
Eastern Warm Temperate Fallow/Idle Cropland	Cropland that has been removed from active production.	0.1	0.0	0.1
Open Lands				
Eastern Cool and Warm Temperate Urban Herbaceous and Shrubland	Areas of lawn grasses and shrubs commonly within single-family housing units, parks, and golf courses. Vegetation is planted in developed settings for recreation, erosion control, or aesthetics.	6.4	1.9	8.3
Ruderal Upland Herbaceous	See Table 4.5-1 for class location and description.	<0.1	0.3	0.3
Central Interior Highlands Calcareous Glade and Barrens Herbaceous	Occurs on moderate to steep slopes and step valleys on primarily southerly to westerly facing slopes. Bedrock includes limestone or dolomite. Soils are shallow, moderately well drained, and interspersed with rocks. Soils often dry out during the summer and fall and become saturated during winter and spring. Dominant plant species include little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), sideoats grama (*Bouteloua curtipendula*), and other calcium loving plant species. Stunted woodlands dominated by chinquapin oak interspersed with eastern red cedar may occur.	0.1	0.7	0.8

Table 4.5-3
Upland Vegetation Cover Types Affected by the Gulf XPress Project

Class Name a/	System Location and Description a/, b/	Acres b/		Total Acres b/
		Temporary	Permanent (Operation)	
Central Interior Highlands Dry Acidic Glade and Barrens	Occurs on flatrock outcrops and along moderate to steep slopes or valley walls of rivers. Parent material includes chert, igneous and/or sandstone bedrock with well- to excessively well-drained shallow soils interspersed with rock and boulders. Soils are typically dry in the summer and fall and saturated during the spring and winter. Dominant vegetation includes little bluestem, Indian grass (*Sorghastrum nutans*) with stunted oak species including post oak and blackjack oak. Shrubs, such as blueberry (*Vaccinium* spp.) occur on variable depth soils. Eastern red cedar can also be present. This system is influenced by drought and fire.	<0.1	<0.1	<0.1
Western Highland Rim Prairie and Barrens	Open, fire maintained barrens on flat to gently sloping uplands. Barrens may occur in part on Cretaceous gravels which cap Mississippian limestone strata on hills or cherty residuum. Droughty, gravelly soils and resulting stresses to vegetation as well as fire maintain this system.	<0.1	<0.1	<0.1

a Class name, location and description were obtained from LANDFIRE (LANDFIRE, 2016). LANDFIRE data are different from the data used to calculate total vegetation and land use impacts for the project (as reported in table 4.8-3). Thus, the totals for different vegetative cover types in this table may not reflect the totals in table 4.8-3.

b Acreages and miles in this table have been rounded for presentation purposes. Thus, the totals may not reflect the exact sum of the addends in all cases.

Impacts that would occur to the natural upland cover types from construction and operation of the GXP are provided in table 4.8-3 in section 4.8. Based on table 4.8-3, the largest natural upland cover type that the GXP would affect is agricultural land (about 149 acres). Agricultural land is primarily comprised of Eastern Cool and Warm Temperate Pasture and Hay Land and Eastern Cool and Warm Temperate Row Crop – Close Grown Crop. The next largest upland cover type that the GXP would affect is forested land (about 22 acres). The largest forested land class is Southern Interior Low Plateau Dry-Mesic Oak Forest. The smallest natural upland cover type that the GXP would impact is open land (about 13 acres), primarily comprised of Eastern Cool Temperate Urban Herbaceous and Shrubland.

During construction, contractors would use TWS on the compressor station sites for office trailers, parking, and storage of materials and equipment. Following construction, all disturbed areas outside of the compressor station permanent footprints would be restored to preconstruction conditions in accordance with Columbia Gulf's ECS.

The degree of impact on vegetation would depend on the type of vegetation affected, the rate at which the vegetation would regenerate after construction, and the area and frequency of vegetation maintenance conducted during operation. The primary impact of compressor station construction would be the cutting, clearing, and/or removal of about 183 acres (sum of temporary construction impacts on forested, agricultural, and open land from table 4.8-3 in section 4.8) of existing vegetation, of which the predominant type (about 149 acres) is agriculture land.

Impacts associated with disturbances to vegetation could include increased soil compaction and erosion, increased potential for the introduction and establishment of non-native and invasive species, and a local reduction in available wildlife habitat (see section 4.6.2.1). Columbia Gulf would implement erosion control measures as described in its ECS and mitigate the introduction of non-native and invasive species by post-construction monitoring of revegetated areas.

During clearing activities, Columbia Gulf would mow non-woody vegetation to ground level and cut and remove woody vegetation and stumps, as necessary. Columbia Gulf would fell trees and other woody material into the work area, then chip, burn (if approved by state and/or local regulations), or remove debris to a commercial disposal facility. Chipped material may be spread across upland areas in the work area during construction. To limit overall impact, clearing and grading would incorporate procedures to:

- limit vegetation removal to the extent necessary for construction of the GXP;
- restore pre-construction ground contours, where possible; and
- prevent topsoil erosion.

Following construction, Columbia Gulf would seed all previously vegetated workspaces disturbed by construction (and not covered by concrete, asphalt, or aggregate) in accordance with its ECS.

Lands currently dominated by herbaceous growth would be expected to revegetate quickly, often within one growing season after seeding and otherwise typically within 3 years, depending on a number of factors.

Construction in the limited forested lands affected would remove the tree canopy, which would change the structure and environment of the underlying area. Forested lands within the maintained project areas would be permanently converted to an herbaceous cover type. The regrowth of shrubs and trees within the previously forested areas may take decades to resemble the forest vegetation that was present before construction. In addition, soils that were previously shaded by the tree canopy would receive increased amounts of light, which could lead to drier soils and higher soil temperatures.

4.5.2 Federal Lands

No federally owned or managed lands have been identified within the MXP or GXP areas of disturbance. Information regarding federally listed plant species is included in section 4.7.

4.5.3 State Natural Heritage Communities

Natural heritage communities are typically tracked at the state level. This designation is given to areas that possess rare plants, rare animals, exemplary natural communities, or special geological features. Vegetation communities discussed in this section were identified through review of official agency data and direct consultations with state agencies. Information regarding state-listed plant species (including species of special concern) is included in section 4.7.

4.5.3.1 Mountaineer XPress Project

At Columbia Gas' request, the WVDNR Natural Heritage Program (NHP) conducted a review of the state Natural Heritage Inventory to determine possible impacts on known locations of rare, significant, or unique ecological communities within the project area (WVDNR, 2015a). No WVDNR NHP rare, significant, or unique ecological communities were identified during the review. However, four state-owned Wildlife Management Areas (WMA) are crossed by the pipeline centerline:

- Cecil H. Underwood WMA, crossed from approximately MP 9.2 to MP 9.4;
- Lewis Wetzel WMA, crossed from approximately MP 28.3 to MP 33.4;
- Frozen Camp WMA, crossed from approximately MP 113.2 to MP 113.1 and MP 113.3 to MP 114.4; and
- O'Brien Lake WMA, crossed from approximately MP 120.4 to MP 120.7 and MP 120.9 to MP 121.5.

These WMAs are managed for habitat and are not considered unique, rare, or significant except for Lewis Wetzel, which has been recognized as an Important Bird Area (IBA) for the management of cerulean warblers. IBAs and cerulean warblers are further discussed in section 4.6.1.1 and 4.6.2.1. WMAs are further discussed in section 4.6.1.1.

4.5.3.2 Gulf XPress Project

No unique, sensitive, or protected vegetation communities were identified within the GXP areas. No state-owned or managed lands would be affected.

4.5.4 Interior Forest Habitat

Interior forest habitat is not managed as a federal or state-regulated sensitive area, but does provide habitat for a variety of wildlife species. We are defining interior forests as forested areas greater than 300 feet from the influence of forest edges or open habitat (Jones et al., 2001). These habitats provide protection from disturbance and predation, food resources, and breeding habitat for wildlife. Clearing or fragmentation of interior forests creates more edge habitat and smaller forested tracts, which can impact availability and quality of feeding and nesting habitat for certain species, as well as isolate species populations (Rosenberg et al., 1999). Some species require large, un-fragmented blocks of habitat, and fragmentation can lead to reduced habitat quality. Habitat fragmentation can negatively impact habitat-specialist species, while having a positive or neutral effect to habitat-generalist species (Graham, 2002). Utility corridors also can create a barrier to wildlife movement for some species and a travel corridor for others. Additionally, corridor widths and vegetation characteristics can have varying effects to different species. Abrupt vegetation transitions (i.e., mature forest to open land) often cause the greatest barriers, while a forest-to-shrub-to-grassland transition can have minimal to no effect to transiting species (Graham, 2002).

4.5.4.1 Mountaineer XPress Project

We received comments during public scoping expressing concern regarding the potential impacts of the MXP on interior forest. We assessed interior forests using a dataset produced by the Natural Resource Analysis Center at West Virginia University (Strager and Maxwell, 2012), which identifies Core Forest Areas (CFA) based upon the acreage of contiguous habitat. CFA rankings include patch (small forest fragments), edge (continuous forest periphery), perforated (core forest containing a small clearing(s) within the forest), small core (less than 250 acres), medium core (250 to 500 acres), and large core (greater than 500 acres). Table 4.5-4 provides a breakdown of types of CFAs that would be directly affected by the MXP. Figures in appendix I illustrate the CFAs traversed by the MXP. Figures are provided at two different scales (1:10,000 and 1:2,000).

Based on our independent analysis, construction of the MXP would directly impact about 2,255 acres of CFA. Permanent impacts on CFA, from operation of the MXP, would total about 829 acres. About 755 acres of direct impacts would be to large core CFA.

Table 4.5-4
Core Forest Area Directly Affected by the Mountaineer XPress Project (acres) a/, b/

Project/Facility Type/Facility	Edge (continuous forest periphery)		Patch (small forest fragments)		Perforated (core forest containing small clearings within the forest)		Small Core (< 250 acres)		Medium Core (250-500 acres)		Large Core (< 500 acres)		Core Forest Total	
	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)
New Pipelines														
MXP-100	171.4	69.5	12.0	4.9	604.9	237.5	34.0	13.5	10.2	<4.3	1,135.2	455.9	1,967.8	785.6
Cathodic Protection	0.2	0.2	0.0	0.0	0.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1
MXP-200	5.5	2.8	0.7	0.3	21.5	10.9	4.0	1.9	0.0	0.0	16.4	8.2	48.2	24.1
Cathodic Protection	0.0	0.0	0.0	0.0	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4
Subtotal	177.0	72.5	12.7	5.2	627.6	249.7	38.0	15.4	10.2	<4.3	1,151.6	464.1	2,017.3	811.2
Pipeline Replacement														
SM80 Replacement	0.4	0.3	0.0	0.0	1.1	0.6	0.0	0.0	0.0	0.0	0.2	0.1	1.7	1.0
SM80 Loop Replacement	0.0	0.0	0.0	0.0	0.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.4
Subtotal	0.4	0.3	0.0	0.0	1.9	1.0	0.0	0.0	0.0	0.0	0.2	0.1	2.5	1.4
Pipeline Facility Total	**177.9**	**73.1**	**12.7**	**5.2**	**631.5**	**251.7**	**38.0**	**15.4**	**10.2**	**<4.3**	**1,152.0**	**464.3**	**2,022.5**	**814.0**
Access Roads														
MXP-100	15.2	0.4	0.9	0.1	73.6	2.9	1.0	0.5	1.0	0.0	95.4	0.0	187	3.9
MXP-200	1.6	0.0	0.1	0.0	11.6	0.1	0.2	0.0	0.0	0.0	5.1	0.0	18.6	0.1
SM80 Replacement	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
SM80 Loop Replacement	0.4	0.3	0.0	0.0	0.8	0.8	0.0	0.0	0.0	0.0	<0.1	<0.1	1.2	1.1
Access Roads Total	**17.2**	**0.7**	**1.0**	**0.1**	**86.1**	**3.9**	**1.2**	**0.5**	**1.0**	**0.0**	**100.5**	**0.0**	**206.9**	**5.2**

Table 4.5-4
Core Forest Area Directly Affected by the Mountaineer XPress Project (acres) a/, b/

Project/Facility Type/Facility	Edge (continuous forest periphery)		Patch (small forest fragments)		Perforated (core forest containing small clearings within the forest)		Small Core (< 250 acres)		Medium Core (250-500 acres)		Large Core (< 500 acres)		Core Forest Total	
	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)
New Aboveground Facilities														
LXP Tie-In	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
Sherwood CS	4.8	1.7	0.8	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	1.7
White Oak CS	0.0	0.0	0.9	0.8	5.5	1.6	0.0	0.0	0.0	0.0	0.0	0.0	6.5	2.4
Mount Olive CS	0.7	0.0	0.0	0.0	7.2	0.0	21.7	8.3	0.0	0.0	0.0	0.0	29.7	8.3
Ripley RS	0.0	0.0	0.0	0.0	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4
Saunders Creek RS	0.0	0.0	0.6	0.6	3.1	2.4	0.0	0.0	0.0	0.0	0.0	0.0	3.9	3.0
MXP-200 Tie-in to Line 1983	0.0	0.0	0.0	0.0	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3
MLV	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Subtotal	5.6	1.7	2.3	1.4	17.1	4.7	21.7	8.3	0.0	0.0	0.0	0.0	47.1	16.1
Existing Aboveground Facilities														
Lone Oak Compressor Station c/	2.6	0.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.3	0.0
Ceredo Compressor Station	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	0.0
Elk River Compressor Station c/	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0
Subtotal	7.2	0.0	1.3	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.2	0.0
Aboveground Facilities Total	**12.8**	**1.7**	**3.6**	**1.4**	**20.8**	**4.7**	**21.7**	**8.3**	**0.0**	**0.0**	**0.0**	**0.0**	**59.3**	**16.1**

Table 4.5-4
Core Forest Area Directly Affected by the Mountaineer XPress Project (acres) a/, b/

Project/Facility Type/Facility	Edge (continuous forest periphery)		Patch (small forest fragments)		Perforated (core forest containing small clearings within the forest)		Small Core (< 250 acres)		Medium Core (250-500 acres)		Large Core (< 500 acres)		Core Forest Total	
	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)
Pipe Yards and Staging Areas														
Pipe Yards	5.8	0.0	2.7	0.0	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.6	0.0
Staging Areas	12.3	0.0	1.6	0.0	11.7	0.0	1.2	0.0	0.0	0.0	0.0	0.0	27.7	0.0
Subtotal	18.1	0.0	4.3	0.0	18.7	0.0	1.2	0.0	0.0	0.0	1.0	0.0	43.3	0.0
ATWS														
MXP-100 ATWS	16.2	0.0	1.6	0.0	42.3	0.0	2.0	0.0	0.3	0.0	66.3	0.0	128.7	0.0
MXP-200 ATWS	0.2	0.0	<0.1	0.0	1.0	0.0	0.1	0.0	0.0	0.0	0.6	0.0	1.9	0.0
X59M1 Line ATWS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM80 Line ATWS	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0
SM80 Loop Line ATWS	0.3	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.8	0.0
Subtotal	16.7	0.0	1.6	0.0	44.4	0.0	2.1	0.0	0.3	0.0	67.0	0.0	132.1	0.0
PROJECT TOTAL	**225.0**	**74.5**	**22.2**	**6.6**	**713.4**	**255.4**	**63.0**	**23.7**	**10.5**	**4.3**	**755.6**	**464.2**	**2,254.5**	**828.7**

a The subtotals and totals shown in this table may not equal the sums of the addends due to rounding.

b Core Forest Area type, location and description were obtained from Strager and Maxwell, 2012.

c The initial construction of the Lone Oak Compressor Station will be performed under the LXP, which was certificated by FERC on January 19, 2017. The Elk River Compressor Station is pending in another proceeding before FERC.

Table 4.5-5 depicts the various CFA forest systems that would be impacted by the MXP. LANDFIRE data (2016) were used in the analysis of impacts on forest systems within CFAs. This dataset provides a landscape-level characterization of specific forest systems crossed by the project. Although CFA includes patch, edge, and perforated areas, these areas have been converted to urban, agricultural or open land so they are not mapped in LANDFIRE data as forest systems. Even though they are not mapped in the LANDFIRE data, they are still relevant in the analysis because impacts on these features can have resulting impacts on small, medium, and large core forest area. By far, the largest CFA forest system that would be impacted by the MXP is South-Central Interior Mesophytic Forest (about 1,167 acres of CFA within this system). South-Central Interior Forest is believed to cover 2,777,629 acres in West Virginia and 3,543,609 acres across its total range within West Virginia, Pennsylvania, and Virginia (The Nature Conservancy, 2016). Impacts resulting from the MXP would result in a 0.04 percent decrease in West Virginia and a 0.03 percent decrease across the total range of South-Central Interior Mesophytic Forest.

Construction of the MXP would create a new, cleared corridor in areas of interior forest. Clearing or fragmentation of interior forests creates more edge habitat and smaller forested tracts, which can impact the characteristics of vegetation communities including their suitability for wildlife. Table 4.5-6 provides a summary of conversions of small, medium, and large CFA that would result from the construction of the MXP. Our review of CFA within 10 miles of either side of the MXP indicates that the project would traverse an area comprising approximately 571,136 acres of large CFAs, 1,206 acres of medium CFAs, and 1,516 acres of small CFAs. Construction of the MXP would decrease large CFAs by 24,601 acres (4 percent). The MXP would increase medium CFAs by 5,497 acres (356 percent) and would increase small CFAs by 6,876 acres (354 percent). The MXP also would create forest edge where the pipeline traverses CFAs. MXP facilities that would result in an impact on CFAs are included in table 4.5-6.

The MXP rights-of-way through forest and forest edges would result in the removal and modification of habitat for species that use these habitats as far as 300 feet into adjacent forest habitats. The creation of a new corridor and forest edges could impact micro-climate factors such as wind, humidity, and solar exposure, which could lead to a change in species composition. Forest edges also play a role in ecosystem functions, including the dispersal of plants and wildlife, the spreading of fire, movement of wildlife, and vegetation composition and structure. Non-native species could vegetate interior forests that are impacted by construction.

Edge effects could include a change in available habitat for some species due to an increase in light and temperature levels on the forest floor and the subsequent reduction in soil moisture; such changes may result in habitat that would no longer be suitable for species that require these specific habitat conditions. An alteration of habitat could affect the fitness of some species and increase competition within, between, or among species, possibly resulting in an overall change to the structure of the forest community.

Table 4.5-5
Forest Systems Affected by the Mountaineer XPress Project (acres) a/, b/, c/, d/

Forest System	Edge (continuous forest periphery)		Patch (small forest fragments)		Perforated (core forest containing small clearings within the forest)		Small Core (< 250 acres)		Medium Core (250-500 acres)		Large Core (> 500 acres)		Project Total	
	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)	Const. (acres)	Oper. (acres)
Allegheny-Cumberland Dry Oak Forest and Woodland	30.1	20	1.2	0.8	133.8	86.3	17.9	10.9	4.3	2.5	287.9	183.8	475.2	304.3
Appalachian Hemlock-Northern Hardwood Forest	18.2	12.5	0.8	0.4	54.9	39.1	2.1	1.3	0.0	0.0	80.1	53.1	156.1	106.4
Central Appalachian Rocky Pine-Oak Woodland	<0.1	<0.1	<0.1	0.0	0.2	0.2	<0.1	0.0	0.0	0.0	0.6	0.5	0.8	0.7
Central Interior and Appalachian Floodplain Forest	17.1	12.2	0.6	0.4	19.4	13.6	0.8	0.7	0.0	0.0	15.7	11.5	53.6	38.4
Central Interior and Appalachian Riparian Forest	0.2	0.1	<0.1	<0.1	0.5	0.4	<0.1	<0.1	0.0	0.0	<0.1	<0.1	0.7	0.5
Central Interior Highlands Calcareous Glade and Barrens Woodland	<0.1	<0.1	0.0	0.0	<0.1	<0.1	<0.1	<0.1	0.0	0.0	0.2	0.1	0.2	0.1
Eastern Cool Temperate Urban Forest	14.2	10.0	1.5	1.1	24.1	16.8	<0.1	<0.1	<0.1	<0.1	11.5	7.8	51.3	35.7
Managed Tree Plantation-Northern and Central Hardwood and Conifer Plantation Group	3.4	2.2	0.3	0.2	18.4	11.4	1.6	0.9	0.1	<0.1	33.5	19.9	57.3	34.6
Northeastern Interior Dry-Mesic Oak Forest	31.1	20.9	2.2	1.5	117.2	81.2	11	7.4	1.1	0.7	151.5	99.2	314.1	210.9
Ruderal Forest-Northern and Central Hardwood and Conifer	2.3	1.7	<0.1	<0.1	8.0	4.8	0.2	0.1	<0.1	<0.1	14.1	9.2	24.6	15.8
South-Central Interior Mesophytic Forest	80.0	52.3	4.6	3.1	345.6	229.6	30.5	18.6	4.3	3.0	702.0	454.1	1,167.0	760.7

a The subtotals and totals shown in this table may not equal the sums of the addends due to rounding.
b Class name, location, and description were obtained from LANDFIRE (LANDFIRE, 2016).
c Core Forest Area type, location, and description were obtained from Strager and Maxwell, 2012.
d Acreages in this table will differ from 4.8-4, because Forest Systems are not mapped within the Patch, Edge, and Perforated designations.

Table 4.5-6
Changes in Core Forest As a Result of the Mountaineer XPress Project a/

Facility	Milepost Start	Milepost End	Core Forest Crossed by MXP (acres)			Change in Post-construction Core Forest (acres)		
			Small Core (< 250 acres) acres/blocks	Medium Core (250-500 acres) acres/blocks	Large Core (>500 acres) acres/blocks	Small Core (< 250 acres) acres/blocks	Medium Core (250-500 acres) acres/blocks	Large Core (>500 acres) acres/blocks
MXP-100	3.4	6.9	0 / 0	0 / 0	3,919 / 1	+299 / 4	+441 / 1	-951 / 2
	7.2	18.3	0 / 0	0 / 0	30,193 / 1	+170 / 5	0 / 0	-855 / 6
	18.3	24.3	0 / 0	0 / 0	62,162 / 1	+ 2 / 1	0 / 0	-358 / 2
	24.3	48.7	0 / 0	0 / 0	130,383 / 1	+830 / 27	+978 / 3	-4,013 / 14
	67.2	75.6	0 / 0	0 / 0	34,723 / 1	+700 / 6	0 / 0	-758 / 6
	95.3	96	67 / 2	0 / 0	0 / 0	-34 / 2	0 / 0	0 / 0
	97.3	101	0 / 0	0 / 0	7,037 / 1	+180 / 3	0 / 0	-408 / 3
	101	102.1	0 / 0	0 / 0	816 / 1	+240 / 1	0 / 0	-218 / 1
	102.1	104.1	128 / 2	0 / 0	0 / 0	-28 / 4	0 / 0	0 / 0
	104.1	106.1	32 / 1	0 / 0	0 / 0	-6 / 2	0 / 0	0 / 0
	107.3	109.9	98 / 1	0 / 0	38,626 / 1	+275 / 3	0 / 0	-370 / 2
	111.3	112.6	0 / 0	0 / 0	702 / 3	+325 / 3	+285 / 1	-702 / 0
	112.6	117.6	0 / 0	0 / 0	14,270 / 2	+629 / 4	0 / 0	-754 / 1
	117.6	117.9	149 / 1	0 / 0	0 / 0	-21 / 2	0 / 0	0 / 0
	117.9	119.4	10 / 1	0 / 0	0 / 0	-3 / 2	0 / 0	0 / 0
	119.4	121.6	0 / 0	0 / 0	3,600 / 1	0 / 0	0 / 0	-149 / 2
	122	122.3	0 / 0	0 / 0	2,594 / 1	+201 / 1	0 / 0	-231 / 1
	123.9	124.3	86 / 1	0 / 0	0 / 0	-41 / 1	0 / 0	0 / 0
	125.7	126.3	0 / 0	0 / 0	719 / 1	0 / 0	+681 / 2	-719 / 0
	126.3	128	61 / 1	0 / 0	0 / 0	-6 / 1	0 / 0	0 / 0
	128	131.8	41 / 1	0 / 0	10,097 / 1	+56 / 4	0 / 0	-175 / 2
	131.8	134	224 / 3	0 / 0	0 / 0	-18 / 5	0 / 0	0 / 0
	135.8	137.8	133 / 1	350 / 1	0 / 0	+233 / 8	+350 / 1	0 / 0
	137.8	138.8	0 / 0	0 / 0	3,460 / 1	+31 / 1	0 / 0	-59 / 1
	140.3	141.2	161 / 1	0 / 0	0 / 0	-22 / 1	0 / 0	0 / 0
	141.2	142.3	0 / 0	278 / 1	0 / 0	0 / 0	-17 / 1	0 / 0

Table 4.5-6
Changes in Core Forest As a Result of the Mountaineer XPress Project a/

Facility	Milepost Start	Milepost End	Core Forest Crossed by MXP (acres)			Change in Post-construction Core Forest (acres)		
			Small Core (< 250 acres) acres/blocks	Medium Core (250-500 acres) acres/blocks	Large Core (>500 acres) acres/blocks	Small Core (< 250 acres) acres/blocks	Medium Core (250-500 acres) acres/blocks	Large Core (>500 acres) acres/blocks
MXP-100 (continued)	142.3	146.7	0 / 0	0 / 0	5,518 / 2	+152 / 7	0 / 0	-319 / 3
	148.4	154.8	0 / 0	0 / 0	4,616 / 2	+65 / 4	+1,470 / 4	-1,986 / 3
	154.8	160.5	0 / 0	0 / 0	5,354 / 1	+91 / 3	+297 / 1	-802 / 3
	160.5	162.5	0 / 0	0 / 0	10,432 / 1	+38 / 2	0 / 0	-47 / 1
	162.5	164.3	136 / 1	290 / 1	0 / 0	-36 / 2	-21 / 1	0 / 0
	48.7	51	200 / 1 b/	288 / 1	201,811 / 1	+2,573 / 42	+1,033 / 3	-10,725 / 13 b/
	51.9	60.8						
	60.8	63.8						
	63.8	65.5						
	65.5	67.2						
	77.8	88.9						
	88.9	90.5						
	90.5	93.6						
MXP-200	0	2						
	2	2.2						
	2.2	4.5						
	4.5	5.9						
SM80 Loop Replacement	20.6	20.7	0 / 0	0 / 0	1,104 / 1	+1 / 1	0 / 0	-2 / 1
		Total	**1,516 / 18**	**1,206 / 4**	**571,136 / 26**	**6,876 / 152**	**5,497 / 18**	**-24,601 / 67**

a Core Forest Area type, location, and description were obtained from Strager and Maxwell, 2012.
b Milepost impacts were aggregated due to the same large core forest area being crossed twelve times.

The landscape along the MXP has already been fragmented in places by existing roads, utility rights-of-way, residential and commercial development, agricultural, and open land. Even though this fragmentation exists, the MXP could still impact migratory bird and other wildlife habitat. In sections 4.6.1 and 4.7, we discuss the MXP's potential impacts on migratory birds and their interior forest habitats in relation to the MBTA and federally listed bat species, including proposed tree clearing outside of agency-recommended timeframes.

Construction in the forested areas affected would remove the tree canopy, which would change the structure and environment of the underlying area. Forested lands within the maintained project areas would be permanently converted to an herbaceous cover type. To encourage revegetation and minimize the potential spread of invasive species in temporarily impacted areas, Columbia Gas would implement the measures in Section I of its ECS (e.g., temporary and permanent seeding, mulch application, erosion control blanket installation), which would promote the establishment of desirable plant species and deter the spread of unwanted plant species. The regrowth of shrubs and trees within the previously forested areas may take decades to resemble the forest vegetation that was present before construction. In addition, soils that were previously shaded by the tree canopy would receive increased amounts of light, which could lead to drier soils and higher soil temperatures. Therefore, **we recommend**:

- **Prior to the end of the draft EIS comment period, Columbia Gas should identify any specific construction, restoration, and/or operation mitigation measures identified through its discussions with the WVDNR that it would implement to promote compatibility with the restoration and management of upland forest areas.**

4.5.4.2 Gulf XPress Project

Most of the vegetation disturbed by construction of the GXP facilities is agricultural (about 149 acres, or 75 percent of the project total). The GXP impacts on upland forested vegetation is about 22 acres in various locations in Kentucky, Tennessee, and Mississippi: Moorhead (0.5 acre), Goodluck (4.7acres), Cane Ridge (8.7 acres), Clifton (6.4 acres), and Holcomb Compressor Station (1.6 acre). Interior forest tracts would not be affected by GXP construction.

4.5.5 Noxious Weeds and Invasive Plant Species

Invasive species are those that display rapid growth and spread, becoming established over large areas (USDA, 2016d). Most commonly, they are exotic species that have been introduced from another part of the United States or another continent, although some native species that exhibit rapid growth and spread are also considered invasive. Invasive plant species can change or degrade natural vegetation communities, which can reduce the quality of habitat for wildlife and native plant species. Like invasive species, noxious weeds are frequently introduced but occasionally are native. Noxious weeds are defined as those that are injurious to commercial crops, livestock, or natural habitats and typically grow aggressively in the absence of natural controls (USDA, 2016d). Under EO 13112, a federal agency shall not authorize, fund, or carry out actions likely to cause or promote the introduction or spread of invasive species in the United States.

4.5.5.1 Mountaineer XPress Project

The West Virginia Noxious Weed Act defines noxious weeds as "any living plant, or part thereof, declared to be detrimental to crops, other desirable plants, waterways, livestock, land or other property, or to be injurious to public health or the economy," and prohibits persons from moving, transporting, delivering, shipping, or offering for shipment noxious weeds into or within the state without a permit from the Secretary of Agriculture (West Virginia Code, 1976; WVDA, 2007).

Columbia Gas included surveys for noxious and invasive weed species during its 2015 field survey season. The results are presented in table 4.5-7. Species sought were based on the recommendations of the West Virginia Department of Agriculture (see "West Virginia Noxious Species" in table). This table also presents West Virginia's 12 most common invasive species (WVDNR, 2015a).

Table 4.5-7
Noxious Weed Species Potentially Located within the MXP Areas

Common Name	Scientific Name	Identified within the Project Survey Corridor
West Virginia Noxious Species a/		
Autumn olive	*Elaeagnus umbellata*	Yes; multiple sites in Doddridge, Jackson, Marshall, Putnam, Ritchie, Roane, and Wirt Counties
Curled thistle	*Carduus crispus*	No
Japanese knotweed **b**/	*Polygonum cuspidatum*	Yes; multiple sites in Doddridge, Marshall, Putnam, and Ritchie Counties
Japanese stiltgrass **b**/	*Microstegium vimineum*	Yes; multiple sites in all counties
Johnsongrass	*Sorghum halepense*	Yes; multiple sites in Jackson, Marshall, Ritchie, and Roane Counties
Kudzu **b**/	*Pueraria montana, Pueraria thunbergiana*	Yes; MP 134.6 in Putnam County
Marijuana	*Cannabis sativa*	Yes; MP 134.6 in Putnam County
Mile-a-minute **b**/	*Polygonum perfoliatum*	No
Morrow's honeysuckle	*Lonicera morrowii*	Yes; multiple sites in Doddridge, Jackson, Marshall, and Putnam Counties
Multiflora rose **b**/	*Rosa multiflora*	Yes; multiple sites in Calhoun, Doddridge, Jackson, Marshall, Putnam, Ritchie, Roane, Wirt, and Wetzel Counties
Musk thistle	*Carduus nutans*	Yes; multiple sites in Jackson County
Opium poppy	*Papaver somniferum*	No
Plumeless thistle	*Carduus acanthoides*	No
Poison hemlock	*Conium maculatum*	No
Purple loosestrife **b**/	*Lythrum salicaria*	No
Tartarian honeysuckle	*Lonicera tartarica*	Yes; multiple sites in Doddridge, Jackson, Putnam, Ritchie, Wirt, and Wetzel Counties
Tree of heaven **b**/	*Ailanthus altissima*	Yes; multiple sites in Calhoun, Doddridge, Jackson, Marshall, Putnam, Ritchie, Roane, Wirt, and Wetzel Counties
Common West Virginia Invasive Species		
Crown vetch	*Securigera varia*	No
Garlic mustard	*Alliaria petiolata*	Yes; MP 153 in Putnam County
Reed canary grass	*Phalaris arundinacea*	No

Table 4.5-7
Noxious Weed Species Potentially Located within the MXP Areas

Common Name	Scientific Name	Identified within the Project Survey Corridor
Water-shield	*Brasenia schreberi*	No
Yellow iris	*Iris pseudacorus*	No

a Source: USDA, 2016d.
b Also one of the 12 most common invasive plant species in West Virginia (WVDNR, 2017).

The removal of existing vegetation and disturbance of soils along the rights-of-way during construction would create conditions conducive to the spread and establishment of noxious and invasive weeds, particularly where new corridors are established in previously vegetated areas. To limit the potential spread of invasive species, Columbia Gas states that it is continuing consultations with the WVDNR, WVDEP, and West Virginia Office of the NRCS to develop BMPs to control the spread of invasive and noxious species.

Based on our review and EPA's recommendations, we believe this issue merits additional effort. Therefore, **we recommend that prior to construction:**

- **Columbia Gas should develop, in consultation with the appropriate West Virginia state agencies and local NRCS, a noxious and invasive weed management plan. This plan should include:**

  a. identification of the locations by milepost where noxious or invasive weeds are currently present either within or immediately adjacent to all areas of project-related disturbance; and

  b. development of BMPs and a site-specific plan for each location where weeds are present which:

    i. describes options for pretreatment (including the month(s) of the year when pretreatment would be effective), treatment during construction (to avoid introducing or spreading invasive species), and post-construction treatment and monitoring;

    ii. identifies who was consulted regarding possible treatment options; and

    iii. includes whether the landowner/administrator has approved of the treatment options proposed.

  Columbia Gas should file this plan with the Secretary, for the review and written approval from the Director of OEP, before implementation and include the comments of the various agencies consulted during its development.

Invasive species also could spread during project operation from the transmission of seeds or viable plant fragments from infested areas via mowing equipment. Columbia Gas has committed to monitoring for invasive species for 3 years following construction; however, we believe that additional post-construction invasive species monitoring is needed. The risk of invasive species introduction decreases once revegetation of native species is successful and

complete, although mowing could re-introduce invasive species during operation of the project. Therefore, **we recommend that**:

- **Columbia Gas should conduct noxious and invasive species monitoring within the maintained rights-of-way for 3 years following successful completion of revegetation, as determined by the FERC staff based on post-construction monitoring inspections. Columbia Gas should not move mowing and maintenance equipment from an area where invasive species have been encountered during operation of the project unless the equipment is cleaned prior to moving.**

Based on our recommendations, we conclude that the potential spread of noxious or invasive weeds would be effectively avoided or mitigated.

4.5.5.2 Gulf XPress Project

Columbia Gulf's removal of existing vegetation and disturbance of soils during construction could create conditions conducive to the establishment of invasive weeds. Kentucky, Tennessee, and Mississippi all have state-listed noxious or invasive weeds. In Kentucky, there are eight species that have the potential to occur in project areas; in Tennessee, there are three; and in Mississippi, there are eight. Columbia Gulf conducted noxious weed surveys at each of the areas where soils would be disturbed by the GXP. Table 4.5-8 lists noxious weed species potentially present in each state affected by the GXP, as well as the results of Columbia Gulf's surveys of each location.

Table 4.5-8
Noxious Weed Species Potentially Located within the GXP Areas

Common Name	Scientific Name	Identified within GXP Area of Disturbance
Kentucky		
Black nightshade	*Solanum ptycanthum*	No
Canadian thistle	*Carduus crispus*	No
Giant foxtail	*Polygonum cuspidatum*	No
Johnsongrass	*Sorghum halepense*	Morehead Compressor Station site
Kudzu	*Pueraria montana*	No
Multiflora rose	*Rosa multiflora*	Morehead Compressor Station site
Musk thistle	*Carduus nutans*	No
Wild cucumber	*Sicyos angulatus*	No
Tennessee		
Purple loosestrife (two species)	*Lythrum salicaria, Lythrum virgatum*	No
Tropical soda apple	*Solanum viarum*	No
Mississippi		
Brazilian satintail	*Imperata brasiliensis*	No
Chinese tallow tree	*Triadica sebifera*	No
Cogon grass	*Imperrata cylindrica*	No
Giant salvinia	*Salvina molesta*	No
Hydrilla	*Hydrilla verticillata*	No

Table 4.5-8 Noxious Weed Species Potentially Located within the GXP Areas		
Common Name	**Scientific Name**	**Identified within GXP Area of Disturbance**
Itchgrass	*Rottboellia cochinchinensis*	No
Kudzu	*Pueraria montana*	New Albany Compressor Station site
Tropical soda apple	*Solanum viarum*	No
Source: USDA, 2012		

To limit the potential spread of invasive species, Columbia Gulf would limit vegetation removal to the extent necessary to construct the project, and either burn, chip, or haul cleared vegetation to a commercial disposal facility. Additionally, Columbia Gulf would implement the measures in its ECS (e.g., temporary and permanent seeding, mulch application, erosion control blanket installation), which would promote the establishment of desirable plant species and deter the spread of unwanted plant species. Columbia Gulf would also conduct post-construction monitoring for noxious weed growth in revegetated areas. Based on these measures, we conclude that the potential spread of noxious or invasive weeds would be avoided or effectively mitigated.

4.5.6 Conclusion

4.5.6.1 Mountaineer XPress Project

Construction of the MXP, including the construction rights-of-way, extra workspaces, aboveground facilities, contractor yards, and access roads, would result in impacts on about 3,268 acres of vegetated lands.

Based on our review of the potential impacts on vegetation as described above, we conclude that the primary impact from project construction and operation would be on forested lands and fragmentation of interior forest blocks. Due to the length of time required to recover forested vegetation, these impacts would be considered long-term to permanent. Columbia Gas would attempt to minimize these impacts through the implementation of their ECS, in addition to recommendations made throughout this EIS. Therefore, despite impacting a small percentage of the primary CFA forest system (South-Central Interior Forest), co-locating a portion of the pipeline with existing utilities, and with implementation of the ECS, we have determined that MXP impacts on forested lands would be significant.

4.5.6.2 Gulf XPress Project

Construction of the GXP, including work conducted at two existing facilities and seven new compressor station sites, would result in impacts on about 191 acres of vegetated lands. This total includes about 163 acres of agricultural land, 17 acres of forested land, and 9 acres of open land.

As discussed for the MXP above, construction impacts on vegetation resources are classified based on the duration and significance of impacts. Based on our review of the potential impacts on vegetation as described above, we conclude that the primary impact from construction

and operation would be on agricultural land. Impacts on forested and non-forested vegetation types would be minor, and mitigated through adherence to the measures described in Columbia Gulf's ECS.

4.6 WILDLIFE AND FISHERIES

4.6.1 Existing Wildlife Resources

4.6.1.1 Mountaineer XPress Project

The MXP would traverse terrestrial and wetland habitats that support a diversity of wildlife species. Representative wildlife species include various species of waterfowl and migratory birds including raptors (e.g., red-tailed hawks), white-tailed deer, raccoons, Virginia opossums, beavers, little brown myotis, eastern pipistrelle bats, eastern snapping turtles, and spotted salamanders. Four state-managed WMAs would be traversed by the MXP. One of the WMAs, the Lewis Wetzel WMA, is also part of an IBA. Information on the four WMAs and the IBA is provided in section 4.6.2.1.

Terrestrial vegetation communities include forested land, agricultural land, and open land. Descriptions of these communities are provided in section 4.5.1.1. Upland hardwood forests provide food resources, nesting habitat, and cover for a variety of reptiles, amphibians, mammals, birds, and invertebrates. Agricultural land provides forage and nesting habitat for a variety of songbirds. Open land provides cover as well as foraging and nesting habitat for a variety of species. Wetlands provide cover, forage, and nesting habitat for a variety of reptiles, amphibians, mammals, and birds. Descriptions of wetland habitats are provided in section 4.4.1.1. In addition to terrestrial and wetland habitats, the MXP would cross developed land including roadways, mining operations, and residential, commercial, and industrial lands. Developed lands are generally devoid of native vegetation and provide little wildlife habitat.

4.6.1.1.1 Pipeline Facilities

Wildlife could be impacted by clearing of vegetation; alteration of the landscape from soil disturbance during grading and recontouring; conflicts with vehicles; human presence; activities associated with trenching; increased predation; and edge effects and habitat fragmentation. During construction, more mobile species would be temporarily displaced from the construction right-of-way to similar habitats nearby due to human presence and increases in noise. Noise impacts would typically be temporary and intermittent, as pipeline construction normally occurs in a linear fashion, like a moving assembly line. Less mobile species, such as small mammals, reptiles, amphibians, and nesting birds, may experience direct mortality or permanent displacement. Displacement of species from the project area could lead to increased competition for resources in the areas where they relocate. Some wildlife displaced from the right-of-way would return to the newly disturbed area and adjacent, undisturbed habitats after completion of construction. Soil-dwelling invertebrates would be impacted directly through movement of soil from one place to another, resulting in some mortality and displacement. This could reduce the forage potential for insectivores and other small predators that inhabit the area. The overall impact of these effects, however, would be minor due to the temporary nature of the effects and limited area affected by construction.

Clearing vegetation on the construction right-of-way and extra workspaces would reduce cover, foraging, breeding, and nesting habitat for some wildlife. The degree of impact would depend on the type of habitat affected, the timing of clearing and construction activities, and the rate at which the area recovers after disturbance from construction. Seasonal habitat use for migratory birds is discussed above. The effect to species that rely on open land habitats would be short-term, as Columbia Gas would seed these areas, and vegetation would likely recover within 1 to 3 years after construction. Cleared scrub-shrub vegetation would likely require several years to regain woody composition. The effect of workspace clearing on forest-dwelling wildlife species would be greater than the effect open and scrub-shrub habitat wildlife because forested lands could take decades to return to pre-construction condition, and Columbia Gas would prevent trees from reestablishing on the permanent right-of-way. Columbia Gas would limit the potential for these long-term effects by co-locating the proposed workspace with other existing rights-of-way in certain areas to reduce the amount of additional clearing required.

Trenching activities and the spoil piles generated during construction could create potential traps where wildlife could fall into the pipeline trenches. In addition, spoil piles could create barriers to some less mobile species such as small reptiles and amphibians. Prior to the start of the construction day, Columbia Gas would inspect open trenches for wildlife and return any wildlife found to the appropriate suitable habitat. Columbia Gas would also sequence construction to limit the amount and duration of open trenching (and related spoil piles). Columbia Gas would maintain breaks in the trench and place gaps in the temporary spoil piles to allow wildlife to migrate through the construction corridor. Escape ramps would be installed about every 50 feet within the trench to provide a wildlife exit. Therefore, we conclude that potential trenching and spoil pile impacts on wildlife movement would be minimized to the extent practicable.

Increased predation could occur during construction and operation of the pipeline due to the removal of vegetation and the resulting increase in visibility. While individual mortality rates could increase, the project would not likely have any population-level impact due to these effects.

Interior forests (CFAs) and habitat fragmentation are discussed in detail in section 4.5.4.1. In general, habitat fragmentation and the creation of additional edge habitat has the potential to cause changes in vegetation composition, species distributions, and available foraging and nesting habitat (Rosenberg et al., 1999). Forest habitat (and interior forest habitat in particular) can takes decades to become established compared to forest edges and scrub or herbaceous habitats, which can be established much more rapidly and which are relatively common in the project area. Conversely, the creation of additional edge habitat could benefit certain mammal species, such as white-tailed deer and raccoons, by providing travel corridors and additional forage habitat. Following construction, Columbia Gas would re-seed soils disturbed by project activities to facilitate revegetation which would support the movement of mammals between adjacent forested areas. Project-related CFA impacts on sensitive or managed wildlife habitats and species protected under the MBTA and BGEPA are discussed in sections 4.6.2 and 4.6.3, respectively.

Blasting may be necessary along the pipeline routes, including in sensitive wildlife areas with shallow depth-to-bedrock, as well as interior forest areas. Impacts from blasting would be similar to those described for trenching, in that larger animals would likely be displaced, but that smaller or less mobile individuals could be killed. Columbia Gas has developed a Blasting Plan that would limit potential impacts.

Riparian zones adjacent to waterbodies contain vegetation dependent on moist soils. These habitats are important for water quality and bank stabilization and provide shelter, foraging areas, and nesting habitat for species of birds, mammals, reptiles, amphibians, and invertebrates. Potential impacts on wildlife from the removal of riparian habitat include loss of habitat, reduced habitat quality, increased predation, temporary displacement of individuals, and alteration of migration and breeding habits. Columbia Gas would allow riparian areas to permanently revegetate across the pipeline rights-of-way at each waterbody crossing, except for a 10-foot-wide corridor centered over the pipeline that would be maintained in an herbaceous state, to facilitate bank stabilization, facilitate stream shading, and provide wildlife habitat.

Columbia Gas would minimize impacts on wildlife habitat further by adhering to its ECS, as well as recommendations from wildlife management agencies. Columbia Gas would restore herbaceous and scrub-shrub wetlands within its rights-of-way, and would mitigate for permanent impacts on forested wetlands (see section 4.4.2.1).

4.6.1.1.2 Aboveground Facilities

Three new compressor stations would be constructed for the MXP. A total of 126.8 acres would be utilized during construction of the three facilities, with about 41.2 acres utilized for operation. The permanent footprint at each new compressor station would be converted to developed land. Areas used for TWS at each facility would be restored and maintained as open land or allowed to revert to pre-construction land use cover. We expect wildlife would return to the restored areas post-construction. Wildlife habitat within the permanent footprint, which would be fenced-off, would be limited primarily to supporting songbirds and small mammals.

Three new regulator stations also would be constructed for the MXP, one at the Sherwood Compressor Station and one each at the Ripley and Saunders Creek Regulator Stations. Land use and impacts for the Sherwood Compressor Station (including the regulator station located within) are discussed in the previous paragraph. Each of the new regulator station sites would be permanently converted to developed land uses. Conversion of existing habitats (0.6 acre agricultural land, 5.5 acres forested land, 2.2 acres open land, and less than 0.1 acre of open water) totaling 8.4 acres at the Ripley and Saunders Creek Regulator Station sites would not have a significant impact on wildlife in these areas due to the limited size of these facilities.

The project would require the construction of 10 new pig launcher/receiver facilities. All the new launcher/receiver facilities would be installed within other proposed aboveground facilities; therefore, impacts associated with the installation of these launcher/receivers are included with the impacts reported for the aboveground facilities within which they would be located.

Modifications and upgrades associated with existing Ceredo, approved Lone Oak and pending Elk River Compressor Stations would be completed within the fenced facilities, existing rights-of-way, and previously disturbed areas adjacent to the facilities. Therefore, no new permanent impacts would occur as a result of the modifications at the existing facilities.

4.6.1.1.3 Pipe Yards and Staging Areas

Pipe yards and staging areas would impact 214.4 acres of agricultural land, 94 acres of open land, and almost 45 acres of forest. Following construction, Columbia Gas would restore and reseed any previously vegetated areas affected, except for actively cultivated croplands (unless approved in writing by the landowner). Use of these areas would temporarily displace wildlife species; however, displaced wildlife would likely return to these areas following restoration. Therefore, no permanent impacts on wildlife would result from the use of the pipe yards and staging areas.

4.6.1.1.4 Access Roads

After construction is complete, only 2.2 acres of new access roads would be maintained permanently for project operation. Use of access roads by construction personnel would temporarily displace wildlife species. Additionally, there would be the potential for a minor increase in wildlife fatalities along access roads due to the temporary increase in traffic during construction. After construction, the access roads would be restored in accordance with landowner agreements and applicable permits, or used for permanent access to accommodate facility operations.

4.6.1.1.5 Other Project Impacts

Trash and debris could impact wildlife. Animals could eat contaminated or dangerous items. The presence of trash and debris could encourage certain species to move into areas where humans are working, resulting in potential wildlife-human interaction and conflict. To limit the potential for wildlife attraction, Columbia Gas would maintain construction debris in a neat and orderly manner, remove it from all work areas, and dispose of it in an approved offsite location.

A spill of hazardous materials during construction, such as diesel fuel or oil, or the excavation and exposure of contaminated soil or groundwater could impact wildlife. Columbia Gas would minimize impacts from chemicals or contaminants by adhering to its ECS and SPCC Plan, which include measures such as storing hazardous materials with adequate containment (e.g., containment dikes and impervious liners) and refueling in designated areas at least 100 feet from wetlands and waterbodies (or in accordance with EI guidance). Thus, we conclude the risk of chemical exposure to individual animals would be low, and there would be no risk of population-level impacts on any wildlife species.

Construction traffic on paved and unpaved roads could temporarily disturb birds and other wildlife near the roadways. There could also be an increase in direct mortality of certain wildlife resulting from animal/vehicle collisions. However, due to the use of existing roads when practicable, and the short timeframe of construction, we would expect the overall impacts on wildlife from increased vehicular traffic to be minor.

4.6.1.2 Gulf XPress Project

The GXP would be constructed within the Western Allegheny Plateau, Interior Plateau, Southeastern Plains, and Mississippi Alluvial Plains ecoregions. Wildlife species commonly found throughout the project region include white-tailed deer; black bears; bobcats; foxes;

raccoons; cottontail rabbits; gray squirrels; river otters; beavers; various species of snakes, turtles, and frogs; lizards; raptors; wild turkeys and other game birds; ducks, herons and egrets; songbirds; and many small rodents, bats, and shrews.

Game and non-game wildlife species are regulated and protected through state and federal laws and regulations covering the project areas in Kentucky, Tennessee, and Mississippi. Even though the GXP areas fall within certain ecoregions, the workspaces are primarily located in open, disturbed, and agricultural lands, or existing/pending fenced facilities, and not all the affected habitat types support a diversity of species. Detailed information on upland cover types and GXP impacts are provided in section 4.5.

Construction of the GXP facilities could affect wildlife resources through:

- temporary or permanent wildlife displacement due to human activity, lighting, and noise;
- habitat loss or modification;
- wildlife harassment, injury, or mortality by construction machinery and vehicles.

Wildlife sensitivity to elevated noise, light, and human activity varies by species and individuals, with some species becoming quickly acclimated to human activities. We expect that wildlife present within project areas when construction activities commence would likely be displaced to nearby areas of suitable habitat. Construction of the project would temporarily disturb about 191 acres of wildlife habitat, of which about 109 acres would be restored to preconstruction conditions. Operation of the project facilities could result in the permanent loss of about 80 acres of potential wildlife habitat, although most of these impacts (84 percent) would be on agricultural land. Increased vehicle traffic also may result in the mortality of wildlife species; collisions with motor vehicles are a known cause of mortality for birds, mammals, reptiles, and amphibians.

4.6.2 Sensitive or Managed Wildlife Habitats

4.6.2.1 Mountaineer XPress Project

Four state-managed WMAs would be traversed by the MXP-100 pipeline corridor (see section 4.8.2.2). These areas are managed by the WVDNR for habitat and to provide opportunities for hunting and fishing.

The project would cross the western unit of the Cecil H. Underwood WMA from MP 9.2 to MP 9.4. The WMA is made up of three portions, with the smaller western unit about 5 miles from the main parcel. The WMA is located on 2,072 acres comprising mixed hardwood forest in steep-to-moderate terrain. The forest canopy is dominated by oak-hickory and cove hardwoods. The WMA provides hunting opportunities for deer, grouse, squirrel, and turkey. Fishing is limited to the eastern portion of the WMA on the West Virginia Fork of Fish Creek (WVDNR, 2003a).

The Lewis Wetzel WMA would be crossed from about MP 28.3 to MP 33.4. The WMA is 13,591 acres and is heavily forested. There are two major habitat types found within this WMA: dry deciduous forest and moist deciduous forest. The dry deciduous forest areas are dominated by an oak-hickory community. Moist hardwood forests occur within sheltered topographic areas such as within the interior concavity of a ridge formation. Here, hardwood or hemlock-hardwood

forests form within the sheltered topographic positions. This WMA is also part of an IBA. IBAs represent a network of important sites needed to ensure the survival of global bird populations and are identified using internationally agreed upon criteria (BirdLife International, 2015). The WVDNR owns and controls surface land at Lewis Wetzel, but mineral rights are largely controlled by private individuals. Thus, numerous natural gas wells and pipelines are in the WMA. Rights-of-way that bisect the WMA provide linear shrubland habitat scattered throughout the area. The WMA is managed for deer, grouse, raccoon, squirrel, and turkey hunting, and is listed as an IBA for cerulean warblers (*Dendroica cerulea*) in West Virginia (National Audubon Society, 2013).

The cerulean warbler is included as a Priority 1 species in the West Virginia State Wildlife Action Plan. Priority 1 species are those 'Species of Greatest Conservation Need' (SGCN) within West Virginia (WVDNR, 2015d). Cerulean warbler populations have steadily declined at a rate of about 3 percent per year since 1966. In 2006, populations were estimated to be approximately 400,000 (USFWS, 2017a). The MXP falls within Bird Conservation Region (BCR) 28, where approximately 80 percent of the remaining population of cerulean warblers breed. While BCR 28 is approximately 103,869,815 acres in size (NABCI, 2017), breeding areas for the cerulean warbler have been impacted by clearing of over 50 percent of historical forests. Suitable breeding habitat for cerulean warblers includes structurally diverse canopies with a large enough forest patch size to reduce the risk of nest parasitism and predation (USFWS, 2017a). The minimum isolated forest patch size for detection of the cerulean warbler is 341 acres (Robbins et al., 1989). Although the cerulean warbler makes use of canopy gaps and can be found using thin forest edges and small perforated areas near narrow roads or rights-of-way, they are less abundant near abrupt forest edges, and in West Virginia have been shown to avoid edges of powerlines with right-of-ways that are around 75 feet wide (Wood et al., 2013).

The Lewis Wetzel WMA includes 9,206 acres (1 block) of large CFA, 338 acres (1 block) of medium CFA, and 900 acres of edge areas. Edge areas consist of areas mapped as edges, perforations, or open areas adjacent to CFAs. The amount of suitable habitat for the cerulean warbler is estimated to be 9,544 acres (large CFA plus medium CFA). The methodology used to identify CFA and associated edges is provided in section 4.5.4.1. The MXP components within the Lewis Wetzel WMA would include a 125-foot-wide pipeline construction corridor and the use of various existing access roads. The construction of the MXP would result in the creation of 8,560 acres (2 blocks) of large CFA, 580 acres (4 blocks) of medium CFA, 129 acres (4 blocks) of small CFA, and 1,077 acres of edge areas. The total amount of suitable habitat for the cerulean warbler in the Lewis Wetzel WMA in post-construction conditions is estimated to be 9,140 acres (large CFA plus medium CFA), which is approximately a 4.3 percent decrease. There would be similar effects to cerulean warbler habitat outside the Lewis Wetzel WMA, when large and medium CFAs are converted to small CFA and/or edge forest habitat. Figure 4.6-1 provides a comparison map of pre- and post-construction forest impacts within the Lewis Wetzel WMA.

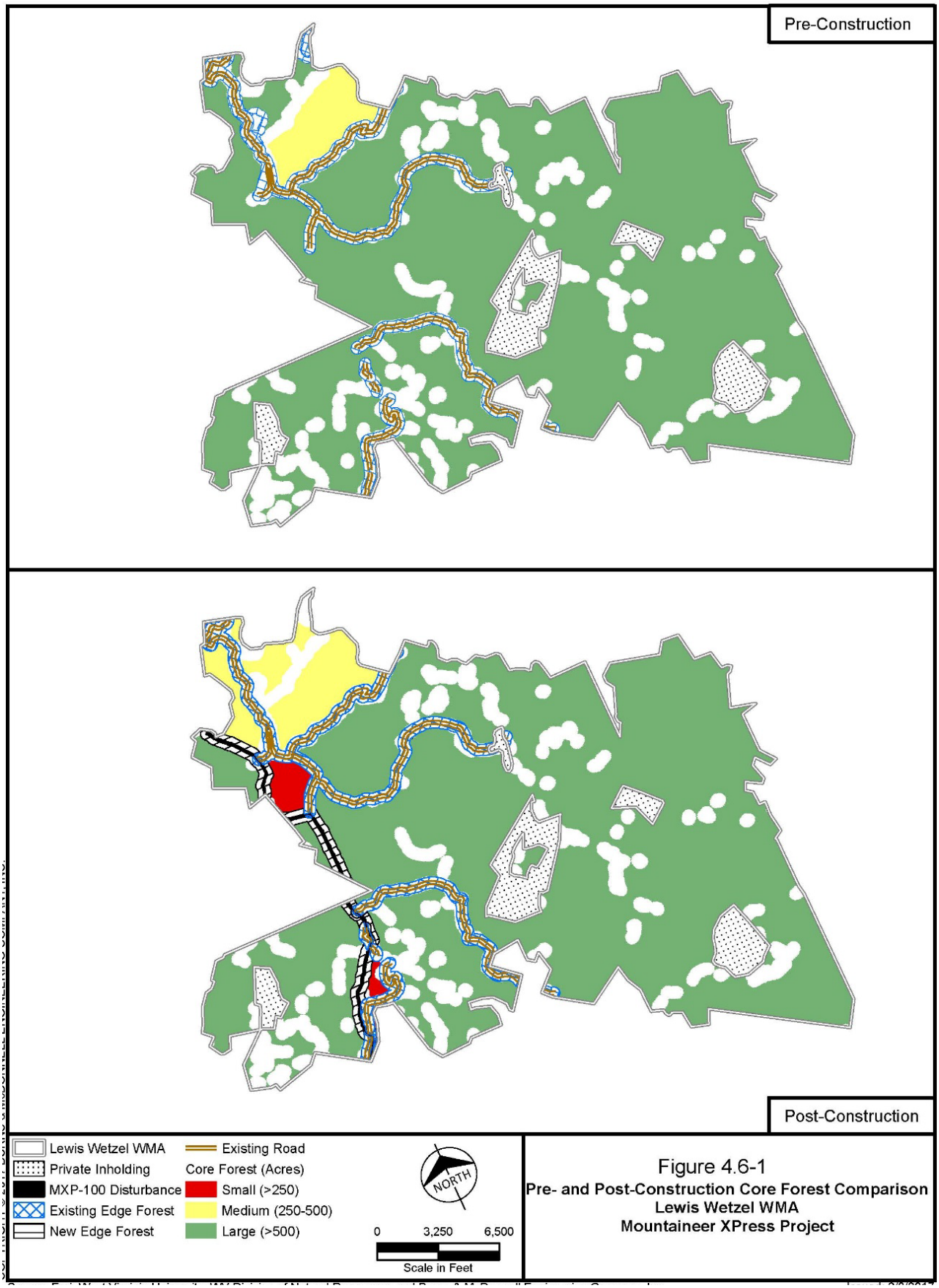


Figure 4.6-1
Pre- and Post-Construction Core Forest Comparison
Lewis Wetzel WMA
Mountaineer XPress Project

We concluded in section 4.5 that impacts on upland forest habitat would be significant. Likewise, the reduction to the cerulean warbler habitat and the existing CFA within 10 miles of the MXP-100 corridor, as a direct result of the MXP construction, would be considered significant. This is based on the designation of the cerulean warbler as a Priority 1 species in West Virginia and the considerable reduction in an already limited amount of breeding habitat available.

The 2,587-acre Frozen Camp WMA is crossed from about MP 113.2 to MP 114.4. The WMA is hilly with wooded slopes, some open bottomland, and a few open ridge tops. The area is managed for deer, grouse, rabbit, squirrel, turkey, and waterfowl. Additionally, lakes and streams are managed for largemouth bass, bluegill, and channel catfish (WVDNR, 2003b).

The project would also cross the O'Brien Lake WMA between about MP 120.4 to MP 121.5. This area includes 217 acres of hilly, forested woodlands and is managed for biodiversity and public recreational use with fishing and hunting opportunities (WVDNR, 2003b).

Impacts on Cecil H. Underwood, Frozen Camp, and O'Brien Lake WMAs by construction and operation of the MXP would be comparable to impacts within other portions of the MXP-100 route as discussed in previous sections. Disturbances to natural habitats due to construction noise and the presence of equipment, machinery, vehicles, and workers would temporarily deter wildlife from the immediate construction areas. The temporary displacement of wildlife could negatively affect hunters using the area if active construction occurs during hunting seasons.

4.6.2.2 Gulf XPress Project

None of the proposed GXP components are within any sensitive or managed wildlife habitats.

4.6.3 Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act

Migratory birds are species that nest in the United States and Canada during the summer, and then migrate south to the tropical regions of Mexico, Central and South America, and the Caribbean for the non-breeding season. Migratory birds are protected under the MBTA (16 USC 703-711). The MBTA, as amended, prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, or nests. Bald and golden eagles are additionally protected under the BGEPA (16 USC 668-668d).

EO 13186 (66 FR 3853) directs federal agencies to identify where unintentional take is likely to have a measurable negative effect to migratory bird populations and to avoid or minimize adverse impacts on migratory birds through enhanced collaboration with the USFWS and to restore and enhance migratory bird habitat. The EO states that emphasis should be placed on species of concern, priority habitats, and key risk factors, and that particular focus should be given to addressing population-level impacts. If a proposed project or action were to occur in areas where nesting, feeding, or roosting eagles are present, then project proponents would need to take additional conservation measures to achieve compliance with the BGEPA. Additionally, the USFWS has published National Bald Eagle Management Guidelines (National Guidelines; USFWS, 2007) intended to help minimize impacts on bald eagles, particularly where impacts constitute "disturbance," which is prohibited under the BGEPA.

As discussed in section 1.5.2, the USFWS and the Commission entered into an MBTA MOU in 2011. This voluntary memorandum focuses on avoiding or minimizing adverse impacts on migratory birds, as well as strengthening conservation through enhanced collaboration between the two agencies. It does not waive legal requirements under the MBTA, BGEPA, ESA, or any other statutes, and does not authorize the take of migratory birds.

In response to the 1998 amendment to the Fish and Wildlife Conservation Act, the USFWS established a list of Birds of Conservation Concern (BCC) that, without conservation action, were expected to become candidate species for listing under the ESA (USFWS, 2008). Although the MBTA provides protection for all migratory birds and their nests, it is standard practice, as noted in the MBTA MOU, to use the BCC list when evaluating the potential impact of a project on migratory birds. The BCC lists species of concern at national, USFWS region, and BCR geographic scales. BCRs are regions that encompass landscapes having similar bird communities, habitats, and resource issues. They are the fundamental biological units through which landscape-scale bird conservation is undertaken (NABCI, 2016). A total of 67 BCRs have been identified in North America (ACJV, 2016).

4.6.3.1 Mountaineer XPress Project

The MXP, sited entirely in West Virginia, falls within the BCR 28. Table 4.6-1 lists BCCs for Region 28. The *2015 West Virginia State Wildlife Action Plan* (SWAP) was reviewed to determine if any of the BCCs were also identified as SGCN and assigned a Priority 1 status. Priority 1 species are the focus of conservation activities. The 2015 SWAP was prepared by WVDNR to establish comprehensive goals over a 10-year period that will assist in the conservation of West Virginia's biological diversity. There are four key goals set forth by the SWAP:

- halt the decline of at-risk species which would reduce the number of species being listed as federally threatened or endangered;
- assist with the recovery of federally listed species;
- keep the common species common (i.e., keep them off of any rare or protected species lists); and,
- conserve the full array of habitat types and biological diversity within West Virginia (WVDNR, 2015b).

Table 4.6-1
Birds of Conservation Concern in Bird Conservation Region 28 (Appalachian Region)

Common Name (*Scientific Name*)	Preferred Breeding Habitat	Individuals Observed in Project Area	Priority 1 Species	Additional Breeding/Habitat Notes
Bald eagle (*Haliaeetus leucocephalus*)	Forested areas adjacent to large bodies of water	No	No	Breeding/nesting occurs December through May
Black-billed cuckoo (*Coccyzus erythropthalmus*)	Prefer large tracts of forest, woodlands, and thickets	Yes	Yes	Tends to favor younger forests and dense, scruffy thickets. Orchards/open woodlands. Nests in early May. May lay eggs in nests of other bird species. Egg-laying to fledging = 17 days. Young leave nest at 6-7 days; can fly at 2 weeks. Most eggs laid 5/25-6/15. Most fledglings out by mid-July.
Black-capped chickadee (*Poecile atricapillus*)	Deciduous and mixed forests, open woods, and disturbed areas	Yes	No	Habitat generalist. Egg-laying to fledging = 25+ days. Eggs in May, fledge in June. One brood.
Blue-winged warbler (*Vermivora cyanoptera*)	Early to mid-successional habitats at forest/field edges	Yes	No	Breeds at forest/field edges. Nests on ground. Eggs in late May, young fledged by late June.
Cerulean warbler (*Setophaga cerulea*)	Tall deciduous forests with open understory	Yes	Yes	Most nesting in May, eggs first half of June, young fledged by mid-July.
Fox sparrow (*Passerella iliaca*) **a**/	Scrubby, brushy woods and forest edges	No	No	Breeds in dense thickets. Non-breeding in West Virginia.
Golden-winged warbler (*Vermivora chrysoptera*)	Tangled, shrubby habitats	No	Yes	Breeding occurs in tangled, shrubby habitats, but move into mature forests immediately after fledging.
Henslow's Sparrow (*Ammodramus henslowii*)	Grasslands	No	Yes	Grasslands. Eggs 5/10-5/25. Fledglings out late June.
Kentucky warbler (*Oporornis formosus*)	Deciduous forests	Yes	Yes	Nests on ground. Nesting in May, eggs in early June, young fledged late June.
Least bittern (*Ixobrychus exilis*)	Freshwater marshes with tall emergent vegetation	No	Yes	Eggs 5/25-6/15, young out in June.
Louisiana waterthrush (*Parkesia motacilla*)	Riparian forests, along streams	Yes	Yes	Forest streams. Breeds along gravel-bottomed streams flowing through hilly, forested areas. Nests in shallow hollow or cavity on stream bank, under fallen log, or within roots of upturned tree. Eggs in May, young fledge in June.

Table 4.6-1
Birds of Conservation Concern in Bird Conservation Region 28 (Appalachian Region)

Common Name (*Scientific Name*)	Preferred Breeding Habitat	Individuals Observed in Project Area	Priority 1 Species	Additional Breeding/Habitat Notes
Northern saw-whet owl (*Aegolius acadicus*)	Mature forests with open understory	No	Yes	Breeds in extensive forests; prefer mature forest with open understory, deciduous trees for nesting, dense conifers for roosting, with riverside habitat nearby. Incubation about 26 days; nesting about 30 days. Eggs mid-March. Young leave late May.
Peregrine Falcon (*Falco peregrinus)*	High ledges of rocks	No	Yes	Nests in a scrape on the ground on a cliff ledge. Nesting April/May, fledging in June.
Pied-billed grebe (*Podilymbus podiceps*)	Wetlands and lake edges	No	No	Most eggs second half of April; young in 23 days (mid-May); fledge in mid-July.
Prairie warbler (*Setophaga discolor*)	Shrub habitats	Yes	Yes	Scrubby fields and forests; regenerating forests, open fields, Christmas tree farms. Nests in shrubs. Nesting prevalent in May (Ohio); most egg dates 5/25-6/14. Most fledglings out by second half of June. Two broods; fledglings in early August.
Red crossbill (*Loxia curvirostra*) **a**/	Mature coniferous forests	No	No	Nomadic movements driven by variable nature of cone production. Species is scarce in project area.
Red-headed woodpecker (*Melanerpes erythrocephalus*)	Deciduous forests, recently cleared areas, forest edges	No	No	Nests in cavities. Egg-laying to fledging = 40 days. Nest construction May/June. Fledglings appear in July.
Rusty blackbird (*Euphagus carolinus*) **a**/	Forested wetlands	Yes	No	Non-breeding in West Virginia.
Short-eared owl (*Asio flammeus*) **a**/	Open areas, such as fields and meadows	No	No	Non-breeding in West Virginia.
Swainson's warbler (*Limnothlypis swainsonii*)	Floodplain forests with heavy underbrush	No	Yes	Nests in shrubs. May-June.
Upland sandpiper (*Bartramia longicauda*)	Grasslands	No	Yes	Most clutches in May; young early June.
Willow Flycatcher (*Empidonax traillii*)	Moist shrubby areas	Yes	No	Nests low in bushes or small trees, often close to water. Egg laying to fledging = 29 days. Nesting late May to late June; fledging by mid-July.

Table 4.6-1
Birds of Conservation Concern in Bird Conservation Region 28 (Appalachian Region)

Common Name (*Scientific Name*)	Preferred Breeding Habitat	Individuals Observed in Project Area	Priority 1 Species	Additional Breeding/Habitat Notes
Wood thrush (*Hylocichla mustelina*)	Mature deciduous or mixed forests	Yes	Yes	Nests in trees. Egg-laying to fledging = 27 days. Two clutches. Second half of May and late June; fledglings late June and early August, respectively.
Worm eating warbler (*Helmitheros vermivorum*)	Mature deciduous forests	Yes	Yes	Nests on ground. Young leave nest at 8-10 days. Most clutches mid-May through early June. Fledged through mid-July.
Whip-poor-will (*Antrostomus vociferus*)	Dry deciduous or evergreen deciduous forest with little underbrush and close to open areas	No	No	Lays eggs directly on leaf litter of forest floor. Egg laying to fledging = 29 days. Two clutches. Nocturnal.
Yellow-bellied sapsucker (*Sphyrapicus varius*) **a**/	Young forest and edge habitat	No	No	Winter habitat includes hickory or pine and oak forests.

Sources: USFWS, 2016d; Cornell Lab of Ornithology, 2016b; USFWS, 2008.
a Species does not breed in state; wintering or migrating populations only.

The BCCs within BCR 28 that are also Priority 1 species include the black-billed cuckoo, cerulean warbler, golden-winged warbler, Henslow's sparrow, Kentucky warbler, least bittern, Louisiana waterthrush, northern saw-whet owl, peregrine falcon, prairie warbler, Swainson's warbler, upland sandpiper, wood thrush, and worm-eating warbler.

The majority of the BCCs are habitat generalists and/or do not require CFA. These birds would likely not be significantly impacted by the fragmentation and forest edges created by the MXP. Eight of the birds (cerulean warbler, Kentucky warbler, Louisiana waterthrush, wood thrush, golden-winged warbler, northern saw-whet owl, worm eating warbler, whip-poor-will) are forest dependent and require forests for breeding, nesting, or overwintering. Of these eight forest-dependent birds, five (cerulean warbler, Kentucky warbler, Louisiana waterthrush, wood thrush, and worm eating warbler) were noted as being observed by Columbia Gas during biological surveys. Those birds which are forest-dependent would be most impacted by the MXP. A discussion of the cerulean warble is provided in section 4.6.2.1. The remainder of these species require less contiguous acreage of forest habitat than the cerulean warbler. The Louisiana waterthrush requires 61 contiguous acres and the worm eating warbler requires 52 acres (Robbins et al., 1989). Kentucky warbler requires 80 acres (Robbins, 1979) and wood thrush requires 200 acres (Rosenberg et al., 2003). Forest acreage requirement information was not found for the golden wing warbler, northern saw-whet owl, or the whip-poor-will. Based on the preferences of those species where forest acreage requirements could be identified, conversions of large and medium CFA to small CFA is unlikely to result in a significant impact on these species.

Additionally, it is unlikely that newly created forest edges (12,228 acres) would significantly impact these species (2 percent decrease).

The primary migratory bird nesting season (for non-raptors) generally begins in early April and extends through August in West Virginia. The nesting season normally begins with courtship behaviors, followed by nest building and egg-laying. Bald eagles begin nesting earlier, but according to Columbia Gas, no nests have been documented in counties crossed by the MXP. In 2005 there were 19 known breeding pairs in West Virginia, however, as bald eagle numbers continue to rise the number of breeding pairs is likely higher (WVDNR, 2006). Golden eagles may migrate into West Virginia during the winter season (The Cornell Lab of Ornithology, 2016a). Although individual raptors (and some other migratory bird species) may nest outside of this primary window, the period during and after egg-laying is when most MBTA-related impacts occur, as eggs and unfledged young that cannot move are in nests.

Noise and nearby construction activities during migratory bird courtship and breeding periods could result in a decrease in reproduction and increase in nest abandonment. Columbia Gas intends to initiate, and complete (if possible), vegetation clearing within the rights-of-way before the primary nesting season begins in April. Nonetheless, potential delays (e.g., due to weather, receipt of permits) may result in some clearing continuing into May. Vegetation clearing activities that occur in May are not as likely to affect active nests containing eggs or unfledged young, as many nesting pairs are expected not to have reached this stage in the nesting process. Additionally, the MXP is in higher-elevation mountainous areas, where the start of the nesting season is sometimes delayed compared to lower-elevation regions in the state, further reducing the likelihood of active nests during early May (McClain, 2001). Columbia Gas would attempt to complete clearing vegetation in forested areas before the nesting season begins in April; however, if limited vegetation clearing activities continue into May, there could be some risk of affecting active nests of migratory birds.

Maintenance of the permanent rights-of-way would create smaller contiguous tracts of forest habitat and might reduce available feeding and nesting habitat for certain bird species, such as woodland warblers. Habitat fragmentation also can result in increased predation and can alter wildlife use of these forests, in particular by habitat-specialist species, such as the cerulean warbler (Graham, 2002). However, corridor widths and vegetation characteristics can have varying effects to different species, and the creation of additional edge habitat could benefit certain species such as Bachman's sparrow by providing travel corridors and additional forage habitat (Dunning et al., 1995). Nest parasites, such as the brown-headed cowbird, which lay their eggs in the nests of other species also have been shown to benefit from fragmented forests (Wilcove, 1985).

Columbia Gas has consulted with the USFWS and WVDNR to implement appropriate steps to avoid or minimize the potential for the unintentional take of migratory birds during construction and operation of the proposed facilities. Implementation of Columbia Gas' ECS construction and operational practices (e.g., using the minimum land required for safe and efficient construction, confining disturbances to construction work areas, minimizing erosion, and enhancing revegetation after completing construction) would reduce the potential for impacts on migratory birds. Mitigation required for wetland impacts under CWA section 404, particularly mitigation for the conversion of forested wetlands to other cover types, would provide habitat mitigation for birds that utilize wetland habitats. In addition, timing restrictions on clearing as

well as other avoidance and mitigation measures (AMMs) that would be implemented to address impacts on federally listed species such as the Indiana bat and northern long-eared bat (NLEB) (e.g., restricting right-of-way clearing and trimming to periods when bats are not raising young; retaining snags, dead and dying trees in maternity areas; and limiting aerial applications of herbicides from April 15 to August 15) also would reduce impacts on migratory bird species.

With the development of a Migratory Bird Plan in addition to the ECS and AMM, Columbia Gas could adequately reduce potential impacts on migratory birds, which would be consistent with the goals of EO 13186 and the MBTA MOU. Through consultations with the USFWS and WVDNR, Columbia Gas would identify the appropriate steps to avoid and minimize the potential for the unintentional take of migratory birds during construction and operation of the proposed facilities. However, Columbia Gas has not finalized this consultation or plan development. Therefore, **we recommend:**

- **Prior to the end of the draft EIS comment period, Columbia Gas should file an update to the Secretary regarding the status of MBTA consultations with the USFWS and WVDNR regarding the development of a Migratory Bird Plan (and provide a draft copy of the plan, if available); and identify special measures, if any, that Columbia Gas would implement to reduce impacts on cerulean warbler habitat.**

4.6.3.2 Gulf XPress Project

In compliance with the MBTA MOU, Columbia Gulf consulted with the USFWS field offices in Kentucky, Tennessee, and Mississippi to identify BCC species in each region where the GXP would have impacts.

There are 29 bird species listed as breeding BCCs in the BCRs where the project is located, which includes Region 28, Appalachian Mountains; Region 24, Central Hardwoods; Region 27, Southeastern Coastal Plain; and Region 26, Mississippi Alluvial Valley. Based on reviews of the BCR boundaries, the Morehead Compressor Station would be in the Appalachian Mountains Region; the Paint Lick, Goodluck, Cane Ridge, and Clifton Junction Compressor Stations would be in the Central Hardwoods Region; the New Albany Compressor Station would be in the Southeastern Coastal Plain Region; and the Holcomb Compressor Station would be mostly within the Mississippi Alluvial Valley Region and partially within the Southeastern Coastal Plan Region (Bird Studies Canada and NACBI, 2014). No project areas are within an IBA; thus no impacts on IBAs are expected.

Bald eagles have potential to occur in all areas affected by the GXP. Golden eagles are not known to occur in Tennessee or Mississippi, but may migrate into Kentucky during the winter season (The Cornell Lab of Ornithology, 2016a).

No bald eagle nests or eagles were identified in the project areas or along public roads near project areas in Kentucky. Additionally, the Kentucky Department of Fish and Wildlife Resources (KDFWR) did not identify golden eagle nests or documented occurrences in the project areas during review of the project. Based on the results of biological field surveys conducted by Columbia Gulf and KDFWR review, we believe that construction and operation of the project

would comply with the National Guidelines (USFWS, 2007) and would not affect the bald eagle in Kentucky.

Information Planning and Conservation System (IPaC) data indicate that bald eagles may occur in the project areas in Tennessee. No bald eagle nests or eagles were identified at the project sites or along public roads near the project sites during field surveys. Additionally, the TDEC maintains records of known bald eagle nest locations in the state and confirmed that no bald eagle nests are documented within the project counties (Davidson and Williamson Counties). Based on the results of these surveys and TDEC review, we believe that construction and operation of the project would comply with the National Guidelines (USFWS, 2007) and not affect the bald eagle in Tennessee.

IPaC data indicate that bald eagles may occur in the project areas in Mississippi. No bald eagle nests or eagles were identified at the project sites or along public roads near the project sites during biological field surveys. Additionally, the Mississippi Department of Wildlife, Fish, and Parks (MDWFP) maintains records of known bald eagle nest locations in the state, and no bald eagle nests are documented within the project counties (Union and Grenada Counties). Based on the results of these surveys and MDWFP review, we believe that construction and operation of the project would comply with the National Guidelines (USFWS, 2007) and not affect the bald eagle in Mississippi.

Noise and construction activities during migratory bird courtship and breeding periods could result in reduced reproduction and increased nest abandonment; however, the project is not anticipated to have a significant impact on migratory birds, including BCC. Although most workspaces would be within open habitats, tree clearing would be required in certain areas. Columbia Gulf would implement tree-clearing timing restrictions related to protected bat species, which also would protect migratory birds and habitat. In correspondence from the USFWS Ecological Services Field Offices in Kentucky, Tennessee, and Mississippi, the agency concurred with Columbia Gulf's findings that no migratory birds would be adversely affected by GXP work activities. We agree with these findings.

4.6.4 Fisheries and Other Aquatic Resources

4.6.4.1 Mountaineer XPress Project

The MXP would cross freshwater waterbodies, including perennial, intermittent, and ephemeral streams. No marine or estuarine waterbodies would be crossed or affected by the project. Refer to section 4.3 for additional information regarding waterbodies; table 4.3-1 lists the waterbodies crossed by the MXP.

Title 47 of the WVCSR, Series 2, outlines water use, lists anti-degradation policies, and establishes Water Use Categories A through E for waters of West Virginia. Regarding fisheries, waterbodies are classified within Water Use Category B: Propagation and Maintenance of Fish and Other Aquatic Life. Within this category, fisheries are classified as warm water fishery streams (B1) or trout waters (B2) (WVCSR §47-2-6, 2014). West Virginia also designates three tiers of anti-degradation protection for state waters (see section 4.3.2.2.1). Tier 1 streams are those listed on the state's 303(d) list of impaired waterbodies and are maintained and protected for their

existing uses and the water quality conditions necessary to support such uses. Tier 2 protection covers HQWs. These are waterbodies where the level of water quality exceeds levels necessary to support recreation and wildlife and the propagation and maintenance of fish and other aquatic life. Waters placed in the Tier 3 category are known as Outstanding National Resource Waters (ORWs). These include waters in Federal Wilderness Areas, specifically designated federal waters, and HQWs or naturally reproducing trout streams in state parks, national parks, and national forests (WVCSR §47-2-4, 2014). West Virginia state fisheries classifications are further detailed in table 4.6-2.

Table 4.6-2
Mountaineer XPress Project West Virginia Waterbody and Fisheries Classifications

Designation	Classification	Description	Designating Agency
Warm Water Fishery	B1	Streams or stream segments that contain populations of warm water aquatic life. Streams are managed for or currently support warm water fish species.	WVDNR
Trout Water	B2	Streams or stream segments that sustain year-round trout populations. Excluded are those streams or stream segments which receive annual stockings of trout but which do not support year-round trout populations.	WVDNR
High Quality Water	HQW **a**/	Streams listed in the West Virginia Natural Stream Preservation Act, listed as HQW by WVDNR, or receive annual stockings of trout but do not support year-round trout populations.	WVDEP, WVDNR
Outstanding National Resource Water	ORW	Streams located within a Federal Wilderness Area, listed as a Wild and Scenic River, or located within a state or national park or forest and are considered high quality waters or naturally reproducing trout streams.	WVDEP

Sources: WVCSR, 2014, and WVDEP, 2014.
a Streams listed as HQW by the WVDNR include streams stocked with trout or containing native trout populations, and warm water streams over 5 miles in length with desirable fish populations and public utilization (WVDNR, 2001).

In West Virginia, 947 streams are classified as HQW, and 132 of these are stocked with trout. While many tributaries are not classified as HQW, they may still be valuable, and impacts on a tributary of a HQW stream could adversely affect the main stream (WVDNR, 2001). The project pipelines would result in 108 crossings of B1 fisheries and 36 crossings of HQWs. HQWs crossed by the project are summarized in table 4.6-3. The project would not impact any B2 coldwater fisheries or ORW.

4.6.4.1.1 Waterbody Crossings

Waterbody crossings would be constructed in accordance with all federal, state, and local permits and the ECS. Columbia Gas proposes to cross most HQW streams using dry-ditch crossing methods (see section 2.4.4.2). Only three HQW streams are proposed for open-cut/wet crossings: Thirteenmile Creek (an intermittent stream at MP 129.3 in Jackson County), Five and Twenty Mile Creek (an intermittent stream at MP 152.4 in Putnam County), and Meathouse Fork Back Channel (an intermittent stream at MP 5.8 on MXP Line 200 in Doddridge County). Table 4.6-3 lists the HQWs that would be crossed by the MXP centerline and the proposed crossing method.

Table 4.6-3
High Quality Waters Crossed by the MXP Centerline

County a/	Waterbody Name	MP	Flow Type	Crossing Method
MXP-100				
Marshall	Fish Creek	7.1	Perennial	Dry-ditch
Wetzel	Little Fishing Creek	18.3	Perennial	Dry-ditch
	Fishing Creek	24.5	Perennial	Dry-ditch
Tyler	Indian Creek	34.9	Perennial	Dry-ditch
Doddridge	McElroy Creek	34.4	Perennial	Dry-ditch
	Flint Run	44.0	Perennial	Dry-ditch
	Buckeye Creek	48.7	Perennial	Dry-ditch
	Meathouse Fork b/	50.5	Perennial	Dry-ditch
	Meathouse Fork b/	51.8	Perennial	Dry-ditch
	Bluestone Creek	54.3	Perennial	NA c/
	South Fork Hughes River	59.6	Perennial	Dry-ditch
Ritchie	South Fork Hughes River	67.3	Perennial	Dry-ditch
	Slab Creek	71.4	Perennial	Dry-ditch
	South Fork Hughes River	72.2	Perennial	Dry-ditch
	South Fork Hughes River	72.5	Perennial	Dry-ditch
	South Fork Hughes River	76.9	Perennial	Dry-ditch
	Leatherbark Creek	78.9	Perennial	Dry-ditch
Wirt	Straight Creek	87.5	Perennial	Dry-ditch
	Little Kanawha River	94.8	Perennial	Dry-ditch
	Spring Creek	96.5	Perennial	Dry-ditch
	Spring Creek	96.9	Perennial	Dry-ditch
	Spring Creek	97.3	Perennial	Dry-ditch
Roane	Middle Fork Reedy Creek	104.5	Perennial	Dry-ditch
Jackson	Little Mill Creek	113.3	Perennial	Dry-ditch
	Elk Fork	118.6	Perennial	Dry-ditch
	Tug Fork	121.8	Perennial	Dry-ditch
	Thirteenmile Creek	129.3	Intermittent	Open-cut/wet trench
Putnam	Eighteenmile Creek	138.4	Perennial	Dry-ditch
	Eighteenmile Creek	138.9	Perennial	Dry-ditch
	Eighteenmile Creek	140.0	Perennial	Dry-ditch
	Kanawha River	147.0	Perennial	HDD
	Five and Twenty Mile Creek	152.4	Intermittent	Open-cut/wet trench
Cabell	Mud River	163.4	Perennial	Dry-ditch
MXP-200				
Doddridge	Meathouse Fork	1.1	Perennial	Dry-ditch
	Toms Fork	3.7	Perennial	Dry-ditch
	Meathouse Fork	5.9	Perennial	Dry-ditch
	Meathouse Fork - Back Channel	5.8	Ephemeral	Open-cut/wet trench

a No HQWs are within the Sherwood Compressor Station or within the SM80 Line or SM80 Loop Line Replacement workspaces.

b Meathouse Fork would be crossed by the MXP-100 pipeline inbound into Sherwood Compressor and Regulator Station, MXP-100 outbound from the station, and MXP-200 outbound from the station. All three crossings would be installed concurrently and are therefore counted as 1 crossing.

c Waterbody is within the construction workspace but not crossed by the pipeline centerline.

Temporary impacts on fisheries and other aquatic resources, such as macroinvertebrates, from pipeline crossings would result from stream bank disturbance, increased sedimentation, waterbody turbidity (upon the return of flow to the stream following restoration), reduction in shading and cover, and modification of stream flow. Additionally, macroinvertebrates within the area of disturbance at an open-cut/wet crossing could be crushed or buried. Further information regarding Columbia Gas' coordination with the USFWS and WVDNR on fisheries and aquatic resources with special designations is provided in section 4.7. Studies have found that instream disturbance from pipeline crossings and similar projects does not have a significant long-term effect to fish and benthic communities (Winesett and Cook, 1999; Wellman Combs, and Cook, 1999; Anderson et al., 1995). Potential short-term effects of stream crossing techniques that adversely affect vegetation, benthic invertebrates, and/or fish often involve water quality parameters such as total suspended solids (TSS) and turbidity. Varying levels of TSS and turbidity occur naturally in streams, and instream organisms are adapted to withstand the natural range of such conditions. During the pipeline construction process, however, additional sediment enters a waterbody as the substrate is disturbed. Suspended solids and turbidity in levels beyond the tolerable range for floral and faunal communities can choke organisms, depriving them of food, oxygen, and light, and can cause abrasive damage to essential organs and tissues (James and Evison, 1979; Wilber, 1983; NCSU, 2001). These temporary impacts also could disrupt food sources and predator/prey interactions, impact fish passage, increase ambient water temperature, degrade spawning and nursery habitat, smother demersal eggs, and temporarily reduce reproduction potential. Aquatic invertebrates and macroinvertebrates such as caddisflies, dragonflies, and damselflies, which are preyed upon by fishes, could be impacted by direct mortality from construction, increased sedimentation filling interstitial spaces of streambed substrates, and reduced reproduction potential.

All stream crossing construction techniques result in temporary spikes of TSS and turbidity, but elevated levels of these parameters resulting from conventional crossing activities usually are local in extent and return to normal ranges within a short time, usually 24 hours. Studies show that increased TSS levels resulting from open-cut crossings drop rapidly as downstream distances increase. These studies note significant reductions within 1 day following cessation of the stream crossing activities (Trow Engineering Consultants, 1996). Furthermore, aquatic species displaced by construction activities are expected to rapidly recolonize the relatively small impacted areas (Matthaei et al., 1996; McCabe and Gotelli 2000).

Columbia Gas would adhere to the BMPs described in the ECS to mitigate impacts on aquatic resources, including the use of erosion and sediment control measures; use of temporary equipment bridges to transport construction equipment; and limiting instream equipment to that required to construct the crossing. Equipment bridges would be designed to avoid or minimize impacts on channel bottoms and banks, allow normal flow, and withstand maximum expected flows at each location. Waterbodies crossed by access roads would be stabilized with culverts and clean rock fill or bridge structures, in compliance with federal and state permit requirements.

Columbia Gas would not use permanent fill at any waterbody for pipeline activities. Where waterbodies are within the construction right-of-way, but not directly crossed by the pipeline, impacts would be limited to installation of equipment crossings such as bridges or clearing of vegetation adjacent to the stream. Columbia Gas would maintain a minimum 15-foot undisturbed vegetation buffer between construction activities and the waterbody in most areas where the

corridor parallels the waterbody (see section 2.4). All spoil from minor and intermediate waterbody crossings would be placed in the construction right-of-way at least 10 feet from the water's edge or in extra work areas.

4.6.4.1.2 Blasting

Waterbodies with a shallow depth to bedrock along the pipeline corridor are anticipated; however, blasting in streams would be conducted only when traditional means of trenching (excavators, rock hammers, etc.) are deemed impractical due to the time required to complete excavation using these techniques. Instream blasting, if required to excavate the pipeline trench, could have acoustic impacts on fisheries resources. Sound pressure waves can change fish behavior or injure/kill fish by rupturing swim bladders or causing internal hemorrhaging (Hastings and Popper, 2005).

Stream crossing locations where blasting is required would be identified during construction based on site-specific conditions. Blasting may occur up to 1 week prior to initiating excavation of the waterbody, where approved by the applicable agencies. If required, blasting would primarily occur under dry conditions (i.e., dry intermittent/ephemeral waterbodies or waterbodies being crossed using a dry-ditch crossing technique), thereby avoiding impacts on fisheries by isolating the work area from stream flow. If blasting is necessary in a flowing waterbody, the use of controlled blasting techniques (where small, localized detonations are utilized) would avoid or minimize the impacts of blasting and limit rock fracture to the immediate vicinity of these activities. Immediately following blasting, Columbia Gas would remove any shot rock impeding stream flow.

Because of the potential for blasting, Columbia Gas has developed a project-specific Blasting Plan. Columbia Gas would attempt to minimize disturbance associated with blasting by employing BMPs described in the Blasting Plan, which includes consulting with regulatory agencies to determine appropriate protective measures. If blasting is required in waterbodies containing sensitive species, Columbia Gas would consult with the appropriate federal and state agencies to determine what, if any, additional mitigation measures would be necessary.

4.6.4.1.3 Hydrostatic Test Water

To confirm the integrity of the pipelines, hydrostatic testing would be conducted in accordance with the requirements of the USDOT pipeline safety regulations (49 CFR 192), Columbia Gas testing specifications, and applicable permit conditions. Hydrostatic testing involves filling the pipeline with water, pressurizing the water, and checking for pressure losses due to leaks. Test water would typically be withdrawn from water sources either crossed by or near the pipeline facilities in accordance with West Virginia State regulations and required permits. No chemicals or additives would be mixed with the test water. Potential impacts on fisheries resources associated with hydrostatic testing include entrainment of fish during water withdrawals; reduction of downstream flows; impairment of downstream uses due to water withdrawals; and erosion or scour due to water discharges. To avoid impacting fisheries resources during this process, Columbia Gas would implement procedures described in the ECS, including:

- installing appropriately sized screens on water intakes to avoid entrapment per agency recommendations;
- controlling water withdrawal rates to avoid impingement;
- placing water intakes above streambeds to avoid disturbing sediments on the streambeds;
- re-using water from one test section to another (termed "cascading"), where practicable, to reduce the amount of water withdrawn for testing;
- discharging water back to the waterbody after filtration or settling through an approved holding structure to avoid affecting water quality, or discharging water into containment structures such as hay bales and/or filter bags located in well-vegetated upland areas; and
- regulating discharge rates to prevent scour in streambeds or erosion in uplands.

Test waters would be discharged back into the waterbody of origin, within waterbodies of the same watershed, or within upland areas, which would eliminate the translocation of invasive aquatic species that may be present. Discharges would be conducted in accordance with the applicable project permits. In addition to these measures, Columbia Gas would coordinate with the appropriate agencies and implement measures from the ECS to reduce the potential for depletion of stream flow at water sources and allow for fish passage. See section 4.3.2.4.1 for a recommendation to further limit the potential for adverse impacts from hydrostatic testing activities on Grasslick Run.

4.6.4.1.4 Spill Prevention Control and Countermeasures

Accidental spills of construction-related hazardous fluids (e.g., oil, gasoline, or hydraulic fluids) into waterbodies could result in water quality impacts that affect fish and other aquatic organisms. The potential impact would depend on the type and quantity of the spill, and the dispersal and attenuation characteristics of the waterbody. Minimization and mitigation procedures related to water quality are discussed in section 4.3.2.4. To reduce the potential for surface water contamination and resulting impacts on aquatic life, Columbia Gas would implement the measures in its ECS and SPCC Plan which include conducting routine inspections of construction equipment, tanks, and storage areas to help reduce the potential for spills or leaks; restricting refueling and the handling of hazardous materials to greater than 100 feet from wetland and waterbody resources; and the use of secondary containment around all containers and tanks. With adherence to these measures, we conclude that impacts on aquatic resources from potential spills would be adequately minimized.

4.6.4.1.5 Fisheries of Special Concern

No EFH is in the vicinity of the MXP area. Fisheries information is based on review of publicly available information including USGS topographic maps, aerial photographs, spatial data layers, and results from waterbody field surveys. Fisheries of special concern may include waterbodies that provide habitat for federal- or state-listed fish species, support naturally reproducing coldwater fisheries, or support commercial fishing. Columbia Gas consulted NOAA Fisheries, the USFWS, and the WVDNR to identify waterbodies that may contain federally or state-listed threatened, endangered, or candidate species and their habitats, coldwater fisheries, and other fisheries resources that could be considered fisheries of special concern.

Based on a review of Columbia Gas' Multi-Species Habitat Conservation Plan (MSHCP) database, USFWS's IPaC, and consultation with the WVDNR, one protected fish species, the federally endangered diamond darter (*Crystallaria cincotta*), and no commercial fish species or coldwater fisheries, are known or believed to occur within waterbodies crossed by or located near the MXP. The diamond darter is discussed further in section 4.7.4.

The Lewis Wetzel WMA, in Wetzel County, includes a public fishing area. The primary recreational fishing opportunity in this area is South Fork of Fishing Creek, which contains smallmouth bass, spotted bass, and stocked trout (WVDNR, 2003a). While the MXP-100 would cross this WMA at four locations (and several access roads also would cross the WMA), the pipeline would not cross South Fork of Fishing Creek.

4.6.4.2 Gulf XPress Project

The GXP would be constructed within three regional watersheds (Ohio, Tennessee, and Lower Mississippi Regions). Columbia Gulf identified surface water resources in the project area during field surveys conducted in 2015. A total of 15 waterbodies could potentially be affected by the project, including 12 ephemeral streams and 3 impoundments/stock ponds. Detailed information on these waterbodies is provided in section 4.3.

As noted, no perennial waterbodies would be crossed at any of the GXP facilities. As a result, very limited fishery impacts are anticipated. A discussion of hazardous materials spills as well as water withdrawals for hydrostatic testing and dust control is provided in section 4.3. Based on this information, significant impacts on fisheries are not anticipated. Columbia Gulf would implement the measures included in its ECS, which incorporates FERC's Procedures, to limit potential impacts on ephemeral waterbodies and ponds present on several of the sites.

No EFH is in the vicinity of the GXP facilities. Fisheries information is based on review of publicly available information including USGS topographic maps, aerial photographs, and spatial data layers, and results from waterbody field surveys. State fisheries classifications for Kentucky, Tennessee, and Mississippi are provided in table 4.6-4.

Table 4.6-4
Gulf XPress Project Kentucky, Tennessee, and Mississippi State Fisheries Classification

Designation	Classification	Description	Designating Agency
Kentucky			
Warm Water Aquatic Habitat	WAH	Surface water and associated substrate capable of supporting indigenous warm water aquatic life.	KAR **b**/
Cold Water Aquatic Habitat	CAH	Surface waters and associated substrate that will support indigenous aquatic life or self-sustaining or reproducing trout populations on a year-round basis.	KAR **b**/
Outstanding State Resource Water	OSRW	Unique waters of the Commonwealth, including those with federally threatened or endangered species.	KAR **b**/
Tennessee			
Fish and Aquatic Life	FAL	Assigned to all waterbodies for the protection of fish and aquatic life such as aquatic insects, snails, mussels, and crayfish.	TDEC
Trout Stream	TS	Stocked trout/low abundance of wild trout streams.	TDEC
Naturally Reproducing Trout Stream	NRTS	Found in cold headwaters in eastern Tennessee. Wild populations include brook, rainbow, and brown trout.	TDEC
Mississippi (Inland Waterbodies a/)			
Fish and Wildlife	N/A	Waters intended for fishing and for propagation of fish, aquatic life, and wildlife. Waters that meet these criteria are also suitable for secondary contact recreation (incidental contact with the water during activities such as wading, fishing, and boating).	MDEQ

Sources: KAR, 2014; TDEC, 2014; TDEC, 2015; MDEQ, 2003.

a Only inland waterbodies are potentially affected by the project.

b Kentucky Administrative Regulations (KAR): Title 301. Tourism, Arts, and Heritage Cabinet. Department of Fish and Wildlife Resources.

Fisheries in Kentucky are classified according to water temperature (Warm Water Aquatic Habitat or Cold Water Aquatic Habitat), type of use (Primary Recreation and Secondary Recreation), Domestic Water Supply, and Outstanding State Resource Water. No Special Designated Use Waters of Kentucky were identified within the project areas (Boyd, Carter, Garrard, Metcalfe, and Rowan Counties) (Kentucky Administrative Regulations [KAR] 401 10:026, 2008). North Triplett Creek in Rowan County (Morehead compressor station site) is within the Licking Basin, where a portion of the stream is stocked and designated as a rainbow trout put-and-take fishery. However, this 4-mile section occurs about 5 miles upstream from the vicinity of the Morehead site.

Tennessee designates all waterbodies as Fish and Aquatic Life for the protection of fish and aquatic life such as aquatic insects, snails, mussels, and crayfish. Trout Streams and Naturally Reproducing Trout Streams are fisheries-specific designations in the state (TDEC, 2014). No Trout Streams or Naturally Reproducing Trout Streams are located in the project area (Davidson and Wayne Counties).

Mississippi stream classification for fisheries includes the Fish and Wildlife designation. These streams include waters that are intended for fishing and propagation of fish, aquatic life, and

wildlife. Other stream classifications include PWS, Shellfish Harvesting, Recreation, and Ephemeral Stream. Many of the streams in the project area (Union and Grenada Counties) are classified under the Fish and Wildlife designation.

No waterbodies classified as a fishery resource would be affected by any of the compressor station sites in Kentucky, Tennessee, or Mississippi. Columbia Gulf would implement the measures included in its ECS, which adopts the measures of FERC's Plan and Procedures, to limit impacts on waterbodies and associated fisheries.

4.6.5 Conclusion

4.6.5.1 Mountaineer XPress Project

The majority of impacts on wildlife resources would generally be temporary in nature, occurring mostly during construction activities. Larger, more mobile generalist fauna would be displaced during construction because of vegetation loss, increased noise and ground disturbance. Despite a considerable amount of linear clearing of upland forested habitat (which we have concluded is a significant impact), we expect that the remaining amount of forested habitat in the surrounding areas would be sufficient to incorporate displaced wildlife. Non-forested habitat and associated wildlife would likewise not be significantly impacted (with the exception of the cerulean warbler, discussed below). Because of the linear nature of the project, temporary impacts from construction would be offset by the presence of similar habitat communities adjacent to the rights-of-way. Neighboring areas would allow wildlife to disperse sufficiently to continue to utilize similar habitats. The temporary effects to these habitats should have little or no significant impact on their importance to wildlife, and no changes to wildlife populations as a whole are anticipated.

Impacts could occur on individual animals, however. Incidental mortality of immobile wildlife may occur during construction clearing and grading, and displacement of mobile species could induce resource competition and lead to stress and mortality. Species are expected to recolonize habitats within permanent rights-of-way and TWS post-construction; however, the increase in ambient noise in the immediate vicinity of compressor stations during construction and operation may result in a decrease in wildlife use of adjacent habitat. Columbia Gas would implement measures to limit noise exposure during both construction and operation of the project. Wildlife resources are not expected to be significantly impacted due to construction and operation of the project because of the amount of similar adjacent habitat available for use.

Impacts on the majority of BCC that are dependent on forests are not expected to be significant due to the birds' ability to inhabit the smaller blocks of CFA that would be created by the construction of the MXP. Columbia Gas would adhere to recommended clearing windows to the extent practicable for avoidance of migratory birds during nesting season, which would minimize impacts on other wildlife species from forest clearing. Both temporary and permanent impacts on existing land use would be mitigated by implementation of Columbia Gas' ECS. However, the amount of impacts that would occur to cerulean warbler habitat within large and medium CFAs within 10 miles of the MXP would be significant. This is based on the designation of the cerulean warbler as a Priority 1 species in West Virginia and the limited amount of breeding habitat available. We are recommending that Columbia Gas coordinate with WVDNR to prepare

a Migratory Bird Plan (including mitigation measures) and consult with the USFWS and the WVDNR to avoid and minimize the take of BCC and other migratory birds during construction and operation of the proposed facilities.

During operation, maintenance of the permanent rights-of-way and fenced facilities would be performed in accordance with the requirements and timing identified in Columbia Gas' ECS, and in consideration of recommendations provided by wildlife management agencies. Columbia Gas would continue to consult with authorizing agencies to address location-specific impact minimization and mitigation measures regarding wildlife, wetlands, and other regulated sensitive environmental features.

Based on our review of potential MXP impacts on fisheries and other aquatic resources, we conclude that the MXP would result in some temporary impacts but that these impacts would be adequately mitigated through adherence to the measures described in Columbia Gas' ECS and other construction plans, timing of construction activities, and implementation of instream blasting plans.

4.6.5.2 Gulf XPress Project

Overall, wildlife resources would not be significantly impacted by construction and operation of the GXP compressor stations. This conclusion is based on the small amount of habitat disturbed, the criteria considered when siting the stations, the amount of similar adjacent habitat available for use, and the proposed vegetation clearing windows for avoidance of the migratory bird nesting season. In addition, Columbia Gulf would minimize impacts to the extent possible through adherence to its ECS and SPCC Plan.

Based on our review of potential project impacts on aquatic resources, we conclude that any impacts that may occur, would be negligible. These impacts would be mitigated through adherence to the measures described in Columbia Gulf's ECS and SPCC Plan, as well as the conditions and requirements of water resource agencies with jurisdiction over resources affected by the project.

4.7 THREATENED AND ENDANGERED, AND OTHER SPECIAL STATUS SPECIES

Special status species are those species for which state or federal agencies afford an additional level of protection by law, regulation, or policy. For the purposes of this analysis, special status species of plants and animals include species officially listed by the federal government as endangered or threatened (as per the ESA), and those that are state-listed by West Virginia, Kentucky, Tennessee, and Mississippi as endangered or threatened, or as a species of special concern. Other applicable federal laws and regulations protecting wildlife resources include the Fish and Wildlife Coordination Act of 1958, Fish and Wildlife Conservation Act of 1980, the BGEPA, and MBTA.

The ESA requires each federal agency to ensure that any actions authorized, funded, or carried out by the agency do not jeopardize the continued existence of a federally listed endangered or threatened species, or result in the destruction or adverse modification of the designated critical habitat of a federally listed species. As the lead federal agency, FERC is required to consult with

the USFWS and/or NOAA Fisheries to determine whether federally listed endangered or threatened species or designated critical habitat are found in the vicinity of a proposed project, and to determine the proposed action's potential effects on those species or critical habitats.[27]

For actions involving major construction activities with the potential to adversely affect federally listed species or designated critical habitat, FERC must prepare a BA for those listed species that may be affected and report its findings to the USFWS. If it is determined that the action would adversely affect a federally listed species, FERC must submit a request for formal consultation to comply with section 7 of the ESA. In response, the USFWS would issue a biological opinion (BO) as to whether or not the federal action would likely jeopardize the continued existence of a listed species, or result in the destruction or adverse modification of designated critical habitat.

Columbia Gas and Columbia Gulf, acting as FERC's non-federal representatives for the purpose of complying with section 7(a)(2) of the ESA, requested technical assistance and initiated informal consultation with the USFWS on July 22, 2015, and June 6, 2015, respectively. Columbia Gas submitted letters to the USFWS West Virginia Field Office, and Columbia Gulf submitted letters to the USFWS Kentucky Ecological Services Field Office, Tennessee Ecological Services Field Office, and Mississippi Ecological Services Field Office. Additionally, Columbia Gas consulted with the WVDNR, Wildlife Resources Section; and Columbia Gulf consulted with the KDFWR, TDEC's Natural Heritage Inventory Program, and the MDWFP's Museum of Natural Science. Both applicants also consulted the USFWS Environmental Conservation Online System to identify federally listed species in their respective project areas.

To comply with section 7 of the ESA, we consulted either directly or indirectly (by using Columbia Gas or Columbia Gulf as our federal representative for informal consultations) with the USFWS and state resource agencies regarding the presence of federally listed, proposed for listing, or state-listed species in the project area. The USFWS identified 43 federally listed threatened or endangered species, and 1 species that is currently under review for federal listing, that are known to occur in the MXP and GXP areas. Some of these species are already covered under CPG's Multi-species Habitat Conservation Plan (MSHCP), and some require additional consultation.

Currently, we have determined that the MXP is likely to adversely affect the northern long-eared bat, Indiana bat, and several federally listed mussels, including the clubshell, fanshell, pink mucket, rayed bean, sheepnose, snuffbox, and spectaclecase. The GXP would not adversely affect

[27] The USFWS, which is responsible for terrestrial and freshwater species, and NOAA Fisheries, which is responsible for marine species, jointly administer the ESA. NOAA Fisheries, during early coordination with Columbia Gas, indicated that no threatened or endangered species under its purview are expected to be within the MXP area and that no further consultation was required. Likewise, we determined there are no federally listed species under NOAA's jurisdiction in the vicinity of the GXP; therefore, section 7 consultation was conducted solely with the USFWS.

any federally listed species. We have received the necessary concurrences from the USFWS for the GXP[28], which concludes section 7 consultation for that project.

Columbia Gas is continuing discussions with the USFWS regarding stream impacts on mussels. Such consultations could result in additional mitigation, conservation measures, or reroutes. Once we receive that information, in compliance with section 7, we will finalize our BA for the MXP and will request formal consultation with the USFWS.

4.7.1 Multi-Species Habitat Conservation Plan

In coordination with the USFWS, NPS, USFS, USACE, and FERC, in 2013 NiSource[29] (predecessor to CPG, which includes Columbia Gas and Columbia Gulf) developed a programmatic MSHCP compliant with section 10 of the ESA to streamline consultations under section 7 of the ESA related to construction, operation, and maintenance of NiSource's natural gas pipelines and ancillary facilities. The USFWS also issued a programmatic BO resulting in an Incidental Take Permit for 10 MSHCP species for 50 years, in addition to a series of one-time consultation letters for Columbia Gas' and Columbia Gulf's activities within designated MSHCP covered lands.[30] NiSource did not request take authorization for the remaining 32 species addressed in the MSHCP.[31] Furthermore, the MSHCP does not address 47 additional listed, proposed, or candidate species that may occur within the MSHCP covered lands. Therefore, NiSource and the USFWS worked together to develop AMMs for the non-MSHCP species. The MSHCP became effective on January 1, 2014 (NiSource/Columbia, 2014). An amendment to the MSHCP to include the NLEB, which provides a detailed analysis of impacts, calculates incidental take, and provides mitigation for potential impacts on this species within MSHCP covered lands, was approved by the USFWS on May 1, 2015.

Columbia Gas would use the MSHCP for those portions of the MXP located within covered lands, which includes portions of Cabell, Kanawha, Jackson, Marshall, and Wetzel Counties, West Virginia (figure 4.7-1). All activities associated with GXP are within MSHCP covered lands. Within covered lands, Columbia Gas and Columbia Gulf would implement AMMs for species identified in the MSHCP. Where we (representing the lead federal agency) have determined that the proposed activities are consistent with the MSHCP, programmatic BO, and/or resource agency concurrence letters, no further section 7 consultation is required. For non-MSHCP species (i.e., 47 additional species evaluated in the programmatic BO but not authorized for incidental take under the MSHCP), the Companies would implement BMPs similar to the AMMs, and additional

28 Administratively, we still need to document USFWS concurrence for the snuffbox mussel (see discussion in section 4.7.3.2).

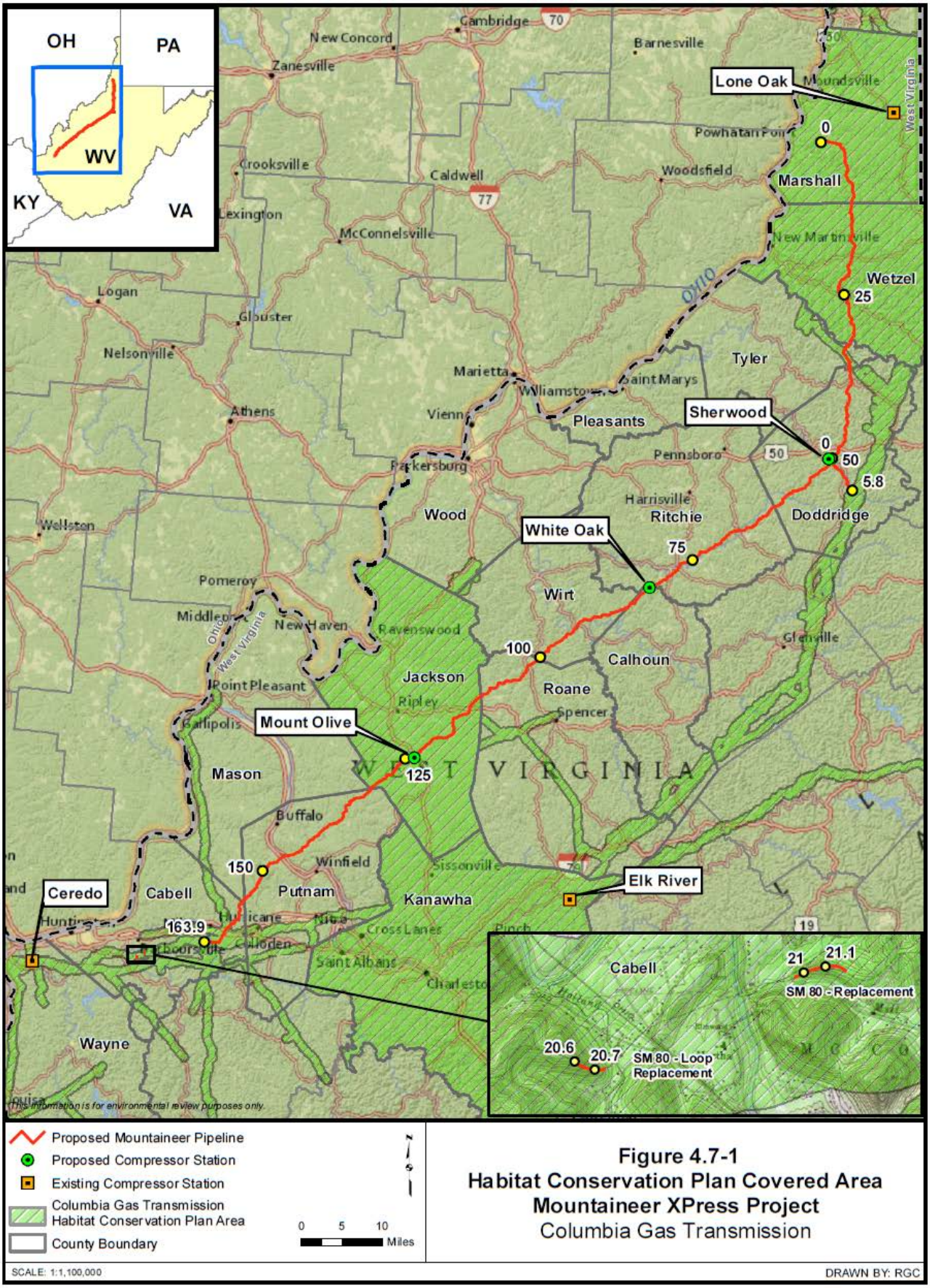
29 In mid-2015, NiSource Inc. separated its natural gas pipeline and related businesses into a stand-alone publicly traded company, CPG. CPG is a pure-play natural gas pipeline, midstream, and storage company. CPG includes Columbia Gas Transmission, Columbia Gulf Transmission, NiSource Midstream Services, and other current NiSource natural gas pipeline, storage, and midstream holdings. TransCanada Corporation acquired CPG in July 2016.

30 Covered lands include a 1-mile wide linear corridor of Columbia Gas' existing pipeline facilities and 12 counties where storage fields are located.

31 The 32 species for which NiSource did not request take authorization have been addressed through AMMs, are not affected by NiSource activities, have been de-listed, or are species for which the USFWS cannot provide incidental take authorization.

section 7 consultation may or may not be required. Section 7 consultation remains required for any and all project areas or species that are not covered under the MSHCP (i.e., non-covered lands, non-MSHCP species).

In addition to federal law, West Virginia, Kentucky, Tennessee, and Mississippi have passed laws to protect state-listed threatened and endangered species. The state-specific regulations include the Kentucky Administrative Regulations (301 KAR 3:061), Tennessee Nongame and Endangered or Threatened Wildlife Species Conservation Act of 1974 and Tennessee Rare Plant Protection and Conservation Act of 1985, and the Mississippi Nongame and Endangered Species Conservation Act of 1974. West Virginia provides protection for all freshwater mussels under West Virginia Code Section 20-2-4 and Code of State Rules at 58-605.11.


OH
PA
WV
KY
VA
Lone Oak
Marshall
Wetzel
Sherwood
White Oak
Mount Olive
Ceredo
Elk River
0
25
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5.8
75
100
125
150
163.9
Cambridge
New Concord
Zanesville
Barnesville
Moundsville
West Virginia
Powhatan Point
Crooksville
Caldwell
Woodsfield
Lexington
McConnelsville
New Martinsville
Ohio
Logan
Glouster
Nelsonville
Tyler
Marietta
Williamstown
Saint Marys
Athens
Vienna
Pleasants
Parkersburg
Pennsboro
Harrisville
Ritchie
Doddridge
Wood
Wellston
Pomeroy
Middleport
New Haven
Ravenswood
Wirt
Glenville
Calhoun
Point Pleasant
Jackson
Ripley
Roane
Spencer
Ballipolis
Mason
WEST VIRGINIA
Buffalo
Winfield
Sissonville
Putnam
Kanawha
Cabell
Hurricane
Nitro
Cross Lanes
Culloden
Saint Albans
Charleston
Pinch
Wayne
Cabell
21
21.1
SM 80 - Replacement
20.6
20.7
SM 80 - Loop Replacement
This information is for environmental review purposes only.
Proposed Mountaineer Pipeline
Proposed Compressor Station
Existing Compressor Station
Columbia Gas Transmission Habitat Conservation Plan Area
County Boundary
0 5 10
Miles
N
S
Figure 4.7-1
Habitat Conservation Plan Covered Area
Mountaineer XPress Project
Columbia Gas Transmission
SCALE: 1:1,100,000
DRAWN BY: RGC

4.7.2 Species Identification

Various sources of available data were reviewed to identify federally and state-listed species and other special status species that could potentially be present in the project areas, including letters of request to federal and state resource agencies for technical assistance, informal consultations, review of NiSource's MSHCP database, and field surveys. Further details regarding agency correspondence, consultations, and field surveys are provided in the following subsection. An overview of field survey timing and methodology is provided below.

During the 2015 and 2016 field seasons (June to October), Columbia Gas conducted habitat evaluations of the MXP-100 corridor to identify potential areas of special status species habitat. The survey corridor was approximately 300 feet wide, centered on the proposed pipeline alignment. Corridor surveys also included the approximately 6-mile-long MXP-200 line from the Sherwood Compressor Station site to Columbia Gas' existing T-System Line 1983 in Doddridge County, and approximately 0.4 mile within two SM80 corridors in Cabell County. Compressor station sites in Doddridge, Calhoun, and Jackson Counties and some temporary work areas also were surveyed. In addition to generalized surveys of the pipeline corridors, Columbia Gas initiated specialized surveys for federally protected species in areas not covered under the MSHCP.

During the 2015 field season, Columbia Gas completed acoustic surveys at 45 sites covering about 33 miles to determine presence or probable absence of the NLEB and Indiana bat. Of these 45 sites surveyed, 32 were determined to have probable presence of NLEBs, and 2 sites had positive detections of Indiana bats. In 2016, surveys were completed for areas that were not completed during 2015, as well as for portions of the modified route not previously covered by environmental survey. Surveys were not conducted at six sites where Columbia Gas has not yet obtained survey access. Columbia Gas plans to survey these remaining sites in 2017, upon receiving survey permission or site access. Potential impacts on federally listed bat species occurring outside of MSHCP covered lands would be addressed by the USFWS in a BO specific to the MXP.

With USFWS and WVDNR approval, Columbia Gas also conducted initial surveys for protected mussel species in 2015 and 2016. In consultation with these agencies, Columbia Gas is determining the need for additional stream surveys for mussel species. If presence of a federally listed mussel species is identified outside of MSHCP-covered lands during surveys, the USFWS would address impacts to these species in the project-specific BO, which could include reasonable and prudent measures for avoidance and mitigation, non-discretionary terms and conditions, and an incidental take statement. Columbia Gas anticipates completing the remaining mussel surveys in late spring 2017.

Columbia Gulf conducted field surveys of all GXP preferred site locations and suitable alternatives in June 2015, including observation and documentation of vegetation communities and wildlife. This information was used to characterize habitats and determine if potential threatened and endangered species habitat may be present in the GXP area.

Based on consultations with federal and state agencies and our own research, we identified 13 federally listed species in the general area of the MXP, and 31 federally listed species in the general areas of the various GXP compressor station sites. The potential effects of the MXP and GXP on these species are discussed below.

4.7.3 Federally Listed Species

In their respective applications and supplemental filings, Columbia Gas and Columbia Gulf provided information on their project locations and the extent of coverage by the MSHCP, as well as a description of activities and status of consistency with the MSHCP.

4.7.3.1 Mountaineer XPress Project

We reviewed the information submitted by Columbia Gas, performed our own research, and consulted with wildlife management agencies concerning protected species. According to the USFWS, four bat species, one fish species, and eight mussel species protected under the ESA are in the MXP vicinity. These species are listed in table 4.7-1. Our determination of effect for each species is also summarized in table 4.7-1 and described in the species-specific discussions below. We have included the signed MSHCP Interagency ESA Consultation Checklists for the MXP in appendix J-1.

Of the 13 federally protected species identified that may be present in the MXP area, three are MSHCP species associated entirely with covered lands, five are MSHCP species associated with both covered and non-covered lands, and five are non-MSHCP species, as listed below:

- gray bat, Virginia big-eared bat, and northern riffleshell are MSHCP species associated entirely with covered lands (these three species were eliminated from extensive analysis because Columbia Gas would implement AMMs identified for these species according to the provisions in the MSHCP);
- Indiana bat, NLEB, and the clubshell, fanshell, and sheepnose mussels are MSHCP species associated with both covered and non-covered lands; and
- diamond darter, and pink mucket, rayed bean, snuffbox, and spectaclecase mussels are non-MSHCP species; these automatically receive an assigned determination of likely to adversely affect per the BO for the MSHCP.[32]

Detailed impact evaluations are being undertaken for the covered species where they occur on non-covered lands, and for the non-covered species.

[32] However, a non-jeopardy finding can be attained through compliance with and full implementation of measures described in the MSHCP, the existing Implementing Agreement, or the existing Incidental Take Permit.

Table 4.7-1
Mountaineer XPress Project Federally Listed Threatened and Endangered Species that Potentially Occur in the Vicinity of the Project

Species (*Scientific name*)	Status a/, b/	MSHCP Status	MSHCP Covered (C) or Non-Covered (NC) Lands	Habitat	West Virginia Counties Where Species May Occur	Determination of Effect d/, e/, f/
Mammal						
Gray bat (*Myotis grisescens*)	E	MSHCP	C	Roosts almost exclusively in caves.	Kanawha, Wayne c/	NLAA (consultation complete)
Indiana bat (*Myotis sodalis*)	E	MSHCP	C, NC	Roosts singly or in colonies underneath bark and in crevices of dead or dying trees.	All	LAA (consultation ongoing)
Virginia big-eared bat (*Corynorhinus townsendii*)	E	MSHCP	C	Roosts singly or in colonies in caves; typically in limestone karst regions dominated by mature hardwood forests of hickory, beech, maple, and hemlock.	Kanawha	NLAA (consultation complete)
Northern long-eared bat (*Myotis septentrionalis*)	T	MSHCP	C, NC	NLEB roost alone or in colonies in large caves and abandoned mines; summers in forested areas near wetlands.	All	LAA (consultation ongoing)
Fish						
Diamond darter (*Crystallaria cincotta*)	E	Non-MSHCP (LAA)	C	Large warm-water rivers with very clear water and extensive sand and gravel bars free of mud and silt.	Kanawha	NLAA (consultation ongoing)
Mussel						
Clubshell (*Pleurobema clava*)	E	MSHCP	C, NC	Rivers and creeks with coarse sand and gravel in runs often just downstream of riffles.	Doddridge, Kanawha, Ritchie, Tyler, and Wirt	LAA (consultation ongoing)
Fanshell (*Cyprogenia stegaria*)	E	MSHCP	C, NC	Medium to large streams with strong currents and gravel substrates.	Cabell, Jackson, Kanawha, Putnam, Tyler, Wayne, and Wetzel	LAA (consultation ongoing)
Northern riffleshell (*Epioblasma torulosa rangiana*)	E	MSHCP	C	Creeks and small to medium rivers with high-gradient riffles.	Kanawha	NLAA (consultation complete)
Pink mucket (*Lampsilis abrupta*)	E	Non-MSHCP (LAA)	C, NC	Generally a large-river species, preferring sand-gravel or rocky substrates with moderately strong currents.	Cabell, Jackson, Kanawha, Putnam, Tyler, Wayne, and Wetzel	LAA (consultation ongoing)

Table 4.7-1
Mountaineer XPress Project Federally Listed Threatened and Endangered Species that Potentially Occur in the Vicinity of the Project

Species (*Scientific name*)	Status a/, b/	MSHCP Status	MSHCP Covered (C) or Non-Covered (NC) Lands	Habitat	West Virginia Counties Where Species May Occur	Determination of Effect d/, e/, f/
Rayed bean (*Villosa fabalis*)	E	Non-MSHCP (LAA)	C, NC	Generally found in smaller, headwater creeks, but is sometimes found in large rivers and wave-washed areas of glacial lakes. Prefers gravel or sand substrates, and is often found in and around roots of aquatic vegetation.	Doddridge, Kanawha, and Tyler	LAA (consultation ongoing)
Sheepnose (*Plethobasus cyphyus*)	E	MSHCP	C, NC	Generally a large river species, preferring sand-gravel or rocky substrates with mod-strong currents.	Cabell, Jackson, Kanawha, Putnam, Tyler, Wayne, Wetzel	LAA (consultation ongoing)
Snuffbox mussel (*Epioblasma triquetra)*	E	Non-MSHCP (LAA)	C, NC	Found in small to medium size creeks with swift currents; sometimes in larger rivers.	Cabell, Calhoun, Doddridge, Jackson, Kanawha, Marshall, Ritchie, Roane, Tyler, Wetzel, and Wirt	LAA (consultation ongoing)
Spectaclecase (*Cumberlandia monodonta*)	E	Non-MSHCP (LAA)	C, NC	Habitat specialist to the bends below cliff bluffs in large rivers.	Kanawha and Putnam	LAA (consultation ongoing)

Sources: NiSource/Columbia, 2014; USFWS, 2015g.

a T=Federally Threatened, E=Federally Endangered.

b West Virginia has no state endangered species legislation; therefore, the only species listed as threatened or endangered in the state are federally listed species.

c On September 29, 2016, the USFWS sent out notification that a gray bat had been captured in Logan County, West Virginia and indicated that gray bats could occur in Wayne and Kanawha Counties in the MXP area.

d LAA – Likely to Adversely Affect, NLAA – Not Likely to Adversely Affect. Status in parentheses [i.e., (LAA)] represents the pre-determined (assigned) MSHCP status without applied AMMs.

e Our project-specific determination of effect that results in NLAA assumes that Columbia Gas would implement all mandatory AMMs for MSHCP species and BMPs for non-MSHCP species. For species not fully covered in the MSHCP or outside of MSHCP lands, Columbia Gas would prepare specific plans that provide equal or greater protection than the MSHCP. All species-specific plans would receive prior approval from USFWS prior to implementation.

f For any species where our final determination of effect is noted as LAA, our BA will be requesting that the USFWS evaluate the likely effects of the proposed action to ensure that it will not jeopardize the continued existence of the species or its critical habitat.

4.7.3.2 Gulf XPress Project

We reviewed the information submitted by Columbia Gulf, performed our own research, and consulted with the USFWS regarding federally listed species in the GXP areas. We identified 4 bat species, 1 fish, 18 species of mussels, 1 insect, 1 crustacean, and 6 plant species that are protected under the ESA (or candidate species[33]). These species are listed in table 4.7-2, and are described in the species-specific discussions below.

Of the 31 species identified as potentially occurring in the GXP area, 17 are MSHCP species associated entirely with covered lands, 11 are non-MSHCP species, and 3 are not addressed by the MSHCP, as listed below:

- gray bat, Virginia big-eared bat, Indiana bat, NLEB, Braun's rockcress, Nashville crayfish, and the clubshell, cracking pearlymussel, dromedary pearlymussel, fanshell, northern riffleshell, oyster, sheepnose, pale lilliput, purple cat's paw, tan riffleshell, and white wartyback mussels are MSHCP species associated entirely with covered lands;
- spotfin chub, leafy prairie-clover, running buffalo clover, Short's bladder pod, Price's potato-bean, and orangefoot pimpleback, pink mucket, snuffbox, ring pink, rough pigtoe, and spectaclecase mussels are non-MSHCP species; and
- Cumberlandian combshell, Baker Station cave beetle, and Guthrie's ground-plum are not addressed as part of the MSHCP.

Columbia Gulf conducted field surveys of all GXP preferred site locations and suitable alternatives in June 2015. The emphasis of the field effort was on identification and delineation of wetlands and waterbody features; however, surveys also included habitat assessments for listed species and invasive plant species. Targeted federal species included running buffalo clover, Short's bladderpod, Price's potato-bean, Tennessee purple coneflower, leafy prairie clover, spotfin chub, pygmy madtom, and Nashville crayfish. Survey efforts also considered species on each state's endangered and threatened species list.

Generally, further section 7 consultation would be required for all species not covered under the MSHCP. However, the USFWS has already concurred that GXP activities would have *no effect* or would *not likely to adversely affect* 10 of the 11 non-MSHCP species listed above and that no further consultation is required (our discussion on the one remaining species, the snuffbox mussel, is presented below). The USFWS also indicated that no further consultation is required for the three species (Cumberlandian combshell, Baker Station cave beetle, and Guthrie's ground-plum) not addressed in the MSHCP. We have independently reviewed the habitat and life history requirements of these 10 species, along with Columbia Gulf's proposed action, and agree that the GXP would have little to no impacts on these species. We have included the signed MSHCP Interagency ESA Consultation Checklists for the GXP in appendix J-2.

[33] Candidate species are not protected under the ESA, but are often considered in order to facilitate consultation if they do become federally listed during project review.

The snuffbox was identified as potentially occurring in Carter County, Kentucky. This mussel, which is a non-MSHCP species with an assigned determination of likely to adversely affect per the MSHCP BO, was not included in Columbia Gulf's November 25, 2015, project-specific request for concurrence from the USFWS Kentucky Ecological Services Field Office, nor was this species referenced in the February 16, 2016, response from USFWS, in which it provided effect determinations for federally listed species. We have independently assessed the habitat needs for this mussel species along with the habitat in and around the proposed Grayson Compressor Station, and concluded that required habitat for the snuffbox is not present. Accordingly, we conclude that the GXP would have *no effect* on the snuffbox mussel. However, the MSHCP contains an administrative requirement that the USFWS must concur with or provide an effects determination for this species. We (or Columbia Gulf, as our non-federal representative) will request that the USFWS provide such concurrence prior to construction. Therefore, **we recommend that:**

- **Prior to the end of the draft EIS comment period, Columbia Gulf should file with the Secretary, the USFWS' determination for the GXP impacts on the snuffbox mussel.**

Table 4.7-2
Gulf XPress Project Federally Listed Species that Potentially Occur in the Vicinity of the Project

Species (*Scientific name*)	Federal Status a/	State Status	MSHCP Status b/	Habitats	GXP Facilities c/									Determination of Effect
					Kentucky					Tennessee		Mississippi		
					Leach C Meter Boyd County	Grayson CS - Carter County	Morehead CS - Rowan County	Paint Lick CS - Garrard County	Goodluck CS - Metcalfe County	Cane Ridge CS - Davidson County	Clifton Junction CS - Wayne County	New Albany CS - Union County	Holcomb CS - Grenada County	
Mammal														
Gray bat (*Myotis grisescens*)	E	E (KY, TN)	MSHCP	Roosts almost exclusively in caves.	X	X	X	X	X		X			NLAA (consultation complete)
Indiana bat (*Myotis sodalis*)	E	E (KY, TN, MS)	MSHCP	Roosts singly or in colonies underneath bark and in crevices of dead or dying trees.	X	X	X	X	X	X	X	X d/	X d/	NLAA (consultation complete)
Virginia big-eared bat (*Corynorhinus townsendii virginianus*)	E	E (KY)	MSHCP	Roosts singly or in colonies in caves; typically in limestone karst regions dominated by mature hardwood forests of hickory, beech, maple, and hemlock.			X							NLAA (consultation complete)
Northern long-eared bat (*Myotis septentrionalis*)	T	E (KY)	MSHCP	NLEB roost alone or in colonies in large caves and abandoned mines; summers in forested areas near wetlands.	X		X	X	X	X	X	X	X	NLAA (consultation complete)
Fish														
Spotfin chub (*Erimonax monachus*)	T	T (TN)	Non-MSHCP	Streams with low-silt substrates in good flows; forages commonly on bedrock, boulders, cobble.							X			NLAA (consultation complete)

Table 4.7-2
Gulf XPress Project Federally Listed Species that Potentially Occur in the Vicinity of the Project

Species (*Scientific name*)	Federal Status a/	State Status	MSHCP Status b/	Habitats	GXP Facilities c/									Determination of Effect
					Kentucky					Tennessee		Mississippi		
					Leach C Meter Boyd County	Grayson CS - Carter County	Morehead CS - Rowan County	Paint Lick CS - Garrard County	Goodluck CS - Metcalfe County	Cane Ridge CS - Davidson County	Clifton Junction CS - Wayne County	New Albany CS - Union County	Holcomb CS - Grenada County	
Mussel														
Clubshell (*Pleurobema clava*)	E	E (KY, TN)	MSHCP	Rivers and creeks with coarse sand and gravel in runs often just downstream of riffles.	X						X			NLAA (consultation complete)
Cracking pearlymussel (*Hemistena lata*)	E	E (TN)	MSHCP	Sand, gravel, and cobble substrates in swift currents or mud and sand in slower currents.							X			NLAA (consultation complete)
Cumberlandian combshell (*Epioblasma brevidens*)	E	E (TN)	N/A e/	Large creeks to large rivers, in coarse sand or mixtures of gravel, cobble, or rocks.						X				NE (consultation complete)
Dromedary pearlymussel (*Dromus dromas*)	E	E (TN)	MSHCP	Found in river headwaters; in riffles and shoals in sand and gravel substrates.						X				NE (consultation complete)
Fanshell (*Cyprogenia stegaria*)	E	E (KY, TN)	MSHCP	Medium to large streams with strong currents and gravel substrates.	X	X					X			NLAA (consultation complete)
Northern riffleshell (*Epioblasma torulosa rangiana*)	E	E (KY)	MSHCP	Creeks and small to medium rivers with high-gradient riffles.			X							NLAA (consultation complete)

Table 4.7-2
Gulf XPress Project Federally Listed Species that Potentially Occur in the Vicinity of the Project

Species (*Scientific name*)	Federal Status a/	State Status	MSHCP Status b/	Habitats	GXP Facilities c/									Determination of Effect
					Kentucky					Tennessee		Mississippi		
					Leach C Meter Boyd County	Grayson CS - Carter County	Morehead CS - Rowan County	Paint Lick CS - Garrard County	Goodluck CS - Metcalfe County	Cane Ridge CS - Davidson County	Clifton Junction CS - Wayne County	New Albany CS - Union County	Holcomb CS - Grenada County	
Orangefoot pimpleback (*Plethobasus cooperianus*)	E	E (KY, TN)	Non-MSHCP	Large rivers in sand-gravel-cobble substrates in riffles and shoals in deep flowing water.	X					X	X			NLAA (consultation complete)
Oyster mussel (*Epioblasma capsaeformis*)	E	E (TN)	MSHCP	Found in large rivers with rocky substrates.						X				NLAA (consultation complete)
Sheepnose mussel *(Plethobasus cyphyus)*	E	--	MSHCP	Generally a large river species, preferring sand-gravel or rocky substrates with mod-strong currents.	X									NLAA (consultation complete)
Pale lilliput (*Toxoplasma cylindrellus*)	E	E (TN)	MSHCP	Small streams with firm rubble, gravel, and sand substrates in shallow riffles and shoals.							X			NE (consultation complete)
Pink mucket (*Lampsilis abrupta*)	E	E (KY, TN)	Non-MSHCP	Generally a large-river species, preferring sand-gravel or rocky substrates with moderately strong currents.	X		X			X	X			NLAA (consultation complete)
Purple cat's paw (*Epioblasma obliquata obliquata*)	E	E (TN)	MSHCP	Found in riffles of large to medium rivers with moderate gradient.						X				NE (consultation complete)

Table 4.7-2
Gulf XPress Project Federally Listed Species that Potentially Occur in the Vicinity of the Project

Species (*Scientific name*)	Federal Status a/	State Status	MSHCP Status b/	Habitats	GXP Facilities c/									Determination of Effect
					Kentucky					Tennessee		Mississippi		
					Leach C Meter Boyd County	Grayson CS - Carter County	Morehead CS - Rowan County	Paint Lick CS - Garrard County	Goodluck CS - Metcalfe County	Cane Ridge CS - Davidson County	Clifton Junction CS - Wayne County	New Albany CS - Union County	Holcomb CS - Grenada County	
Snuffbox mussel (*Epioblasma triquetra*)	E	E (KY)	Non-MSHCP	Found in small to medium size creeks with swift currents; sometimes in larger rivers.		X								NE (consultation ongoing)
Ring pink (*Obovaria retusa*)	E	E (KY, TN)	Non-MSHCP	Generally a large river species, preferring sand-gravel or rocky substrates with mod-strong currents.	X					X	X			NLAA (consultation complete)
Rough pigtoe (*Pleurobema plenum*)	E	E (KY, TN)	Non-MSHCP	Medium to large rivers in sand, gravel, and cobble substrates in shoals.	X					X	X			NLAA (consultation complete)
Spectaclecase (*Cumberlandia monodonta*)	E	E (TN)	Non-MSHCP	Habitat specialist to the bends below cliff bluffs in large rivers.							X			NLAA (consultation complete)
Tan riffleshell (*Epiolasma florentina walkeri*)	E	E (TN)	MSHCP	Found in river headwaters, in riffles and shoals in sand and gravel substrates.						X				NE (consultation complete)
White wartyback (*Plethobasus cicatricosus*)	E	E (TN)	MSHCP	Inhabit shoals and riffles in large rivers.						X	X			NE (consultation complete)

Table 4.7-2
Gulf XPress Project Federally Listed Species that Potentially Occur in the Vicinity of the Project

Species (*Scientific name*)	Federal Status a/	State Status	MSHCP Status b/	Habitats	GXP Facilities c/									Determination of Effect
					Kentucky					Tennessee		Mississippi		
					Leach C Meter Boyd County	Grayson CS - Carter County	Morehead CS - Rowan County	Paint Lick CS - Garrard County	Goodluck CS - Metcalfe County	Cane Ridge CS - Davidson County	Clifton Junction CS - Wayne County	New Albany CS - Union County	Holcomb CS - Grenada County	
Insect														
Baker Station cave beetle (Pseudanophthalmus insularis)	C	--	n/a e/	Subterranean obligate of the twilight zone in caves.						X				NLAA (consultation complete)
Crustacean														
Nashville crayfish (*Orconectes shoupi*)	E	E (TN)	MSHCP	First-order and larger streams, generally with bedrock bottom, under slab rock; endemic to Mill Creek watershed.						X				NLAA (consultation complete)
Plant														
Braun's rockcress (*Boechera perstellata*)	E	E (TN)	MSHCP	Limestone bluffs						X				NE (consultation complete)
Guthrie's ground-plum (*Astragalus bibullatus*)	E	E (TN)	n/a e/	Ordovician limestone glades						X				NE (consultation complete)
Leafy prairie-clover (*Dalea foliosa*)	E	E (TN)	Non-MSHCP	Rocky washes in glades						X				NLAA (consultation complete)

Table 4.7-2
Gulf XPress Project Federally Listed Species that Potentially Occur in the Vicinity of the Project

Species (*Scientific name*)	Federal Status a/	State Status	MSHCP Status b/	Habitats	GXP Facilities c/									Determination of Effect
					Kentucky					Tennessee		Mississippi		
					Leach C Meter Boyd County	Grayson CS - Carter County	Morehead CS - Rowan County	Paint Lick CS - Garrard County	Goodluck CS - Metcalfe County	Cane Ridge CS - Davidson County	Clifton Junction CS - Wayne County	New Albany CS - Union County	Holcomb CS - Grenada County	
Price's potato-bean (*Apios priceana*)	T	T (TN, MS)	Non-MSHCP	Openings in rich woods						X	X	X		NE (consultation complete)
Running buffalo clover (*Trifolium stoloniferum*)	E	E (KY)	Non-MSHCP	Mesic woodlands with partial to filtered sunlight underlain with limestone bedrock.				X						NLAA (consultation complete)
Short's bladderpod (*Physaria globosa*)	E	E (KY, TN)	Non-MSHCP	South to west facing dry, open limestone ledges on river bluffs, talus of lower bluff slopes, and shale at cliff bases.				X		X				NLAA (consultation complete)

Sources: IPaC 2015 & 2016. Information supplemented with information provided by USFWS Ecological Field Offices in the project region; Kentucky State Nature Preserves Commission; Tennessee Wildlife Resources Commission; and MDWFP & Mississippi Museum of Natural Science Endangered Species of Mississippi.

a E=endangered, T=threatened, C=candidate.
b MSHCP = MSHCP evaluated species; non-MSHCP = species evaluated outside the context of the MSHCP; LAA = likely to adversely affect; NLAA = not likely to adversely affect; NE = no effect.
c CS=Compressor Station.
d The Indiana bat was not listed by the MSHCP or IPaC as potentially occurring in Mississippi, but was added during consultation with the USFWS Ecological Services Mississippi Field Office in 2015.
e Species not evaluated as part of the USFWS MSHCP analysis.

4.7.4 Fish

4.7.4.1 Mountaineer XPress Project

Only one federally protected fish species, the diamond darter, occurs in the MXP area.

4.7.4.1.1 Diamond Darter

The diamond darter is a member of the perch family, but differs from most other perch by its smaller size and more slender shape. Diamond darters are translucent with silvery sides and a white belly. They are yellow-tan on the back, with four wide olive-colored saddle patterns on the body, and have a dark blotch on the snout below the eyes. Adults reach 3 to 5 inches.

Diamond darters are found in large warm-water rivers with very clear water and extensive sand and gravel bars free of mud and silt. Lack of a swim bladder increases the density of the diamond darter and allows it to remain near the river bottom with little effort. The diamond darter was listed as an endangered species in 2013. The only diamond darter population known to exist is found along a specific reach in the Elk River of West Virginia (USFWS, 2010). As such, all areas of the Elk River in the vicinity of the pending Elk River Compressor Station are assumed to be occupied by the diamond darter.

The MXP would not involve instream work at the Elk River site; however, upland construction immediately adjacent to the river is proposed in order to add compression at the pending station. This MXP activity is located within a MSHCP covered area; but the diamond darter is not a covered species. The programmatic BO prepared for the MSHCP determined that without implementation of approved BMPs, the diamond darter is likely to be adversely affected by activities within known habitat. Columbia Gas has assumed presence of this species in the Elk River, which is adjacent to the Elk River station. No direct impacts are anticipated on this species and applicable AMMs and BMPs for this species (as identified in the BO and agreed to by Columbia Gas) would be implemented by Columbia Gas. For any activity within 100 feet of the Elk River with potential effects, Columbia Gas would include site-specific details particular to the project area and potential impacts within its Environmental Management and Construction Plan (EM&CP). The EM&CP is a comprehensive and project-specific manual that contains all applicable environmental permits, requirements, and compliance measures to be implemented during construction. These procedures may include, but are not limited to, minimization of riparian disturbance, preventing downstream sedimentation through the use of redundant erosion and sediment control devices, and storage of fuel and other contaminants at least 300 feet from the waterway. No fertilizers or herbicides would be used within 100 feet of the Elk River, and no hydrostatic test water would be withdrawn from or be discharged to the waterbody. Columbia Gas' implementation of these measures would control erosion and sedimentation and minimize the potential for water quality impacts on the Elk River. Based on these measures and the fact that the project would not directly impact the Elk River, we have concluded that the project is *not likely to adversely affect* the diamond darter. However, consultation with USFWS is ongoing; and concurrence would be received prior to construction. Therefore, **we recommend that:**

- **Prior to the end of the draft EIS comment period, Columbia Gas should file with the Secretary, the USFWS' determination for the MXP impacts on the diamond darter.**

4.7.4.2 Gulf XPress Project

Only one federally protected fish species, the spotfin chub, occurs in the GXP area.

4.7.4.2.1 Spotfin Chub

The spotfin chub is a small minnow, growing to around 5 inches in length. Preferred habitat includes large creeks with moderate flow, clear cool or warm water, and gravel or bedrock bottoms (NatureServe, 2015). Spotfin chub was a targeted species during field surveys; however, habitat was not identified at project sites within its range. All GXP activities would occur at relatively small, discrete, primarily upland sites with little to no waterbody impacts. The USFWS Tennessee Ecological Services Field Office provided concurrence in correspondence dated February 15, 2016 that project activities would have no adverse impacts on the spotfin chub. We agree.

4.7.5 Mussels

4.7.5.1 Mountaineer XPress Project

Eight federally listed freshwater mussels may occur within the MXP area. Four of the species are MSHCP species and four are non-MSHCP species. All are automatically assigned a determination of *likely to adversely affect* without implementation of appropriate AMMs for project activities per the MSHCP BO. AMMs for all species include surveys to evaluate presence and relocation of species in project action areas, preparation of an EM&CP with site-specific details particular to the project area and potential impacts, preference for HDD or other trenchless pipe installation, implementation of a SPCC Plan, and restrictions on water withdrawals from and discharges to streams with known or presumed occupied habitat. Columbia Gas has completed surveys for some, but not all Group 2 streams where federally protected mussels may occur.

Because we may require formal ESA section 7 consultation with the USFWS for federally listed mussel species potentially impacted by the MXP on non-covered lands, **we recommend that Columbia Gas should:**

- **complete required mussel surveys <u>as soon as conditions allow</u> and provide survey results to the USFWS and WVDNR; and**
- **file an update to the Secretary of any further discussions or progress made with the USFWS regarding recommendations on stream crossing locations and construction methodologies where federally protected mussel species may be present.**

Columbia Gas <u>should not begin construction</u> of the MXP until FERC has completed all necessary section 7 consultation with the USFWS for federally listed mussel species, and the Director of OEP authorizes construction or implementation of mitigation measures to begin.

A brief description of each species and the status of surveys and consultations with state and federal regulatory agencies follows.

4.7.5.1.1 Clubshell

The clubshell mussel was listed as endangered in 1993. The clubshell prefers clean, loose sand and gravel in medium to small rivers and streams. The clubshell will bury itself in the bottom substrate to depths of up to 4 inches (USFWS, 1997a).

The clubshell mussel is an MSHCP species that may occur in covered and non-covered MSHCP areas in Doddridge, Kanawha, Ritchie, Tyler, and Wirt Counties. According to the USFWS (September 16, 2016), suitable habitat for the clubshell mussel occurs at Fish Creek, Fishing Creek, McElroy Creek, the South Fork Hughes River, Spring Creek, Little Kanawha River, and Meathouse Fork. The USFWS has requested additional information from Columbia Gas regarding these crossings and recommends avoiding or drastically minimizing the number of crossings of these streams to avoid adverse impacts on federally listed mussel species. Columbia Gas is continuing to work with the USFWS and WVDNR to re-align its pipeline crossings to minimize impacts on mussels to the extent possible, and to date has filed five route variations where stream crossings have been modified to minimize construction impacts.

Columbia Gas also is conducting multi-year instream surveys at Group 1 (small to mid-sized streams where mussels are known to exist but federally protected species are not expected to occur) and Group 2 (small to mid-sized streams where federally protected mussels are expected to occur) stream crossings to determine presence/absence of listed mussel species. All survey methods have been reviewed and approved by the WVDNR for Group 1 streams and by the WVDNR and USFWS for Group 2 streams. Surveys have been completed for Group 2 streams within MSHCP covered lands (Fish Creek, MP 7.1 and Fishing Creek, MP 24.4). No federally listed mussel species were collected at either of these crossing locations, or at any crossing location surveyed to date. Additional surveys are proposed in 2017 at multiple crossings, including McElroy Creek, Meathouse Fork, the South Fork Hughes River, Little Kanawha River, and Spring Creek. Until we receive confirmation of the AMMs/BMPs that Columbia Gas proposes for these streams and any site-specific crossing plans or conservation measures, we have determined that project activities would be *likely to adversely affect* this species where it may be encountered within the MXP corridor. Our recommendation above would ensure that the appropriate section 7 consultation is completed prior to any construction.

4.7.5.1.2 Fanshell

The fanshell mussel was listed as endangered in 1993 due to dams and reservoirs that flooded most of this mussel's habitat, reducing its gravel and sand habitat, and probably affecting the distribution of its fish hosts. This mussel is found in medium to large rivers. It buries itself in sand or gravel in deep water of moderate current, with only the edge of its shell and its feeding siphons exposed (USFWS, 1997b).

The fanshell mussel is a MSHCP species that may occur in covered and non-covered MSHCP areas in Cabell, Jackson, Kanawha, Putnam, Tyler, Wayne, and Wetzel Counties. Columbia Gas has completed mussel surveys for Group 2 streams within MSHCP covered lands (Fish Creek, MP 7.1 and Fishing Creek, MP 24.4). No federally listed mussel species were collected at either of these crossing locations, or at any crossing location surveyed to date. Additional surveys are still needed at multiple stream crossings in 2017. Until we receive

confirmation of the AMMs/BMPs that Columbia Gas proposes for these streams and any site-specific crossing plans or conservation measures, we have determined that project activities would be *likely to adversely affect* this species where it may be encountered within the MXP corridor. Our recommendation above would ensure that the appropriate section 7 consultation is completed prior to any construction.

4.7.5.1.3 Northern Riffleshell

The northern riffleshell mussel was historically found in a wide variety of streams in Illinois, Indiana, Kentucky, Michigan, Ohio, Pennsylvania, West Virginia, and western Ontario, but its current range has been greatly reduced. It was listed as endangered in 1993, and restoration efforts are ongoing in Illinois, Ohio, and West Virginia. The mussel is found in small streams and large rivers. It buries itself in firmly packed sand or gravel stream beds with its feeding siphons exposed (USFWS, 1997c).The northern riffleshell is an MSHCP species that may occur in MSHCP-covered areas in Kanawha County.

Project construction in Kanawha County is restricted to the addition of compression at the pending Elk River Compressor Station, and no instream impacts at the Elk River are anticipated. For any activity within 100 feet of the Elk River with potential effects, Columbia Gas would include site-specific details particular to the project area and potential impacts within its EM&CP. These procedures may include, but are not limited to, minimization of riparian disturbance, preventing downstream sedimentation through the use of redundant erosion and sediment control devices, and storage of fuel and other contaminants at least 300 feet from the waterway. No fertilizers or herbicides would be used within 100 feet of the Elk River, and no hydrostatic test water would be withdrawn from or be discharged to the waterbody. Columbia Gas' implementation of these measures would control erosion and sedimentation and minimize the potential for water quality impacts on the Elk River. Because the riffleshell in an MSHCP species associated entirely with covered lands, and Columbia Gas has committed to implementing the AMMs identified for this species according to the provisions in the MSHCP, consultation is determined to be complete.

4.7.5.1.4 Pink Mucket

The pink mucket was listed as endangered in 1976. It is found in mud and sand and in shallow riffles and shoals swept free of silt in major rivers and tributaries. This mussel buries itself in sand or gravel, with only the edge of its shell and its feeding siphons exposed (USFWS, 1997d).

The pink mucket is a non-MSHCP species that may occur on covered and non-covered lands in Cabell, Jackson, Kanawha, Putnam, Tyler, Wayne, and Wetzel Counties. In coordination with the WVDNR and USFWS, Columbia Gas is conducting mussel surveys at Group 2 stream crossings where federally listed mussels are expected to occur. Surveys are scheduled for completion in 2017. Until we receive confirmation of the AMMs/BMPs that Columbia Gas proposes for these streams and any site-specific crossing plans or conservation measures, we have determined that project activities would be *likely to adversely affect* this species where it may be encountered within the MXP corridor. Our recommendation above would ensure that the appropriate section 7 consultation is completed prior to any construction.

4.7.5.1.5 Rayed Bean

The rayed bean is a small mussel that is smooth-textured and green, yellowish-green, or brown with numerous dark-green wavy lines. It generally lives in smaller, headwater creeks, but it is sometimes found in large rivers and wave-washed areas of glacial lakes. It prefers gravel or sand substrates, and is often found in and around roots of aquatic vegetation. The rayed bean was listed as endangered in 2012 due to reduction of habitat caused by dams, sedimentation, and pollution from agricultural and industrial runoff (USFWS, 2012a).

The rayed bean mussel is a non-MSHCP species that may occur on covered and non-covered lands in Doddridge, Kanawha, and Tyler Counties. In coordination with the WVDNR and USFWS, Columbia Gas is conducting mussel surveys at Group 2 stream crossings where federally listed mussels are expected to occur. Until we receive confirmation of the AMMs/BMPs that Columbia Gas proposes for these streams and any site-specific crossing plans or conservation measures, we have determined that project activities would be *likely to adversely affect* this species where it may be encountered within the MXP corridor. Our recommendation above would ensure that the appropriate section 7 consultation is completed prior to any construction.

4.7.5.1.6 Sheepnose

The sheepnose mussel is a medium-sized mussel that grows to about 5 inches in length. It lives in larger rivers and streams where it is usually found in shallow areas with moderate to swift currents flowing over coarse sand and gravel. The sheepnose was listed as endangered in 2012 due to reduction of habitat caused by dams, sedimentation, and pollution from agricultural and industrial runoff (USFWS, 2012b).

The sheepnose mussel is a MSHCP species that may occur in covered and non-covered MSHCP areas in Cabell, Calhoun, Doddridge, Jackson, Kanawha, Marshall, Ritchie, Roane, Tyler, Wetzel, and Wirt Counties. In coordination with the WVDNR and USFWS, Columbia Gas is conducting mussel surveys at Group 2 stream crossings where federally listed mussels are expected to occur. Surveys are scheduled for completion in 2017. Until we receive confirmation of the AMMs/BMPs that Columbia Gas proposes for these streams and any site-specific crossing plans or conservation measures, we have determined that project activities would be *likely to adversely affect* this species where it may be encountered within the MXP corridor. Our recommendation above would ensure that the appropriate section 7 consultation is completed prior to any construction.

4.7.5.1.7 Snuffbox

The snuffbox mussel has a yellow, green, or brown shell interrupted with green rays, blotches or chevron-shaped lines. The shell becomes darker and the interruptions less clear with age. The snuffbox is usually found in smaller streams, inhabiting areas with a swift current, although it is also found in Lake Erie and some larger rivers. The snuffbox was listed as endangered in 2012 (USFWS, 2012c).

The snuffbox mussel is a non-MSHCP species that may occur in Cabell, Calhoun, Doddridge, Jackson, Kanawha, Marshall, Ritchie, Roane, Tyler, Wetzel, and Wirt Counties. According to the USFWS (September 16, 2016), suitable habitat for the snuffbox occurs at Fish

Creek, Fishing Creek, McElroy Creek, the South Fork Hughes River, Spring Creek, Little Kanawha River, and Meathouse Fork. The USFWS has requested additional information from Columbia Gas regarding these crossings and recommends avoiding or drastically minimizing the number of crossings to these streams to avoid adverse impacts to federally listed mussel species. As discussed previously in Section 4.7.5.1.1, Columbia Gas has been working with the USFWS and WVDNR to route its pipelines to minimize impacts on mussels to the extent possible and has conducted multi-year instream surveys at Group 1 and Group 2 stream crossings to determine presence/absence of listed mussel species. Surveys have been completed for Group 2 streams within MSHCP covered lands (Fish Creek, MP 7.1 and Fishing Creek, MP 24.4). No federally listed mussel species were collected at either of these crossing locations, or at any crossing location surveyed to date. Additional surveys are proposed at multiple crossings in 2017, including McElroy Creek, Meathouse Fork, the South Fork Hughes River, Little Kanawha River, and Spring Creek. Until we receive confirmation of the AMMs/BMPs that Columbia Gas proposes for these streams and any site-specific crossing plans or conservation measures, we have determined that project activities would be *likely to adversely affect* this species where it may be encountered within the MXP corridor. Our recommendation above would ensure that the appropriate section 7 consultation is completed prior to any construction.

4.7.5.1.8 Spectaclecase

The spectaclecase is a large elongated mussel, sometimes curved, and somewhat inflated. This mussel is found in large rivers where it lives in areas sheltered from the main force of the river current. The species often clusters in firm mud and in sheltered areas, such as beneath rock slabs, between boulders, and even under tree roots. The spectaclecase was listed as endangered in 2012 (USFWS, 2012d).

The spectaclecase mussel is a non-MSHCP species that may occur on covered and non-covered lands in Kanawha and Putnam Counties. In coordination with the WVDNR and USFWS, Columbia Gas is conducting mussel surveys at Group 2 stream crossings where federally listed mussels are expected to occur. Surveys are scheduled for completion in 2017. Until we receive confirmation of the AMMs/BMPs that Columbia Gas proposes for these streams and any site-specific crossing plans or conservation measures, we have determined that project activities would be *likely to adversely affect* this species where it may be encountered within the MXP corridor. Our recommendation above would ensure that the appropriate section 7 consultation is completed prior to any construction.

4.7.5.1.9 MXP Conclusion on Special Status Mussel Species

Eight federally protected mussel species may occur within the MXP area, and we have determined that project activities are *likely to adversely affect* seven of these species (clubshell, fanshell, pink mucket, rayed bean, sheepnose, snuffbox, and spectaclecase) if they occur at MXP crossing locations. Project activities, as per the consultation and provision of the MSHCP, are deemed *not likely to adversely affect* the northern riffleshell. Columbia Gas anticipates completion of instream surveys for federally listed mussel species in 2017 and will provide its findings to the USFWS and WVDNR for evaluation. In response to concerns identified by the USFWS regarding the number and locations of stream crossings, Columbia Gas is continuing to work with regulatory agencies to re-align its pipeline crossings in an effort to minimize impacts on mussels to the extent

possible. In section 4.7.5.1 we have recommended that Columbia Gas complete mussel surveys as soon as conditions allow and provide results to the USFWS and WVDNR. We also have recommended that they provide updates to us regarding ESA consultations with the USFWS. Once we receive that information, in compliance with section 7, we will finalize our BA and will request formal consultation with the USFWS.

4.7.5.2 Gulf XPress Project

All GXP activities would occur at relatively small, discrete, primarily upland sites with little to no waterbody impacts. A number of mussel species were identified from agency databases as potentially occurring in the Tennessee and Kentucky counties where GXP facilities are proposed (see discussion in section 4.7.3.2 and table 4.7-2). However, suitable mussel habitat is not present at the proposed compressor station sites, and Columbia Gulf would implement applicable measures in its ECS that are in accordance with state erosion and sediment control standards, as well as the AMMs from the MSHCP designed to protect mussel species. Further, Columbia Gulf would not withdraw or discharge water from area streams. As such, any waterbodies in the general project area that may contain federally listed mussels would be protected. As discussed above, section 7 consultation for all mussel species is complete for the GXP, either by the USFWS providing clearance for a *not likely to adversely affect* determination, or our *no effect* determination. Our recommendation regarding the snuffbox mussel is included in section 4.7.3.2.

4.7.6 Mammals

4.7.6.1 Mountaineer XPress Project

Four protected bat species occur in the MXP area. All four species are MSHCP species, but two, the Indiana bat and NLEB, occur on both MSHCP-covered and non-covered lands. Surveys are ongoing for the Indiana bat and NLEB on non-covered lands. Because ESA section 7 consultation is ongoing for federally protected bat species, **we recommend that Columbia Gas should:**

- **complete required bat surveys as soon as conditions allow and provide survey results to USFWS and WVDNR;**
- **prior to the end of the draft EIS comment period, file an update with the Secretary regarding any further discussions and/or progress made through consultations with the USFWS for the Indiana bat and the NLEB; and**
- **file its Myotid Bat Conservation Plan with the Secretary as soon as it is available.**

Columbia Gas should not begin construction of the MXP until FERC has completed all necessary section 7 consultation with the USFWS for federally listed bat species, and the Director of OEP authorizes construction or implementation of mitigation measures to begin.

A description of each of these species, potential project impacts, and consultation status is provided in the following sections.

4.7.6.1.1 Gray Bat

The gray bat is a cave-dependent species distributed primarily through the cave regions of Missouri, Kentucky, and Tennessee. This species has very specific habitat preferences, and hibernates only in caves that average 42 to 52 degrees Fahrenheit (°F). It summers in caves that are usually located near rivers and lakes to provide easy access to foraging areas. Reproductive females roost in separate maternity caves, away from males and non-reproductive females. Hibernation begins in November, and emergence begins in late March, when females migrate to their maternity caves. Pups are born in May and June. The gray bat was listed as endangered in 1976. Population declines are attributed to vulnerability to human disturbance and alterations of caves and cave entrances (KDFWR, 2014).

MXP activities in Wayne County include modifications to the existing Ceredo Compressor Station. In Kanawha County, the MXP would add compression to the pending Elk River Compressor Station, associated with the WBX (FERC Docket No. CP16-38-000). The gray bat is addressed in the MSHCP and is automatically assigned a determination of not likely to adversely affect based on the species' range and known occurrences relative to the location of the covered lands footprint, the types and anticipated impacts of covered activities, and through the development of mandatory species-specific avoidance measures. Take was not requested for this species by NiSource during development of the MSHCP, but AMMs have been proposed, which include surveys to determine presence of potential summer roosts or winter hibernacula, protection of summer roosts and winter hibernacula, minimizing tree clearing in known gray bat foraging areas, restricting the use of herbicides for vegetation management, and protection of perennial streams, including constructing crossings of perennial streams during low flow conditions between June 1 and November 30. Other AMMs include restrictions on burning and disposal of woody vegetation in the vicinity of known hibernacula, controlling the use and storage of contaminants, erosion control, and restoration of native vegetation where possible. A detailed EM&CP is required for any project within gray bat habitat. If surveys determine that roosting habitat is not present in the project area, the project may proceed with no AMMs required. On September 29, 2016, the USFWS sent out notification that a gray bat had been captured in Logan County, West Virginia, and indicated that gray bats could occur in Wayne and Kanawha Counties in the MXP area. The letter was received after Columbia Gas filed its application; therefore, project specific information for the gray bat was not provided in Columbia Gas' consultation reports. We have assessed the impacts on the gray bat in the context of the MSHCP, and have determined that the provisions of the MSHCP have been met for the gray bat, and no further consultation is necessary.

4.7.6.1.2 Indiana Bat

The Indiana bat is a small bat, weighing only one-quarter of an ounce, although in flight they have a wingspan of 9 to 11 inches. Their fur is dark-brown to black. Indiana bats are found over most of the eastern half of the United States where they forage for flying insects found along rivers or lakes, and in uplands. They hibernate during winter in caves or, occasionally, in abandoned mines. For hibernation, they require cool, humid caves with stable temperatures, under 50 °F but above freezing. Almost half of the known population hibernates in caves in southern Indiana. After hibernation, they migrate to summer habitats in wooded areas where they usually roost under loose tree bark on dead or dying trees (USFWS, 2006). The 2009 population estimate was about 387,000 individuals, less than half as many as when the species was first listed.

The Indiana bat was listed as endangered in 1967 because of disturbance to cave habitats, leading to the loss of hibernating bats (USFWS, 2015a). In addition to disturbance of cave habitats, the continued decline in numbers is attributed primarily to a fungal infection first identified in 2006, White-Nose Syndrome, which affects many species of bats. White-Nose Syndrome is estimated to have killed 5.5 million bats (multiple species) in the northeastern United States and Canada (USFWS, 2015b). Other factors that may be contributing to population loss include summer habitat loss or degradation, pesticides, and environmental contaminants. Indiana bats have been documented in all counties where the MXP would be constructed. On lands covered by the MSHCP, Columbia Gas has identified potential presence through its MSHCP GIS database, which indicates locational presence data for the species.

In MSHCP-covered project areas where this species occurs, Columbia Gas would implement the appropriate AMMs for this species, including prohibiting clearing activities in areas with known maternity colonies between April 1 and October 15 to avoid direct affects to females (pregnant, lactating, and post-lactating) and juveniles (non-volant and volant). Clearing also is prohibited between June 1 and August 1 to protect non-volant Indiana bat pups. No right-of-way side trimming is allowed between April 15 and September 1 to avoid direct affects to females (pregnant, lactating, and post-lactating) and juveniles (non-volant and volant). Other AMMs include restrictions on burning and disposal of woody vegetation in the vicinity of known hibernacula, protections for recharge areas of cave streams and other karst features, restrictions on drilling and blasting in the vicinity of known or presumed hibernacula, and restrictions on the use of herbicides for vegetation management within 5 miles of known or presumed occupied hibernacula. Operators, employees, and contractors working in areas of known or presumed Indiana bat habitat would be educated on the biology of the Indiana bat, activities that may affect bat behavior, and ways to avoid and minimize these effects. We have included the signed MSHCP Interagency ESA Consultation Checklists for the MXP in appendix J-1 and consultation for the Indiana bat within covered lands is complete.

In the remaining counties crossed by the project that are not covered by the MSHCP, Columbia Gas identified suitable summer habitat and initiated presence or probable absence surveys, via acoustic surveys, in summer 2015 and summer 2016. Summer roost tree surveys and hibernaculum portal surveys also were conducted in 2016, and a Myotid Bat Conservation Plan for lands not covered by the MSHCP is being prepared by Columbia Gas in coordination with USFWS. For any suitable habitat where presence or probable absence surveys are not conducted, species presence is assumed. During the 2015 survey effort, Columbia Gas completed acoustic surveys for multiple sites spanning about 33 miles of portions of the MXP not covered by the MSHCP. Indiana bats were confirmed at two sites in Ritchie County, and at none of the survey sites in Calhoun or Wirt Counties. In 2016, Columbia Gas completed acoustic surveys for Indiana bats for the remainder of the MXP. No Indiana bats were confirmed during the 2016 surveys. Mist netting was conducted in 2016 at the two sites in Ritchie County where Indiana bats were identified in 2015, but no Indiana bats were captured. Columbia Gas is continuing consultations with USFWS regarding the Indiana bat on non-covered lands. Our determination is that the MXP is *likely to adversely affect* the Indiana bat. Our recommendation above would ensure that section 7 consultation is complete for the Indiana bat prior to the beginning of any construction activity.

For non-covered lands where MXP activities are *likely to affect* the Indiana bat, the USFWS would address project impacts on this species in its BO and provide reasonable and prudent

measures for avoidance and mitigation. It is anticipated that AMMs for the Indiana bat on non-MSHCP lands would include the mandatory and non-mandatory AMMs for this species as identified in the MSHCP, which include restrictions on clearing and side-trimming, the use of herbicides, and prohibitions on the use of open pits for the storage of waste fluids. The BO also would address take for the species for non-covered areas of the project.

4.7.6.1.3 Northern Long-eared Bat

The NLEB is a medium-sized bat with a wingspan of 9 to 10 inches. As its name suggests, this bat is distinguished by its long ears, particularly as compared to other bats in its genus. NLEBs are found across much of the eastern and north-central United States and all Canadian provinces from the Atlantic Coast west to the southern Northwest Territories and eastern British Columbia. The species' range includes 37 states.

The NLEBs spend winter hibernating in caves and mines. They use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents, often in small crevices or cracks with only the nose and ears visible. During the summer, the NLEB roost singly or in colonies underneath bark, in cavities or crevices of both live and dead trees. Males and non-reproductive females may also roost in cooler places like caves and mines. Less frequently, the bat has also been found roosting in structures such as barns or sheds (USFWS, 2015c).

In April 2015, the NLEB was listed as threatened throughout its range with an interim 4(d) rule (80 FR 17973-18033). The USFWS issued notice of its Final 4(d) Rule on January 14, 2016, and it became effective February 16, 2016.

An MSHCP amendment to include the NLEB was approved by the USFWS and is applicable as of May 1, 2015. AMMs have been approved and incorporated into the amended MSHCP and Incidental Take Permit. AMMs for the NLEB in summer habitat are similar to those for the Indiana bat described above, but clearing windows differ for the species. Where known maternity colonies occur, clearing is prohibited between April 1 and May 31 and from August 2 to October 15 to avoid direct affects to females (pregnant, lactating, and post-lactating) and juveniles (non-volant and volant). Clearing or side trimming is prohibited in known maternity colony or suitable summer habitat areas from June 1 to August 1 to protect non-volant NLEB pups. In accordance with the MSHCP, Columbia Gas identified potential presence of the NLEB in the project area through a search of its MSHCP GIS database. Timing restrictions on clearing, as well as other applicable AMMs would be implemented by Columbia Gas to address impacts. Incidental take for the NLEB on MSHCP-covered lands has been addressed by the MSHCP, and consultation for the NLEB within covered lands is complete. We have included the signed MSHCP Interagency ESA Consultation Checklists for the MXP in appendix J-1.

In the counties crossed by the project that are not covered by the MSHCP, Columbia Gas identified suitable summer habitat and initiated presence or probable absence surveys, via acoustic surveys, in summer 2015. NLEB presence was confirmed at multiple locations. Further acoustic surveys were completed where access was available in 2016. Access was not available at six locations; therefore, surveys must be completed in 2017, when access to the sites is available. In any suitable habitat where presence or probable absence surveys are not conducted, species presence will be assumed. Summer roost tree surveys and potential hibernaculum portal surveys

were conducted in 2016, and a Myotid Bat Conservation Plan for lands not covered by the MSHCP is being prepared in cooperation with the USFWS. NLEB presence was confirmed at project locations in Doddridge, Ritchie, Calhoun, Wirt, Roane, and Putnam Counties. No suitable hibernacula were identified. Consultations with USFWS regarding the NLEB on non-covered lands are continuing. Our determination is that MXP activities are *likely to adversely affect* the NLEB. Our recommendation above would ensure that section 7 consultation is complete for the NLEB prior to the beginning of any construction activity.

For non-covered lands where MXP activities are *likely to affect* the NLEB, the USFWS would address project impacts on this species in its BO and provide reasonable and prudent measures for avoidance and mitigation. It is anticipated that AMMs for the NLEB on non-MSHCP lands would include the mandatory and non-mandatory AMMs for this species as identified in the MSHCP, which include restrictions on clearing and side-trimming, the use of herbicides, and prohibitions on the use of open pits for the storage of waste fluids. The BO also would address take for this species.

4.7.6.1.4 Virginia Big-Eared Bat

The Virginia big-eared bat is a medium-sized cave bat found in the mountains of western Virginia and into West Virginia, Kentucky, and North Carolina and is considered a subspecies of the Townsend's big-eared bat. They have elongated nostril openings, and light to dark brown fur, depending on the age of the individual and sub-species. As the name implies, the ears of the big-eared bat are extremely large, exceeding the length of the entire head by up to two times. This is not a migratory bat, although if disturbed, the entire colony may move to an alternate site (Virginia Department of Game and Inland Fisheries [VDGIF], 20156). The Virginia big-eared bat was listed as endangered in 1979 (USFWS, 1979).

Virginia big-eared bats have been documented in Kanawha County. The only project activity to take place in Kanawha County is the addition of compression at Columbia Gas' pending Elk River Compressor Station, which would be constructed as part of the WB XPress Project, prior to commencement of construction of the MXP. The Elk River Compressor Station would be located within MSHCP-covered lands, and as such MXP activities would be covered by the MSHCP. No known roosting habitat is present within 6 miles of the project area. As this species is a MSHCP-covered species in covered lands and no suitable habitat is present at the compressor station, no AMMs or mitigation are required and section 7 consultation is complete. We have included the signed MSHCP Interagency ESA Consultation Checklists for the MXP in appendix J-1.

4.7.6.1.5 MXP Conclusion on Special Status Bat Species

We have determined that the MXP is *not likely to adversely affect* the Virginia big-eared bat and the gray bat. Surveys are expected to be completed on the gray bat in 2017. We do not anticipate Columbia Gas will identify habitat for these species; and, since they are covered under the MSHCP, and Columbia Gas would follow AMMs, no further consultations would be required. Surveys are expected to be completed for the Indiana bat and NLEB on non-covered lands in 2017, after which Columbia Gas would submit its Myotid Bat Conservation Plan to us and the USFWS for review. In section 4.7.6.1 we have recommended that Columbia Gas complete bat surveys as

soon as conditions allow and provide results to the USFWS and WVDNR. We also have recommended that they provide updates to us regarding ESA consultations with the USFWS, and that no construction activity begin until we have completed all necessary section 7 consultation with the USFWS.

4.7.6.2 Gulf XPress Project

Four protected bat species occur in the GXP area.

4.7.6.2.1 Gray Bat

A description and habitat requirements for the gray bat are provided in section 4.7.6.1.1. Gray bats may occur in all counties in Kentucky where GXP facilities are proposed, and in Wayne County, Tennessee; however, suitable gray bat habitat (i.e., cave habitat) was not identified at project sites during field surveys. In correspondence to Columbia Gulf dated February 16, 2016, the USFWS Kentucky Ecological Services Field Office responded to Columbia Gulf's finding (that no suitable habitat existed for the gray bat at GXP sites) that the USFWS had no further comment and that the requirements of section 7 of the ESA had been fulfilled for the project. In correspondence dated February 15, 2016, the USFWS Tennessee Ecological Services Field Office offered its concurrence that the project would have no adverse impacts on the gray bat. We agree.

4.7.6.2.2 Indiana Bat

A description and habitat requirements for the Indiana bat are provided in section 4.7.6.1.2.

Potential Indiana bat summer habitat was identified in the vicinity of all GXP sites. The Indiana bat is a covered species in the MSHCP with a likely to adversely affect determination. Thus, a project is defined as likely to adversely affect this species without the implementation of AMMs. However, Columbia Gulf has agreed to implement the appropriate AMMs for this species (which are described in section 4.7.6.1.2), including clearing only during those periods described in the MSHCP, when Indiana bats would be less likely to be affected by construction activities.

In its correspondences to Columbia Gulf dated December 9, 2015 (Mississippi Field Office), February 15, 2016 (Tennessee Field Office), and May 24, 2016 (Kentucky field Office), the USFWS concurred that the GXP would not affect federally listed bat species and stated that no additional section 7 consultation would be required. We agree.

4.7.6.2.3 Northern Long-eared Bat

A description and habitat requirements for the NLEB are provided in section 4.7.6.1.3.

Potential NLEB summer habitat was identified in the vicinity of all GXP sites. The NLEB is a covered species in the MSHCP with a likely to adversely affect determination. Thus, a project is defined as *likely to adversely affect* this species without the implementation of AMMs. However, Columbia Gulf has agreed to implement the appropriate AMMs for NLEBs (which are described in section 4.7.6.1.3), including clearing only during those periods described in the MSHCP, when NLEBs would be less likely to be affected by construction activities.

In its correspondences to Columbia Gulf dated December 9, 2015 (Mississippi Field Office), February 15, 2016 (Tennessee Field Office), and May 24, 2016 (Kentucky field Office), the USFWS concurred that the GXP would not affect federally listed bat species and stated that no additional section 7 consultation would be required. We agree.

4.7.6.2.4 Virginia Big-eared Bat

A description and habitat requirements for the Virginia big-eared bat are provided in section 4.7.6.1.4.

Virginia big-eared bat habitat was not identified at project sites occurring within its range. The Virginia big-eared bat is a covered species in the MSHCP with an assigned determination of not likely to adversely affect. Because no habitat exists for this species at project sites within its range, no AMMs would be implemented and no further section 7 consultation is required. In correspondence to Columbia Gulf dated February 16, 2016, the USFWS Kentucky Ecological Services Field Office responded that it had no further comment and that the requirements of section 7 of the ESA had been fulfilled for the project. We agree.

4.7.7 Insects

4.7.7.1 Mountaineer XPress Project

No federally protected insects are within the MXP area.

4.7.7.2 Gulf XPress Project

One federally protected insect species occurs in the GXP area.

4.7.7.2.1 Baker Station Cave Beetle

The Baker Station cave beetle is a subterranean obligate of the twilight zone in limestone caves. It is endemic to Davidson County, Tennessee and is specifically known from the privately owned Baker Station and Bull Run Caves. It is a candidate for listing under the ESA (USFWS, 2014). However, no caves were identified at project sites during field surveys. Furthermore, the GXP would not impact either of the known cave habitats for the Baker Station cave beetle. In correspondence dated February 15, 2016, the USFWS Tennessee Ecological Services Field Office provided concurrence to Columbia Gulf that project activities would have no adverse impacts on the Baker Station cave beetle. We agree.

4.7.8 Crustaceans

4.7.8.1 Mountaineer XPress Project

No federally listed crustaceans occur within the MXP area.

4.7.8.2 Gulf XPress Project

One federally listed crustacean occurs within the GXP area.

4.7.8.2.1 Nashville Crayfish

The Nashville crayfish is a pigmented crayfish with well-developed eyes. Young are released annually during early summer, and the expected lifespan of an individual is about 3 years. The crayfish requires habitat with high water quality, moderate water flow, and rocky substrate, and is endemic to the Mill Creek watershed in Tennessee. It was listed as endangered in 1986. The population is thought to be stable, but threats include water quality deterioration related to nearby development (NatureServe, 2015). The Cane Ridge Compressor Station site is in the Mill Creek watershed; however, it is separated by 470 to 1,100 feet from the creek itself (see section 4.3.2.4). Field surveys conducted at this site did not identify wetland and waterbody features or any habitat suitable for the Nashville crayfish.

During public scoping, we received comments regarding potential impacts on the Nashville crayfish from construction and operation of the Cane Ridge Compressor Station. In response to the findings of Columbia Gulf, the USFWS Tennessee Ecological Field Services Office stated in its February 15, 2016, letter, "Although we would not anticipate the Nashville crayfish occurring on the proposed Nolensville [i.e., Cane Ridge] site, due to its close proximity to Mill Creek with its known occurrences, strict sediment and contaminant runoff prevention measures should be in place during construction of the station and day-to-day operations." The USFWS concurred that avoidance and mitigation measures required in the MSHCP are sufficient for covering potential impacts on the Nashville crayfish. Columbia Gulf has agreed to implement the appropriate protective measures. As such, we agree that the GXP is *not likely to adversely affect* the Nashville crayfish, and that no further section 7 consultation is necessary.

4.7.9 Plants

4.7.9.1 Mountaineer XPress Project

No federally listed plant species within the MXP project area.

4.7.9.2 Gulf XPress Project

Six federally listed plant species are within the GXP project area.

4.7.9.2.1 Braun's Rockcress

The Braun's rockcress is a perennial herb of the mustard family with small white-pink flowers. It is endemic to Kentucky and Tennessee, found specifically near the Kentucky River in Kentucky and the Stones River in Davidson County, Tennessee (USFWS, 1997e). Braun's rockcress habitat was not identified at any of the project sites surveyed in Davidson County in 2015. Because this species was not identified at the site, and because project activities would be consistent with the MSHCP, the GXP *would not affect* this species and no further section 7 consultation is required.

4.7.9.2.2 Guthrie's Ground-plum

The Guthrie's ground-plum, also known as Pyne's ground-plum, is a perennial legume and member of the pea family found at the edges of limestone cedar glades and open areas around

woodlands. It is endemic to Rutherford County, Tennessee, and is known from only eight occurrences (USFWS, 2009). There are no GXP facilities proposed for Rutherford County, nor was this species identified as occurring at the Cane Ridge Compressor Station site in Davidson County during project field surveys. A letter dated February 15, 2016, from the USFWS concurred with Columbia Gulf's determination that Guthrie's ground-plum is not anticipated in the project area and *no effect* on this species is anticipated as a result of project activities. We agree.

4.7.9.2.3 Leafy Prairie-clover

The leafy prairie-clover is a flowering legume found in prairie remnants where thin soil exists over limestone substrate. In Tennessee, it prefers prairie-like areas at the edge of cedar glades. It currently exists at only 14 sites in Illinois, Tennessee, and Alabama (USFWS, 1997f). Leafy prairie-clover was a targeted species during surveys of project sites; however, habitat was not identified during field surveys. Leafy prairie-clover was not identified at either Tennessee site and because project activities would be consistent with the MSHCP. Further, the USFWS provided concurrence that the GXP would not likely to adversely affect the leafy prairie clover and that no further section 7 consultation is necessary. We agree.

4.7.9.2.4 Price's Potato-bean

Price's potato-bean is an herbaceous, twining, perennial vine that arises from a large underground tuber. It prefers lightly disturbed areas such as forest openings and wood edges, and bluffs near streams. Only 13 populations remain today (USFWS, 2015d). Price's potato-bean was a targeted species during surveys of project sites; however, habitat was not identified at any of the project sites. In correspondence dated February 15, 2016, the USFWS Tennessee Ecological Services Field Office provided concurrence to Columbia Gulf that project activities would have no adverse impacts on Price's potato-bean. We agree.

4.7.9.2.5 Running Buffalo Clover

The running buffalo clover is a flowering perennial plant named for the stolons that extend from the base of erect stems and run along the ground surface. The stolons are capable of rooting and expanding the size of a running buffalo clover population. The flower of this species is white and sits above two opposite leaves with three leaflets each (USFWS, 2015e). Running buffalo clover was a targeted species during surveys of project sites; however, habitat was not identified. In correspondence to Columbia Gulf dated February 16, 2016, the USFWS stated that it had no further comments on the running buffalo clover and that project requirements under section 7 of the ESA have been fulfilled. We agree.

4.7.9.2.6 Short's Bladderpod

The Short's bladderpod is a biennial or perennial flowering plant in the mustard family and can grow 20 inches tall. The stem is topped with a cluster of small yellow flowers that bloom in April and May. Typical habitat includes south- to west-facing steep, rocky, wooded and talus slopes along bluffs near rivers and streams. Populations are commonly associated with calcareous outcrops. Its range is limited to habitat in Indiana, Kentucky, and Tennessee. It was listed as endangered in 2014, and critical habitat was designated in Davidson County, Tennessee, later that year (USFWS, 2015f). Threats to this species' viability include maintenance of transportation

rights-of-way, soil erosion, forest succession, and non-native plants (79 FR 148). Critical habitat was designated as 925.5 acres in 20 units in Posey County, Indiana; Clark, Franklin, and Woodford Counties, Kentucky; and Cheatham, Davidson, Dickson, Jackson, Montgomery, Smith, and Trousdale Counties, Tennessee (79 FR 165).

Short's bladderpod was considered as potentially occurring at the Paint Lick site in Garrard County, Kentucky and at the Cane Ridge site in Davidson County, Tennessee. However, suitable habitat was not identified at either of these sites. In correspondence dated November 25, 2015, Columbia Gulf requested review and comment from the USFWS Tennessee Ecological Services Field Office regarding this and other species protected under the ESA. In its response dated February 15, 2016, the USFWS had no comment regarding Short's bladderpod and concluded that the requirements of section 7 of the ESA had been fulfilled. In correspondence to Columbia Gulf dated February 16, 2016, the USFWS Kentucky Ecological Field Services Office stated that it had no further comments on Short's bladderpod and that project requirements under section 7 of the ESA have been fulfilled. We agree.

4.7.10 State-listed Species

4.7.10.1 Mountaineer XPress Project

West Virginia has no state endangered species legislation; therefore, the only species listed as threatened or endangered in the state are those listed as such by the federal government. The WVDNR NHP does assign state rankings to species considered rare based on the species' documented occurrences and distributions as well as other factors, such as habitat and threats to existing populations (WVDNR, 2003c). The SWAP was prepared by the WVDNR to establish comprehensive goals over a 10-year period that will assist in the conservation of West Virginia's biological diversity.

Additionally, the SWAP identifies SGCN. The 2015 SWAP identifies 661 animal species as SGCN. Of the 661 animal species, 319 were assigned Priority 1 status. These 319 Priority 1 species are the focus of conservation activities. Priority 1 species have global and state conservation rankings. The remaining 342 species were assigned Priority 2 status (WVDNR, 2015b).

During the initial phases of the MXP, as part of Columbia Gas' agency consultations, the WVDNR NHP provided electronic shapefiles to Columbia Gas showing SGCN species as well as federally listed threatened and endangered species identified within 10 miles of the MXP. To date, Columbia Gas has identified eight Priority 1 species of birds in the MXP area. Section 4.6.3.1 provides further details and our recommendations regarding these bird species.

Surveys are being undertaken for mussels in suitable streams crossed by the MXP where S2 species have been confirmed (table 4.7-3). The diamond darter, an S1 species also protected under the ESA, is presumed to be present in the Elk River at the Elk River Compressor Station.

Table 4.7-3
Mountaineer XPress Project Mussel Survey Results for Group 1 and Group 2 Streams

Stream Name (Year Survey Performed)	Nearest Milepost	Species Identified a/	State Ranking b/	Determination/Result
Group 1 Streams				
MXP-100				
Little Fishing Creek (2015, 2016)	18.3	None		
Indian Creek (2015)	34.8	None		
Flint Run (2015)	44.05	None		
Buckeye Creek (2015)	48.6	None		
Bluestone Creek (2016)	54.3	None		
Slab Creek (2015, 2016)	71.4	None		
Leatherbark Creek (2015, 2016)	78.9	None		
Straight Creek (2015)	87.5	None		Additional Phase 1 survey required in 2017
Left Fork Reedy Creek	102.8	None		
Middle Fork Reedy Creek (2015)	104.5	None		
Little Mill Creek (2015, 2016)	113.3	None		
Elk Fork (2015)	118.6	Cylindrical papershell	S2	Consultation ongoing
		Fat mucket	S3	
Tug Fork (2015)	121.8	None		
Grasslick Run (2015)	124.5	None		
Parchment Creek (2015)	127.1	None		
Eighteenmile Creek-2 (2015)	138.4	None		
Eighteenmile Creek-3 (2015)	138.9	Wabash pigtoe, fat mucket, pink heelsplitter	S3	Consultation ongoing
Eighteenmile Creek-1 (2015)	140.0	Pocketbook	S1	Consultation ongoing
		White heelsplitter	S2	
Buffalo Branch (2015, 2016)	140.3	None		
Trace Creek (2016)	154.7	None		
Indian Fork (2016)	161.4	None		
Mud River (2015)	163.4	None		
Group 2 Stream Scoping Surveys				
MXP-100				
Fish Creek (2015, 2016)	7.1	Plain pocketbook	S2	Consultation ongoing
		Pink heelsplitter	S3	
Fishing Creek (2015)	24.5	Plain pocketbook,	S2	Consultation ongoing
		Fluted-shell, pink heelsplitter	S3	
McElroy Creek (2015)	39.1	Rainbow mussel	S2	Consultation ongoing – additional surveys to be completed in 2017
		Threeridge, fatmucket, fluted-shell, round hickorynut	S3	

Table 4.7-3
Mountaineer XPress Project Mussel Survey Results for Group 1 and Group 2 Streams

Stream Name (Year Survey Performed)	Nearest Milepost	Species Identified a/	State Ranking b/	Determination/Result
South Fork Hughes River (2015)	67.3	Threeridge, round hickorynut, giant floater, pink heelsplitter	S3	Consultation ongoing – additional surveys to be completed in 2017
	72.2	Threeridge, fatmucket, fluted-shell, round hickorynut, (shells of giant floater were found but no live individuals)	S3	Consultation ongoing – additional surveys to be completed in 2017
		Lady finger	S2, S3	
	72.3	Pistolgrip	S2	Consultation ongoing – additional surveys to be completed in 2017
		Lady finger	S2, S3	
		Threeridge, fatmucket, fluted-shell, round hickorynut, pink heelsplitter	S3	
	76.9	Pistolgrip	S2	Consultation ongoing – additional surveys to be completed in 2017
		Lady finger	S2, S3	
		Threeridge, fatmucket, fluted-shell, round hickorynut, Wabash pigtoe, kidneyshell	S3	
Little Kanawha River (2015)	94.8	Wavy-rayed lampmussel, fragile papershell	S2	Consultation ongoing – additional surveys to be completed in 2017
		Lady finger	S2, S3	
		Mucket, kidneyshell, pimpleback, creeper	S3	
Spring Creek (2015)	96.5	Wavy-rayed lampmussel, plain pocketbook	S2	Consultation ongoing – additional surveys to be completed in 2017
		Lady finger	S2, S3	
		Threeridge, fatmucket, fluted-shell, creeper, Wabash pigtoe, kidneyshell, round hickorynut	S3	
	96.9	Lady finger	S2, S3	Consultation ongoing – additional surveys to be completed in 2017
		Threeridge, fatmucket, fluted-shell, creeper, Wabash pigtoe, giant floater, pimpleback, kidneyshell	S3	
	97.3	Lady finger	S2, S3	Consultation ongoing – additional surveys to be completed in 2017
		Threeridge, fatmucket, fluted-shell, creeper, giant floater, Wabash pigtoe	S3	

Table 4.7-3
Mountaineer XPress Project Mussel Survey Results for Group 1 and Group 2 Streams

Stream Name (Year Survey Performed)	Nearest Milepost	Species Identified a/	State Ranking b/	Determination/Result
Group 2 Streams Phase I Mussel Surveys				
MXP-100				
Fish Creek (2016)	7.1	Plain pocketbook	S2	Consultation ongoing
		Pink heelsplitter	S3	
Fishing Creek (2016)	24.5	Fragile papershell, plain pocketbook, white heelsplitter	S2	Consultation ongoing
		Mucket, Wabash pigtoe, fatmucket, fluted-shell, pink heelsplitter, giant floater, creeper	S3	

a None of the species identified are federally listed.
b Source: NatureServe Explorer.

Pursuant to West Virginia Code Section 20-2-4 and Code of State Rules 58-60-5.11, and in accordance with the West Virginia Mussel Survey Protocols (Protocols), in addition to the nine federally listed mussel species known to occur in West Virginia, all native freshwater mussels are protected within the state (USFWS, 2015g). Columbia Gas, in consultation with the WVDNR, has developed survey protocols for determining MXP impacts on protected mussel species. For ease of determining the appropriate protocol for mussel surveys, West Virginia streams have been categorized into four groups (Clayton et al., 2014):

- Group 1: High Quality Streams (as listed by the WVDNR as having potential for habitat for mussels) and state-listed mussel streams. Endangered species are not expected.
- Group 2: Small to mid-sized streams where endangered species are expected.
- Group 3: Large rivers where endangered species are not expected. These include the Ohio River upstream of Hannibal Lock and Dam (New Martinsville, West Virginia) and the Monongahela River.
- Group 4: Large rivers where endangered species are expected. These include the Ohio River downstream of Hannibal Lock and Dam, Little Kanawha River (slackwater section adjoining the Ohio River), and Kanawha River.

Based on review of the WVDNR Mussel Stream Listings, 22 project waterbody crossings are categorized as Group 1 streams (high quality streams where federally listed species are not anticipated but mussels protected by the WVDNR may be present). Columbia Gas obtained permits from the WVDNR to survey Group 1 streams along the project route in 2015 and 2016, and has completed surveys of all Group 1 streams crossed by the MXP. As shown in table 4.7-3, state protected mussel species were identified in Elk Fork, at MP 118.6, and in Eighteenmile Creek at two crossing locations (MP 138.9 and MP 140.0).

Columbia Gas also obtained permits to conduct scoping surveys in Group 2 streams to identify habitat suitability and potential presence upstream and downstream of a "preferred" centerline crossing. State-protected mussel species were identified at 11 pipeline crossing locations of Group 2 streams along the MXP-100 corridor, as shown in table 4.7-3.

In 2016, Columbia Gas biologists also completed Phase 1 surveys of Fish Creek at MP 7.1 and Fishing Creek at MP 24.5. For pipeline disturbances in Group 2 streams, the Protocols require upstream and downstream buffer areas to be surveyed, as well as the area of direct impact. Qualified biologists searched upstream and downstream for a total distance of 558 feet at each Group 2 stream crossing. Mussel species identified during the Phase 1 survey of Fish Creek and Fishing Creek are listed in table 4.7-3. Additional surveys are scheduled for 2017 at specific crossings along the MXP corridor where additional information is required. Consultation with the WVDNR is ongoing regarding impacts on protected mussel species. Because this consultation has not been completed, **we recommend that:**

- **Prior to construction, Columbia Gas should file documentation with the Secretary, regarding Columbia Gas' consultation with the WVDNR for state-listed mussel species, including any updated stream crossing plans and/or additional mitigation measures for all locations where state-listed mussels may occur.**

4.7.10.2 Gulf XPress Project

In addition to species protected by the ESA, Kentucky, Tennessee, and Mississippi have state laws to protect threatened, endangered, rare, and sensitive species. These laws and programs are discussed below, and threatened or endangered species with potential to occur in counties where Columbia Gulf would construct and operate compressor stations or other facilities are listed in appendix K. Early in the project planning process, Columbia Gulf contacted the KDFWR, the Tennessee Natural Heritage Inventory Program, and the Mississippi Museum of Natural Science requesting information on protected species in the vicinity of the proposed compressor station sites and related work areas. Columbia Gulf conducted surveys at all GXP activity locations in 2015. Surveys were intended to identify sensitive or unique environmental features potentially occurring on project sites, such as wetlands and waterbodies, habitat assessments for rare and listed species, and noxious and invasive vegetation. As noted in section 4.7.3.1, the AMMs required for federally protected species at project sites by proxy extend conservation measures to state-listed species as well.

Species listed in appendix K were identified through a review of information provided by Columbia Gulf and our review of state wildlife management program/NHP online databases. Some of the species in appendix K may have been identified from just one or two observations in the counties where they are listed and are likely not resident. Additionally, some of the state-listed species also have federal protections, such as the gray bat. Those species listed in appendix K that are protected under federal law are discussed in section 4.7.3.2 and are not discussed further in this section. During our independent review of state agency databases for listed species, we identified an additional 19 state-listed species that were not previously identified or consulted on by Columbia Gulf. Consultation for these 19 state-listed species has not been completed. **We further recommend that:**

- **<u>Prior to construction</u>, Columbia Gulf should file with the Secretary updated consultations with the KDFWR regarding the state-listed species noted as "consultation still ongoing" in appendix K of the Commission staff's EIS.**

4.7.10.2.1 Kentucky

Kentucky strives to enhance wildlife diversity and promote sustainable use of wildlife resources. The KDFWR Wildlife Diversity Program works to protect wildlife species through research, management, and education. This includes protection of threatened and endangered species, species of greatest conservation need identified within Kentucky's Wildlife Action Plan and their habitats, and protection of sensitive areas (KDFWR, 2016). Title 301 of the KAR makes it "unlawful for any person to import, transport, possess, process, sell, or offer for sale any endangered species." (301 KAR 3:061). Endangered species are defined as any species or subspecies designated as endangered under the ESA. The law does not provide protection for species listed as threatened under the ESA. We identified 103 Kentucky state-listed threatened and endangered species with records of occurrence in counties where project activities are proposed. Species include reptiles, amphibians, birds, crustaceans, fish, insects, mammals, mussels, and plants. For the majority of these species, as noted in appendix K, required habitat conditions do not exist at the GXP facility locations.

Amphibians

The eastern hellbender was identified as occurring in two counties where the GXP would construct facilities: the Morehead Compressor Station in Rowan County, and the approved Grayson Compressor Station in Carter County. Based on our review of the sites, habitat requirements of the species, and information from Columbia Gulf's June 2015 general biological surveys of the project sites, there is no suitable habitat for the state-listed eastern hellbender at either site; thus no impacts on this species would be expected. The KDFWR concluded that no further consultation was required for this species (letter dated January 12, 2016). We agree.

Birds

Records of state-listed threatened and endangered bird species were identified in all counties where GXP facilities would be constructed. The majority of the species identified require wetland or open water habitats, although a few are considered forest species. The GXP facilities in Kentucky would be constructed primarily in cleared upland farmed areas, although each of the station sites contain minor ephemeral drainages and small wetland areas. Little natural habitat remains at the sites, except at the fringes where some tree buffers exist. There is no habitat at any of the GXP compressor station sites, or at the Leach C Meter Station, for bird species associated with wetlands and waterbodies or forested habitats. None of the state-listed bird species are expected to occur at the GXP sites in Kentucky, and therefore, no impacts would be expected for these species. In a letter dated January 12, 2016, the KDFWR concluded that the GXP would not impact state-listed species and no further consultation was required. We agree. However, as recommended above, Columbia Gulf should consult with KDFWR regarding the 19 state-listed birds that were absent from initial consultations.

Fish

State-listed threatened and endangered fish species known to occur in Boyd, Carter, Garrard, Metcalfe, and Rowan Counties are identified in appendix K. Based on our desktop review of the GXP facility sites, which included topographic and aerial mapping, site photographs, review of Columbia Gulf's field survey information, and publicly available species accounts, no suitable habitat exists for state-listed fish species at any of the GXP facility sites. GXP activities would take place within primarily upland sites with little to no waterbody impacts. To limit indirect impacts on streams in the vicinity of the project, Columbia Gulf would implement measures in its ECS, which meet BMPs for erosion and sediment control in Kentucky. Thus, no impacts on these species would be expected from construction and operation of the GXP in Kentucky. The KDFWR concluded that the GXP would not impact state-listed fish species (letter dated January 12, 2016). We agree.

Crustaceans

No suitable habitat exists at the approved Grayson Compressor Station in Carter County for the amphipod *Crangonyx caecus*, which is found in pools in caves. All project work at this location would be within the fenceline of the station and the original construction footprint. Therefore, no impacts on this species are anticipated from project activities and no further consultation is required.

Insects

As noted in appendix K, field surveys of the GXP sites by Columbia Gulf biologists identified no suitable habitat for the Kentucky stonefly or silphium borer moth at the Morehead Compressor Station site, olethreutine moth or frosted elfin at the Paint Lick Compressor Station site, or the early hairstreak or karst snowfly at the Goodluck Compressor Station site. In its January 12, 2016, response to a request for concurrence that the GXP would not impact state-listed insect species, the KDFWR replied that it did not anticipate impacts on listed species, critical habitat, wildlife management areas, or other critical areas. We agree.

Mammals

State-listed bat species in Kentucky that are federally protected, including the gray bat, Indiana bat, and NLEB, are discussed previously in section 4.7.6.2. Columbia Gulf identified suitable habitat for the small-footed myotis at project sites, and presence of this species is possible. No caves were identified at any of the GXP sites during field surveys in 2015, and Columbia Gulf did not identify suitable winter habitat at any of the new compressor station sites. Columbia Gulf also determined that the new station sites are not within any known "swarming habitat" buffer of hibernacula known to contain federally listed bat species. Based on the lack of suitable roosting caves and the conservation measures to be implemented for federally listed bat species described in section 4.7.6.2, no impacts would be anticipated for state-listed bat species. In correspondence dated January 12, 2016, the KDFWR concurred that no further consultation was required for state-listed bat species.

Mussels

Mussel species listed in appendix K that also are federally protected are discussed in section 4.7.5.2. Field surveys conducted by Columbia Gulf biologists determined that no suitable habitat exists for any of the listed mussel species at the project locations in Kentucky. All GXP activities would take place within primarily upland sites with little to no waterbody impacts. To minimize indirect effects on streams within the vicinity of the project work areas, Columbia Gulf would implement measures from its ECS, which is compliant with Kentucky erosion and sediment control regulations and also with FERC's Plan and Procedures. Columbia Gulf would not withdraw water from or discharge water to any streams. In its January 12, 2016, response to Columbia Gulf's request for review of potential project impacts on state-listed species, the KDFWR recommended that Columbia Gulf minimize impacts on the aquatic environment by developing and implementing erosion control measures prior to construction to reduce siltation into waterways in the project area. Recommended erosion control measures include silt fences, staked straw bales, brush barriers, sediment basins, and diversion ditches. The KDFWR further recommended that erosion control measures should be inspected and repaired regularly, as needed. As discussed in section 2.4, Columbia Gulf's ECS outlines the company's BMPs that would be implemented during construction. By abiding by the protocols of its ECS, Columbia Gas would satisfies the KDFWR's recommendation. We would verify compliance with the ECS via our construction monitoring and inspection program.

Plants

Based on surveys of the GXP work areas, Columbia Gulf determined that no suitable habitat exists for the plant species listed in appendix K. Therefore, no impacts would be anticipated from project activities. The KDFWR indicated in correspondence to Columbia Gulf on January 12, 2016, that due to the location and nature of the project, it did not anticipate impacts to listed species identified by Columbia Gulf or any associated critical habitat, wildlife management areas, or other critical areas. We agree.

Reptiles

No suitable habitat exists for the coal skink at the Paint Lick Compressor Station site. Thus, no impacts on the coal skink would be expected and no further consultation is required for this species. A letter from KDFWR dated January 12, 2016, confirmed that no state-listed species or any associated critical habitat occurs near the GXP sites (KDFWR, 2016). We agree.

4.7.10.2.2 Tennessee

Tennessee adopted separate acts for protecting animals and plants in the state. The Tennessee Nongame and Endangered or Threatened Wildlife Species Conservation Act of 1974 makes it unlawful for any person to "take, attempt to take, possess, transport, export, process, sell or offer for sale or ship nongame wildlife." Endangered species may include any species of wildlife whose survival within the state is in jeopardy within the foreseeable future, as determined by the Tennessee Fish and Wildlife Commission. It also includes any species listed as endangered under the federal ESA (State of Tennessee, 1974). The Tennessee Rare Plant Protection and Conservation Act of 1985 requires a person to obtain permission from the appropriate source

before removing or destroying a listed plant species. Endangered plant species may include any species of plant "whose continued existence as a viable component of the state's flora is determined by the Commissioner to be in jeopardy," including plants listed as endangered under the federal ESA (State of Tennessee, 1985). We identified 36 state-listed species in Tennessee where project activities would occur. Species included birds, crustaceans, fish, mussels, and plants.

Birds

Based upon desktop review and information obtained from Columbia Gulf's June 2015 general biological surveys of the project sites, there is no suitable habitat for the state-listed Bachman's sparrow or Bewick's wren, and no specific habitat for the peregrine falcon in the project vicinity. Peregrine falcons utilize varied habitats, however, which can sometimes include farmlands such as those occurring at the project area. Any potential impacts on peregrine falcons would be indirect, such as the minor loss of foraging habitat in isolated areas once construction of the project facilities is complete. On June 22, 2015, the TDEC NHP reviewed rare species data for the project area and did not list records for the peregrine falcon. Columbia Gulf contacted the TDEC by telephone on February 9, 2016, to confirm that the GXP would not have direct or major indirect impacts on this species, to which TDEC concurred (TDEC, 2016). We conclude that no further consultation is required for state-listed bird species in Tennessee.

Crustaceans

In its June 22, 2015, response to Columbia Gulf's request for a rare species database review, the TDEC NHP identified the Nashville crayfish as having been observed within 1 mile of the Nolensville (i.e., Cane Ridge) site. As discussed in section 4.7.8.2, no suitable habitat exists for the Nashville crayfish at the Cane Ridge Compressor Station site, and project activities would not directly impact Mill Creek, a stream with suitable habitat for this species. Further, Columbia Gulf would implement its ECS, which complies with the Tennessee Erosion and Sediment Control Handbook, and adopts and incorporates most of the requirements included in FERC's Plan and Procedures. Implementation of Columbia Gulf's ECS and its site-specific E&SC Plan would confine sediment to disturbed areas on the site, and spill control measures would prevent any hazardous materials from contaminating either the site or runoff from the site. Columbia Gulf confirmed with the TDEC in a phone call on February 9, 2016, that no further consultation was required for this species. As discussed in section 2.4, Columbia Gulf's ECS outlines the company's BMPs that would be implemented during construction. By abiding by the protocols of its ECS, Columbia Gas would satisfies the TDEC's recommendation. We would verify compliance with the ECS via our construction monitoring and inspection program.

Fish

The Columbia Gulf field survey report for the Cane Ridge Compressor Station site describes it as hayed in the western portion, while the eastern side includes the Columbia Gulf right-of-way and a degraded mesic hardwood system that is actively grazed. No suitable habitat exists for the state-listed blue sucker or lake sturgeon at the Cane Ridge site, and therefore, no impacts on these species would occur from the GXP activities. The TDEC confirmed on February 9, 2016, that no further consultation was required for fish species. We agree.

Mussels

In its June 22, 2015, response to Columbia Gulf's request for a rare species database review, the TDEC NHP identified the Nashville crayfish and water stitchwort within 1 mile of the Cane Ridge Compressor Station site, and the glade cleft phlox and a cave obligate planarian within 4 miles of the site, but did not identify any mussel species. No suitable habitat exists for the state-listed Cumberlandian combshell, orangefoot pimpleback, pink mucket, or tan riffleshell at the Cane Ridge site. No instream work is proposed at this site. Columbia Gulf would implement its ECS, which complies with the Tennessee Erosion and Sediment Control Handbook, and adopts and incorporates most of the requirements included in FERC's Plan and Procedures. Implementation of Columbia Gulf's ECS and its site-specific E&SC Plan would confine sediment to disturbed areas on the site, and spill control measures would prevent any hazardous materials from contaminating either the site or runoff from the site. As noted previously for the Nashville crayfish, we would verify compliance with the ECS via our construction monitoring and inspection program. We therefore have determined that the GXP will not impact state-listed mussels.

Plants

No suitable habitat exists at the Tennessee project sites for the state-listed plants identified in appendix K. The TDEC NHP identified records for the water stitchwort in Davidson County and Price's potato-bean in Wayne County. The TDEC stated that the "habitat in both project areas has been previously impacted by agricultural use and the habitat for the above state and federal listed plants appears scarce in in the project vicinity. As such, we currently anticipate little if any impact to these species" (TDEC, 2015). No habitat for these species was identified during biological field surveys of the sites. Columbia Gulf confirmed with the TDEC on February 9, 2016, that no further consultation was required for these species. We agree.

4.7.10.2.3 Mississippi

Mississippi's endangered species law, "Nongame and Endangered Species Conservation Act of 1974," declares that "Species or subspecies of wildlife indigenous to the state should be accorded protection in order to maintain and to the extent possible enhance their numbers." An endangered species or subspecies of wildlife is one whose survival and continued welfare in the state is in jeopardy or is likely to become so in the near future. The law prohibits taking, possessing, transporting, exporting, offering to sell, or offering to ship endangered species. Mississippi's official list of endangered species is reviewed every 2 years by the MDWFP and may be amended by additions or deletions as deemed appropriate. The MDWFP is responsible for management of endangered species and enforcement of the Nongame and Endangered Species Conservation Act (MDWFP, 2014). We identified two species of state-listed birds in Mississippi that could be present in the counties where project activities are proposed.

Based on desktop review of the project sites and information provided from Columbia Gulf's July 2015 general biological surveys of the project sites in Mississippi, there is no suitable habitat for the state-listed Bewick's wren at the New Albany Compressor Station site in Union County. Additionally, there is no suitable habitat for the state-listed wood stork at the Holcomb Compressor Station site in Grenada County. Thus, no impacts on Bewick's wren or the wood stork are expected as a result of the project and no further consultation is required. A letter dated

February 8, 2016, from the MDWFP stated that "Based on information provided, we conclude that if best management practices are properly implemented, monitored, and maintained (particularly measures to prevent, or at least, minimize negative impacts to water quality), the proposed project likely poses no threat to listed species or their habitats." (MDWFP, 2016a). Through our construction monitoring and inspection program, we would verify Columbia Gulf's compliance with its ECS, which would satisfy the MDWFP's recommendation.

4.7.11 Conclusion

4.7.11.1 Mountaineer XPress Project

As noted in section 4.7.10.1, West Virginia has no state endangered species legislation, and the only species listed as threatened or endangered in the state are those listed as such by the federal government. However, all native mussel species are protected in West Virginia (60 species). The WVDNR NHP keeps records of state-ranked rare as well as federally listed threatened and endangered species. According to the USFWS, four bat species, one fish species, and eight mussel species protected under the ESA are in the MXP project vicinity. The WVDNR NHP provided electronic shapefiles to Columbia Gas for state-ranked rare as well as federally listed threatened and endangered species found within 10 miles of the MXP, and Columbia Gas is working with federal and state agencies to coordinate surveys and develop suitable protocols to protect sensitive state resources. We have also recommended that Columbia Gas file updated information regarding its consultation with the WVDNR concerning mussel species and stream crossings.

4.7.11.2 Gulf XPress Project

According to the USFWS, there are 4 bat species, 1 fish, 18 species of mussels, 1 insect, 1 crustacean, and 6 plant species that are protected under the ESA which may occur within the GXP project areas. We have determined that the GXP would have either no effect or not likely to adversely affect all of the federally listed species that could occur in the project vicinity. Consultation with the USFWS under section 7 is complete on all but one (snuffbox mussel) of these species. Columbia Gulf consulted with KDFWR, TDEC, and MDWFP regarding the presence/absence of state-listed species within the proposed facility site locations. It is unlikely that the GXP would impact state-listed species as a result of construction and operation; and the three state agencies made the same conclusions. With the exception of the 19 birds that have not been consulted on with KDFWR, consultations for state-listed species in all three states is complete. We have recommended that Columbia Gulf filed updated information regarding its consultation with KDFWR concerning state-listed birds.

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

4.8.1 Land Use

4.8.1.1 Land Use Types within the Project Areas

4.8.1.1.1 Mountaineer XPress Project

Six general land use types would be affected by the MXP. Table 4.8-1 summarizes the acreage of each land use type that would be affected by construction and operation of the project.

The definitions of each land use type are as follows:

- **Agricultural:** cultivated or rotated cropland, orchards, vineyards, or hay fields;
- **Developed Land:** industrial and commercial areas (including manufacturing, landfills, quarries, mines, and retail areas), residential areas (including yards and subdivisions), and transportation corridors (including railroads, highways, and local roads);
- **Forested:** upland forest including evergreen dominant, deciduous dominant, and mixed forests, hedgerows; and forested wetlands from land use cover data where field surveys did not identify a wetland;
- **Open Land:** non-forested upland areas used for open space, pasture, grass and shrubs on previously disturbed areas of land such as mines and utility rights-of-way; and emergent wetlands from land use/land cover data where field surveys did not identify a wetland;
- **Open Water:** delineated surface waters, such as permanently flooded lakes and ponds, perennial rivers and streams, reservoirs, and stormwater retention areas; and
- **Wetland:** delineated emergent herbaceous, scrub shrub, and forested wetlands.

Table 4.8-1
Summary of Existing Land Uses Affected by Construction and Operation of the MXP (acres) a/

Project/Facility Type/Facility	Agricultural		Developed		Forested		Open Land		Open Water c/		Wetland		Total	
	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.
NEW PIPELINES														
MXP-100	337.4 b/	141.9	44.8 b/	18.0	1,916.5 b/	763.0	134.3 b/	58.1	17.2	7.5	6.0	4.0	2,456.0 a/ b/	992.5
Cathodic Protection	1.6	1.6	1.1	1.1	1.1	1.1	0.4	0.4	<0.1	<0.1	<0.1	<0.1	4.3	4.3
MXP-200	7.1	3.5	1.0	0.6	47.3	23.8	3.6	1.8	0.6	0.3	0.2	0.1	59.9	30.1
Cathodic Protection	<0.1	<0.1	0.0	0.0	0.4	0.4	0.0	0.0	<0.1	<0.1	<0.1	<0.1	0.4	0.4
X59M1 Line d/	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
New Pipeline Subtotal	*346.0 a/ b/*	*147.0*	*46.9 b/*	*19.8 a/*	*1,965.3 b/*	*788.2 a/*	*138.3 b/*	*60.3*	*17.8*	*7.7 a/*	*6.2*	*4.2 a/*	*2,520.6 a/ b/*	*1,027.3 a/*
PIPELINE REPLACEMENTS														
SM80 Line	0.0	0.0	0.0	0.0	0.8	0.6	2.0	1.3	0.0	0.0	0.0	0.0	2.8	1.9
SM80 Loop Line	0.0	0.0	0.0	0.0	1.3	0.6	1.0	0.8	0.0	0.0	0.0	0.0	2.3	1.4
Replacement Pipeline Subtotal	*0.0*	*0.0*	*0.0*	*0.0*	*2.1*	*1.2*	*3.0*	*2.1*	*0.0*	*0.0*	*0.0*	*0.0*	*5.1 a/*	*3.3 a/*
Pipeline Facility Total	**346.0 b/**	**147.0**	**46.9 b/**	**19.8**	**1,967.4 b/**	**789.5 a/**	**141.3 b/**	**62.4**	**17.8**	**7.7**	**6.2**	**4.2**	**2,525.7 a/ b/**	**1,030.6 a/**
ACCESS ROADS														
MXP-100 Access Roads	12.9	0.0	82.9	0.0	121.3	0.0	26.6	0.0	1.6	0.0	0.1	0.0	245.4	0.0
MXP-200 Access Roads	1.1	0.0	7.1	0.0	16.0	0.0	2.1	0.0	0.2	0.0	<0.1	0.0	26.3 a/	0.0
SM80 Line Access Roads	0.0	0.0	<0.1	<0.1	0.1	0.1	0.2	0.2	<0.1	<0.1	0.0	0.0	0.3	0.4
SM80 Loop Line Access Roads	0.0	0.0	0.1	0.1	1.0	0.8	1.0	0.9	<0.1	<0.1	0.0	0.0	2.1	1.8
Access Roads Total	**13.9 a/**	**0.0**	**90.0 a/**	**0.1**	**138.4**	**0.9**	**29.9**	**1.1**	**1.8**	**<0.1**	**0.1**	**0.0**	**274.1**	**2.2 a/**
NEW ABOVEGROUND FACILITIES														
LEX Header Tie-in	2.4	0.3	0.1	0.0	0.3	0.0	<0.1	0.0	0.0	0.0	0.0	0.0	2.8	0.3

Table 4.8-1
Summary of Existing Land Uses Affected by Construction and Operation of the MXP (acres) a/

Project/Facility Type/Facility	Agricultural		Developed		Forested		Open Land		Open Water c/		Wetland		Total	
	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.
MXP/Line 1983 Tie-in (MXP 200 MP)	0.0	0.0	<0.1	<0.1	0.6	0.3	0.1	0.1	<0.1	0.0	0.0	0.0	0.7	0.4
Tie-in Subtotal	*2.4*	*0.3*	*0.1*	*<0.1*	*0.9*	*0.3*	*0.1*	*0.1*	*<0.1*	*0.0*	*0.0*	*0.0*	*3.5*	*0.7*
Ripley Regulator Station	0.1	0.1	0.2	0.2	0.3	0.3	0.2	0.2	<0.1	<0.1	0.0	0.0	0.7 a/	0.7 a/
Saunders Creek Regulator Station	0.2	0.2	0.0	0.0	7.3	4.9	3.2	1.9	0.0	0.0	0.0	0.0	10.7	7.0
Regulator Subtotal	*2.7*	*0.6*	*0.3*	*0.2*	*8.5*	*5.5*	*3.5*	*2.2*	*<0.1*	*<0.1*	*0.0*	*0.0*	*14.9*	*8.4*
MXP-1 Valve Site	0.0	0.0	0.3	0.3	0.3	0.3	1.0	1.0	0.0	0.0	0.0	0.0	1.5 a/	1.6
MXP-2 Valve Site	0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0	0.0	0.0	0.0	0.2 a/	0.3 a/
MXP-3 Valve Site	0.0	0.0	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	0.0	0.0	0.0	0.0	<0.1	0.2
MXP-4 Valve Site	0.0	0.1	0.0	<0.1	0.0	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.1
MXP-5 Valve Site	0.0	0.0	<0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2
MXP-6 Valve Site	0.0	0.0	<0.1	<0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1
MXP-7 Valve Site	0.0	<0.1	0.0	<0.1	0.0	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
MXP-8 Valve Site	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
MXP-9 Valve Site	<0.1	<0.1	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.1
MXP-10 Valve Site	0.0	0.0	0.1	0.1	<0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.2	0.4
MLV Subtotal	*0.1*	*0.4*	*0.7*	*0.7*	*0.4*	*0.8*	*1.3*	*1.6*	*0.0*	*0.0*	*0.0*	*0.0*	*2.1*	*3.2*

Table 4.8-1
Summary of Existing Land Uses Affected by Construction and Operation of the MXP (acres) a/

Project/Facility Type/Facility	Agricultural		Developed		Forested		Open Land		Open Water c/		Wetland		Total	
	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.
Sherwood Compressor Station and Sherwood Lateral Tie-in	22.5	9.4	1.4	0.8	5.4	1.5	0.4	<0.1	<0.1	<0.1	0.0	0.0	29.7	11.8 a/
White Oak Compressor Station	10.2	6.3	0.2	0.1	6.3	2.4	0.0	0.0	<0.1	<0.1	<0.1	0.0	16.6 a/	8.7 a/
Mount Olive Compressor Station	0.0	0.0	0.8	0.1	29.9	9.1	0.5	0.1	0.1	<0.1	0.0	0.0	31.3	9.2 a/
New CS Subtotal	*32.7*	*15.7*	*2.4*	*1.0*	*41.6*	*13.0*	*0.9*	*0.1*	*0.2*	*0.2*	*<0.1*	*0.0*	*77.6*	*29.7*
New Aboveground Facilities Subtotal	35.5	16.6	3.1	1.5	50.4	19.3	5.5 a/	3.8 a/	0.2	<0.1	<0.1	0.0	94.8 a/ b/	41.2 a/
APPROVED, PENDING, OR EXISTING ABOVEGROUND FACILITIES														
Approved e/ Lone Oak Compressor Station	0.0	0.0	10.3	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	0.0	0.0	10.3	0.0
Existing Ceredo Compressor Station	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	0.0
Pending f/ Elk River Compressor Station	0.0	0.0	7.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4	0.0
Subtotal	*0.0*	*0.0*	*32.0*	*0.0*	*0.0*	*0.0*	*<0.1*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*32.0*	*0.0*
All Aboveground Facilities Total	**35.5**	**16.6**	**35.1**	**1.5 a/**	**50.4**	**19.3 a/**	**5.5 a/**	**3.8**	**0.2 a/**	**<0.1**	**<0.1**	**0.0**	**126.8 a/ b/**	**41.2 a/**
PIPE YARDS AND STAGING AREAS														
Pipe Yards	58.9	0.0	109.1	0.0	16.8	0.0	73.9	0.0	0.1	0.0	0.5	0.0	259.3	0.0

Table 4.8-1
Summary of Existing Land Uses Affected by Construction and Operation of the MXP (acres) a/

Project/Facility Type/Facility	Agricultural		Developed		Forested		Open Land		Open Water c/		Wetland		Total	
	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.	Constr.	Oper.
Staging Areas	155.5	0.0	7.2	0.0	28.0	0.0	20.1	0.00	0.1	0.0	0.5	0.0	211.4	0.0
Pipe Yard and Staging Area Total	**214.4**	**0.0**	**116.3**	**0.0**	**44.8**	**0.0**	**94.0**	**0.0**	**0.1 a/**	**0.0**	**1.0**	**0.0**	**470.7 a/**	**0.0**
ATWS														
MXP-100 ATWS	39.8	0.0	5.7	0.0	123.6	0.0	18.7	0.0	<0.1	0.0	0.2	0.0	188.0	0.0
MXP-200 ATWS	0.6	0.0	0.2	0.0	1.8	0.0	0.3	0.0	0.0	0.0	0.0	0.0	2.9	0.0
X59M1 Line ATWS	0.0	0.0	0.1	0.0	<0.1	0.0	<0.1	0.0	<0.1	0.0	0.0	0.0	<0.1	0.0
SM80 Line ATWS	0.0	0.0	0.0	0.0	0.7	0.0	0.4	0.0	0.0	0.0	0.0	0.0	1.1	0.0
SM80 Loop ATWS	0.0	0.0	0.0	0.0	0.7	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.8	0.0
ATWS Total	**40.4**	**0.0**	**6.0**	**0.0**	**126.8**	**0.0**	**19.5**	**0.0**	**<0.1 a/**	**0.0**	**0.2**	**0.0**	**192.9**	**0.00**
Project Total	**650.2**	**163.6**	**294.3**	**21.4**	**2,327.8**	**809.7**	**290.2**	**67.3**	**20.2**	**7.9**	**7.6**	**4.2**	**3,590.2 a/**	**1,074.1 a/**

Source: Provided by Columbia Gas Transmission, LLC. Land use classifications were based on a GIS review of West Virginia University's Natural Resource Analysis Center's Land Use Land Cover data (2012), as modified according to aerial photography interpretation using USDA Farm Service Agency 2014 aerial photography, Columbia Gas' 2015 project aerial photography, and wetland and waterbody field delineation data.

a The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the exact sum of the addends in all cases.

b Acreages for access roads used during construction of mainline valves have been included in the MXP-100 mainline construction acreages.

c For analysis purposes, acreages of ephemeral, intermittent, and perennial waterbodies; non-delineated waterbodies that have acreages based on the USGS National Hydrography Dataset; and ponds are counted as open water land use.

d The footprint for the X59M1 Line is located entirely within the MXP-100 right-of-way, so acreages are included in the MXP-100 totals.

e Approved compressor station proposed by Columbia Gas under the LXP (Docket No. CP15-514-000).

f Pending compressor station proposed by Columbia Gas under the WBX (Docket No. CP16-38-000).

Construction of the project would impact a total of about 3,590 acres. About 75 percent of this acreage would be utilized for the pipeline facilities, including the construction rights-of-way (70 percent) and ATWS (5 percent). The remaining acreage impacted during construction would be associated with aboveground facilities (4 percent), pipe yards and staging areas (13 percent), and access roads (8 percent). The primary land use types impacted during construction would be forested (65 percent), agricultural (18 percent), open land (8 percent), and developed lands (8 percent). Open water and wetlands would make up less than 1 percent of land types impacted during construction of the MXP.

Following construction, about 1,074 acres of land would be permanently encumbered by operation of the MXP. About 96 percent of this acreage would be for the new pipeline rights-of-way, 4 percent for aboveground facilities, and less than 1 percent for new permanent access roads. The primary land use types that would be permanently encumbered would be forested (75 percent), agricultural (15 percent), open land (6 percent), and developed lands (2 percent). Open water and wetlands would make up less than 2 percent of permanent impacts.

Pipeline Facilities

Table 4.8-2 provides the linear distance (in miles) of each land use type crossed by the pipelines associated with the MXP.

The principal land use type crossed by the pipelines is forested at 130 miles or approximately 76 percent of the combined length of the pipeline facilities. In descending order, the other land uses crossed include agricultural at 25 miles (15 percent), open land at 10 miles (6 percent), developed land at 3 miles (2 percent), open water at 1 mile (1 percent), and wetland at 0.7 mile (1 percent).

Table 4.8-2
Land Uses Crossed by Pipelines Associated with the Mountaineer XPress Project (in miles) a/

	Agriculture		Developed		Forested		Open Land		Open Water b/		Wetland b/		Total	
Facility	**Miles**	**%**	**Miles**	**%**	**Miles**	**%**	**Miles**	**%**	**Miles**	**%**	**Miles**	**%**	**Miles**	**%**
New Pipeline Facilities														
MXP-100	23.8	13.9	3.0	1.7	125.9	73.7	9.8	5.7	1.2	0.7	0.7	0.4	164.3	96.2
MXP-200	1.0	0.6	0.1	0.1	4.4	2.6	0.4	0.2	0.1	<0.1	0.0	0.0	6.0	3.5
X59M1 Line	0.0	0.0	0.0	0.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0	0.0	0.1	<0.1
Replacement Pipeline Facilities														
SM80 Line	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.2	0.1
SM80 Loop	0.0	0.0	0.0	0.0	<0.1	<0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.1
Total	**24.8**	**14.5**	**3.1**	**1.8**	**130.4**	**76.4**	**10.4**	**6.1**	**1.3**	**0.8**	**0.7**	**0.4**	**170.7**	**100**

a The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the exact sum of the numbers in all cases.

b For analysis purposes, acreages of ephemeral, intermittent, and perennial waterbodies; non-delineated waterbodies that have acreages based on the USGS National Hydrography Dataset; and ponds are counted as open water land use.

In general, land use-related impacts associated with the MXP would include the disturbance of existing uses within the rights-of-way during construction and maintenance of new permanent rights-of-way for operation of the pipelines. For the MXP-100, Columbia Gas proposes to generally use a 125-foot-wide construction right-of-way, consisting of a 75-foot-wide working side and a 50-foot-wide spoil side, except where site conditions require specific workspace configurations. Of this initial corridor, Columbia Gas would retain a 50-foot-wide permanent right-of-way easement for operation of the pipeline. Columbia Gas' construction workspace size would be greater than the 75-foot-wide nominal construction right-of-way width due to the space needed for spoil storage, topsoil segregation, and establishment a safe travel lane in mountainous terrain that characterizes the vast majority of the MXP route. For the MXP-200, a 100-foot-wide construction right-of-way and 50-foot-wide permanent right-of-way is generally proposed. The M59M1 Line would be installed within the MXP-100 permanent easement and would not require ATWS.

Columbia Gas would replace approximately 0.4 mile of existing pipeline (SM80 and SM80 Loop) in two, approximately 0.2-mile-long segments. The pipe would be replaced within the existing maintained right-of-way at each location on what is currently open land. Pipeline replacement would require a 75-foot-wide construction right-of-way including the existing 50-foot-wide permanent easement. After construction, the existing permanent easement would remain 50 feet wide. Land use impacts, including the permanent right-of-way, TWS, and staging areas for the pipeline replacement segments, are included in the pipeline construction corridor impacts. Following the completion of the project, the land use of the pipeline right-of-way would continue to be maintained as open land. Temporary work areas including TWS, ATWS, and staging areas, would be restored in accordance with the ECS and landowner agreements.

In addition to the construction rights-of-way, various ATWS would be used for project construction. As discussed in section 2.3.1.1, Columbia Gas identified a number of areas where it stated that site-specific conditions would require the use of ATWS beyond the proposed construction right-of-way. Appendix L lists the locations of these ATWS, their dimensions, area affected, justification, and other information.

Specific impacts on agricultural, forested, open land, and developed lands are discussed below. Impacts on residential areas are discussed in section 4.8.1.3. Wetlands and surface waters (open water) are discussed in sections 4.4 and 4.3.2, respectively.

Agricultural lands affected by construction would include cultivated croplands and uncultivated lands, such as hayfields. The primary impacts in these areas would be short-term and limited to the growing season concurrent with construction. Farmers would experience some loss of crop production in areas directly disturbed by construction-related activities. Farmers may have to alter planting patterns in areas where construction activities cause limited access to fields. Grazing animals may also have to be moved to different areas or other fields, and/or be penned with gates. Following construction, agricultural practices within the pipeline rights-of-way would be allowed to resume. Columbia Gas would restore all disturbed agricultural areas associated with construction in accordance with its ECS. In cultivated crop areas with 1 foot of topsoil or more, Columbia Gas would typically segregate the top 12 inches and store it separately from excavated subsoil. In agricultural areas with less than 1 foot of topsoil, Columbia Gas would remove the entire topsoil layer. Columbia Gas did not identify any specialty crops (fruit, vegetables,

Christmas trees, or maple trees for syrup) that would be disturbed by the MXP. Impacts on and mitigation for prime farmlands and statewide important farmlands are discussed in section 4.2.4.1.

Drainage tile systems could potentially be impacted by construction activities. Columbia Gas is currently not aware of any existing drain tile systems within the construction work area; however, Columbia Gas is consulting with landowners in an attempt to locate and flag existing drainage tiles. If drainage tiles are exposed or damaged during construction activities, appropriate measures to repair/replace them would be implemented after communication with the landowner and in accordance with the ECS.

Forested land that would be affected by the pipeline project consists mainly of evergreen-dominated forests and woodlands, deciduous-dominated forest and woodlands, and mixed evergreen/deciduous forests and woodlands (section 4.5.1). The primary effect of construction on forested land would be the removal of trees and shrubs from the construction rights-of-way, TWS, and ATWS. Following construction, trees and shrubs in the TWS and ATWS areas would be allowed to regenerate to pre-construction conditions; however, impacts on forest resources in these areas would last for many years. Following construction, the operational portion of the rights-of-way would be permanently maintained in a non-forested condition (see section 4.5.1.1). Forest lands are discussed in more detail throughout section 4.5.

Open lands that would be affected by the MXP include open space, pasture, and grass and shrubs on previously disturbed areas of land, such as mines and utility rights-of-way. Construction-related impacts on open land would include the removal of vegetation and disturbance of soils. These impacts would be temporary and short-term, and would be minimized by the implementation of Columbia Gas's ECS. After final grading and cleanup, Columbia Gas would reseed open land areas in accordance with recommendations for seed mixes, rates, and dates from soil conservation authorities or as requested by the landowner or land managing agency. Open land areas within the temporary and permanent rights-of-way are expected to revert to their preconstruction condition within a few years after completion of construction. Columbia Gas would maintain vegetation within the permanent rights-of-way by periodic mowing. Following construction, most open land uses would resume. However, some activities, such as the building of new structures, would be prohibited on the permanent rights-of-way. Road and railroad crossings are discussed in sections 2.4.4.3 and 4.9.6. Section 4.8.2 provides discussion on potential effects to special use areas.

Developed lands include industrial and commercial areas, as well as roads and railroads. Industrial and commercial land uses could be temporarily impacted during construction of the pipeline project by increased dust from exposed soils, construction noise, and traffic congestion. Columbia Gas would limit impacts on commercial land uses by coordinating driveway crossings with business owners to provide access across the construction rights-of-way.

Columbia Gas would provide access for emergency vehicles during road crossings by using steel plate bridges across the pipeline trench, as needed. Road surfaces would be restored as soon as practicable so that normal access could resume, and commercial land uses would be restored to pre-construction conditions, or as specified in landowner agreements. Additional discussion of traffic-related impacts is provided in section 4.9.5.

Aboveground Facilities

Table 4.8-1 summarizes the land requirements and land uses for the aboveground facilities. The dominant land use that would be affected by these facilities is forested land, followed by agricultural land.

New Compressor Stations

A total of about 78 acres of land would be disturbed by construction of the three new compressor stations (Sherwood [29.7 ac], White Oak [16.6 ac], and Mount Olive [31.3]). Of this total, about 30 acres would be permanently retained for operation. The current land use at the Sherwood site (Doddridge County) includes agricultural, forested, developed, and open lands (see table 4.8-1). Land use at the White Oak site (Calhoun County) includes agricultural, developed, and forested land, while land use at the Mount Olive site (Jackson County) is developed, forested, and open land. The land use at each of the new compressor stations during project operation would be permanently converted to developed land. Areas used for TWS at each facility would be restored and maintained as open land or allowed to revert back to pre-construction land use cover.

New Regulator Stations

Three new regulator stations would also be constructed as part of the MXP. One regulator station would be installed within the Sherwood Compressor Station and would not require any additional land outside of the station site. The Ripley Regulator Station (Jackson County) would be constructed in an area that is agricultural, developed, forested, and open land. The Saunders Creek Regulator Station (Cabell County) would be constructed adjacent to existing Columbia facilities in an area that is agricultural, forested, and open land. The land use at each of the new regulator stations would be permanently converted to developed use following the completion of construction. About 11 acres would be disturbed during construction of the regulator stations, and about 8 acres of land would be retained for operation.

Tie-in Locations

The MXP would include two tie-in sites (LEX Tie-in and Line 1983 Tie-in). The LEX Tie-in (Marshall County) would be constructed in an area that is mostly agricultural land. The Line 1983 Tie-in (Doddridge County) would be constructed in an area that is mostly forested. Both facilities would be sited on land owned by Columbia Gas and adjacent to existing Columbia facilities. The land use at each of the new tie-in sites would be permanently converted to developed use following the completion of construction. A total of almost 4 acres would be utilized during construction of the tie-in sites, and almost 1 acre retained for operation.

Mainline Valves

A total of 10 MLVs would be constructed within the permanent MXP-100 easement, requiring a total of about 3 acres for operation. TWS associated with construction of the MLVs is captured in the pipeline construction corridor impacts. Land use associated with the MLVs includes agricultural, forested, developed, and open land. Following the completion of construction, the current land use would be permanently converted to developed use.

Compressor Station Modifications

Three existing/approved/pending compressor stations (Ceredo, Lone Oak, and Elk River) would be modified as part of the MXP. Impacts associated with MXP activities would require a total of 32 acres for construction, including almost 32 acres of developed land and less than 0.1 acre of open land. No permanent impacts would occur as a result of the modifications at these compressor stations, as the facility footprints would not be expanded.

Staging Areas, Pipe Yards, and Contractor Yards

Columbia Gas identified 95 staging areas and 41 pipe/contractor yards in West Virginia for potential use. These sites would be used for pipe, materials, and equipment storage; employee vehicle parking; and temporary field offices. The size of each yard and/or staging area is dependent upon the amount of material and equipment to be stored or staged at each location and the amount of available land. Impact acreages by land use category are provided in table 4.8-1.

Columbia Gas identified yards that are at convenient locations in relation to each of the pipeline spreads, have been previously developed, and are compatible with the planned use of the yard (e.g., previously cleared and graded areas with access to electrical and telephone service for temporary construction trailers). Where yards are not in previously disturbed areas, Columbia Gas tried to select areas that were relatively level to minimize grading or filling. Columbia Gas is currently negotiating with the respective landowners for temporary use of these locations and would complete environmental surveys on those locations secured for project use.

Within staging areas and pipe/contractor yards, topsoil would be segregated and stored along the edges of the areas, where required. After construction has been completed, all staging areas and pipe/contractor yards would be restored to preconstruction conditions in accordance with Columbia Gas' ECS or per landowner agreements.

Access Roads

Columbia Gas identified roads that would be used to provide access to the pipeline rights-of-way and aboveground facilities during construction and operation of the MXP. The MXP would use existing public and private roads to the extent practicable; however, some new roads would be required to provide access to the construction work area in remote locations and to access new aboveground facilities during project operations. Columbia Gas would use approximately 90 miles of existing private access roads and construct approximately 6 miles of new temporary and permanent access roads. After construction has been completed, fewer than 3 miles of new access roads would be maintained permanently for project operation.

Some modifications or upgrades to existing state, county, and private roads would be required to access the project area for construction. The majority of modifications would include grading and the addition of gravel to stabilize existing unpaved roads, and minor tree trimming along roadways. In some instances, the road would also need to be extended with a gravel pad or apron at the entrance. Existing access roads that are less than 25 feet in width would require widening to accommodate construction vehicles.

See table 4.8-1 for the acres of impact for temporary and permanent access roads associated with the MXP.

4.8.1.1.2 Gulf XPress Project

The project would result in land disturbance at existing facilities and at the new facility locations. All temporary and permanent disturbances related to the modifications at the Grayson Compressor Station would occur within a Columbia Gulf-owned workspace where the station is planned for construction. All disturbances at the existing Leach C Meter Station would be confined to the station footprint and surrounding area previously disturbed by facility construction. Construction of the new compressor facilities would require disturbance at seven discrete sites. Each site would experience temporary and permanent disturbances. All staging, access, and construction would be completed within the permanent and TWS at each site. Once complete, the project would maintain permanent aboveground facilities and access roads at the seven sites.

Seven general land use types would be affected by the GXP. Table 4.8-3 summarizes the acreage of each land use type that would be affected by construction and operation of the project.

Table 4.8-3
Summary of Existing Land Uses Affected by Construction and Operation of the Gulf XPress Project a/

Facilities	County/ State	Agriculture		Forest		Residential		Developed		Open Land		Wetlands		Open Water		Total	
		Total Const.	New Perm.	Total Const.	New Perm.	Total Const.	New Perm.	Total Const.	New Perm.	Total Const.	New Perm.	Total Const.	New Perm.	Total Const.	New Perm.	Total Const.	New Perm.
New Compressor Stations																	
Morehead	Rowan Cty, KY	16.5	10.6	0.5	0.5	0.0	0.0	0.0	0.0	<0.01	0.0	<0.01	0.0	0.1	0.1	17.2	11.2
Paint Lick	Garrard Cty, KY	29.5	9.6	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	30.2	9.6
Goodluck	Metcalfe Cty, KY	19.0	7.3	4.7	4.5	0.0	0.0	0.0	0.0	2.1	2.1	0.0	0.0	<0.001	0.0	25.8	13.9
Cane Ridge	Davidson Cty, TN	10.3	4.2	8.7	5.4	0.6	0.0	0.0	0.0	3.4	0.7	0.0	0.0	0.0	0.0	23.0	10.3
Clifton Junction	Wayne Cty, TN	15.7	10.8	6.4	1.5	0.0	0.0	0.0	0.0	6.1	2.2	0.0	0.0	0.7	0.6	28.9	15.1
New Albany	Union Cty, MS	26.3	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.01	<0.1	<0.1	26.5	10.3
Holcomb	Grenada Cty, MS	31.7	9.0	1.6	0.0	0.0	0.0	<0.1	0.0	0.0	0.0	0.0	0.0	<0.01	0	33.4	9.0
	Subtotal	149.0	61.8	21.9	11.9	0.6	0.0	<0.1	0.0	12.3	5.0	<0.1	<0.01	0.9	0.8	185.0	79.4
Pending Compressor Station																	
Grayson b/	Carter Cty, KY	0.0	0.0	0.0	0.0	0.0	0.0	11.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.9	0.0
Existing Meter Station																	
Leach C	Boyd Cty, KY	0.0	0.0	0.3	0.0	0.0	0.0	0.6	0.0	0.5	0.0	0.0	0.0	0.0	0.0	1.4	0.0
Aboveground Facility Total		**149.0**	**61.8**	**22.2**	**11.9**	**0.6**	**0.0**	**12.5**	**0.0**	**12.8**	**5.0**	**<0.1**	**<0.01**	**0.9**	**0.8**	**198.3**	**79.4**
Access Roads		0.0	1.3	0.0	0.2	0.0	0.0	0.1	<0.1	0.0	0.6	0.0	<0.01	0.0	<0.01	0.1	2.2
Project Total		**149.0**	**63.1**	**22.2**	**12.1**	**0.6**	**0.0**	**12.6**	**<0.1**	**12.8**	**5.6**	**<0.1**	**<0.01**	**0.9**	**0.8**	**198.4**	**81.6**

a The subtotals and totals shown in this table may not equal the sums of the addends due to rounding.
b Pending compressor station proposed by Columbia Gulf under the Rayne XPress Project (Docket No. CP15-539-000).

The definitions of each land use type are described in section 4.8.1.1.1. Construction of the aboveground facilities would temporarily disturb a total of about 198 acres. The primary land use types impacted during construction would be agricultural (75 percent), forested (11 percent), open land (7 percent), and developed lands (6 percent). Residential, open water, and wetlands would make up the remaining 1 percent of land types impacted during GXP construction. Following construction, about 82 acres of land would be permanently converted to developed land for operation of the GXP. The primary land use types that would be permanently changed would be agricultural (77 percent), forested (15 percent), and open land (7 percent). Developed land, open water, and wetlands would make up the remaining 1 percent of permanent impacts.

New Aboveground Facilities

Table 4.8-3 summarizes the land requirements and land uses for the aboveground facilities. The dominant land use that would be affected by these facilities is agricultural land, followed by forested land.

A total of about 185 acres of land would be disturbed by construction of the seven new compressor stations. Of this total, about 79 acres would be permanently retained for operation. The current land use at the Morehead site includes agricultural land, forested land, open water, and open land (see table 4.8-3). There is also an abandoned shed and former residence in the TWS of Morehead Compressor Station, which is on land purchased by Columbia Gas. Land use at the Paint Lick site includes agricultural land (specifically tobacco and alfalfa cultivation) (AGES, 2015g) and open land. Land use at the Goodluck site includes agricultural (specifically corn production) (AGES, 2015c), forested land, open land, and open water. At the Cane Ridge site, land use includes agricultural (specifically pasture for cattle) (AGES, 2015a), forested land, open land, and an area of formerly residential land. The formerly residential land is located within TWS on the Cane Ridge site, which is now owned by Columbia Gulf. This residential parcel, which has been vacated, would be converted to open land following construction. Land use at the Clifton Junction site includes agricultural (specifically grassy pasture for cattle) (AGES, 2015b), forested land, open land, and open water. At the New Albany site, land use includes agricultural (specifically soybean cultivation) (AGES, 2015f), open water, and wetlands. Land use at the Holcomb site includes agricultural (specifically corn cultivation) (AGES, 2015d), forested land, developed land, and open water.

The land use at each of the new compressor station sites during project operation would be permanently converted to developed land. Areas used for TWS at each facility would be restored and maintained as open land or allowed to revert to pre-construction land use cover.

Modifications to Aboveground Facilities

The approved Grayson Compressor Station and existing Leach C Meter Station would be modified as part of the GXP. GXP activities would require about 13 acres for construction, comprised of developed land, open land, and forested land. No permanent impacts would occur as a result of the modifications at these stations because the facility footprints would not be expanded.

4.8.1.2 Landownership and Easement Requirements

4.8.1.2.1 Mountaineer XPress Project

Pipeline Facilities

Columbia Gas would need to obtain easements from landowners to construct and operate its pipeline facilities or acquire the land on which the aboveground facilities would be located. Easements can be temporary, granting the operator the use of the land during construction (e.g., extra workspaces, temporary access roads, contractor yards), or permanent, granting the operator the right to operate and maintain the facilities once constructed. These new easements would convey both temporary (for construction) and permanent (no greater than 50 feet wide for pipeline operation) rights-of-way to Columbia Gas.

An easement agreement between an interstate gas transmission company and a landowner typically specifies compensation for losses resulting from construction (including crop losses, reduced productivity, and timber), damages to property during construction, and restrictions on existing or future uses that would not be permitted on the permanent rights-of-way. Compensation would be determined through negotiations between Columbia Gas and the landowner.

If an easement cannot be negotiated with a landowner and if the Commission issues a Certificate to MXP, Columbia Gas may use the right of eminent domain to acquire the property necessary to construct and operate the MXP. This right would apply to all project-related workspace covered by the approval, including the temporary and permanent rights-of-way, aboveground facility sites, contractor yards, access roads, and extra workspaces. Columbia Gas would still be required to compensate the landowner for the right-of-way and damages incurred during construction. However, the level of compensation would be determined by a court according to state or federal law.

Aboveground Facilities

Columbia Gas has purchased all lands required for construction and operation of the aboveground facilities for the MXP.

4.8.1.2.2 Gulf XPress Project

Columbia Gulf has purchased all lands required for construction and operation of the Gulf XPress aboveground facilities, including additional properties surrounding compressor station sites that are not part of the construction work areas but would be used to "buffer" or further separate the stations from neighbors in the vicinity. Some of these additional properties include existing residences, which Columbia Gulf now owns. These residences are currently vacant, and Columbia Gulf has no plans to use or rent these structures to other parties.

4.8.1.3 Existing Residences

In residential areas, two important impacts associated with construction and operation of a pipeline are temporary disturbances during construction and the encumbrance of a permanent right-of-way, which would restrict the construction of new permanent structures within the right-

of-way. Temporary impacts during construction of the pipeline facilities in residential areas could include: inconvenience caused by noise and dust generated by construction equipment; disruption to access of homes by trenching of roads or driveways; increased localized traffic from transporting workers, equipment, and materials to the work site; disturbance of lawns, landscaping, gardens, and visual character caused by the removal of turf, shrubs, trees, and/or other landscaping between residences and adjacent rights-of-way; and potential damage to existing septic systems or water wells.

During public scoping, we received comments regarding concerns with the loss of privacy from clearing mature trees. We believe that the general and site-specific mitigation measures proposed by Columbia Gas and Columbia Gulf, discussed below, would address these concerns.

The Companies would each implement the following general mitigation measures to limit impacts on residential areas:

- Landowners would receive a 2-week notification prior to construction on their respective property.
- In residential areas, construction would be limited to set daylight hours to avoid or mitigate excessive noise during evening and early morning time periods.
- Mature trees and landscaping would not be removed from the edge of the construction right-of-way unless necessary for safe operation of construction equipment, or as specified in landowner agreements.
- Safety fencing would be installed along the edge of the construction right-of-way in residential areas to discourage non-workers from entering the area. At a minimum, fencing would be installed between a residence and a work area for a distance of 100 feet on either side of the residence.
- Where the construction corridor crosses roads necessary for access to private residences or commercial buildings and no alternative entrance exists, Columbia Gas would implement measures (e.g., steel plating over the open portion of the trench) to maintain passage for landowners, customers, and emergency vehicles, or for others who require access.
- Temporary repairs to septic systems damaged by construction activities would be completed within 48 hours of damage, and permanent repairs would be made between construction and final restoration.
- Site-specific traffic control plans would be developed to limit heavy construction traffic in sensitive areas to specific times of day and/or limit the types of equipment used in these areas to the extent practicable;
- Any open trenches within residential areas would be secured with safety fencing at the end of each construction day.
- Unless specified by the landowner, or replacement topsoil is imported, topsoil would be segregated from either the full work area or from the trench and subsoil storage in order to prevent the mixing of topsoil and subsoil.

- After backfilling the trench, all lawn and landscaping would be restored to final restoration conditions, or temporarily restored pending weather and soil conditions or as specified in landowner agreements. If seasonal or other weather conditions prevent compliance within these time frames, then temporary erosion controls (sediment barriers and mulch) would be maintained and monitored until conditions allow final restoration.
- Attempts would be made to prevent the disruption of utilities. In the event utilities are disturbed, efforts would be made to repair them immediately.
- Fugitive dust would be controlled near residential areas using water trucks, tackifiers, or similar dust control methods.

4.8.1.3.1 Mountaineer XPress Project

Residential structures within 50 feet of the construction work areas would experience greater effects of project construction. Table 4.8-4 lists the 49 residences within about 50 feet of construction work areas by milepost and indicates the distance of each from the work areas.

Table 4.8-4
Residences within 50 feet of the Construction Work Area for the MXP

Project Facility	County	Milepost	Distance from Construction Work Area (feet)
MXP-100			
Access Road	Wetzel	4.1	28
Temporary Workspace	Wetzel	14.2	44
Access Road	Wetzel	14.8	49
Access Road	Wetzel	22.7	3
Access Road	Wetzel	23.2	2, 22
Permanent Right-of-Way	Wetzel	24.8	24
Temporary Workspace	Wetzel	25.0	17
Pipe Yard	Wetzel	29.0	33
Access Road	Doddridge	46.1	53
Temporary Workspace	Doddridge	51.0	22
Access Road	Doddridge	56.5	17
Access Road	Doddridge	60.4	49
Temporary Workspace	Ritchie	68.0	25
Access Road	Ritchie	69.6	17
Temporary Workspace	Ritchie	72.1	23
Permanent Right-of-Way	Ritchie	77.6	34
Temporary Workspace	Ritchie	77.6	40
Staging Area	Ritchie	78.9	14
Temporary Workspace	Wirt	88.0	34
Access Road	Jackson	111.8	48
Temporary Workspace	Jackson	123.7	50

Table 4.8-4
Residences within 50 feet of the Construction Work Area for the MXP

Project Facility	County	Milepost	Distance from Construction Work Area (feet)
Temporary Workspace	Jackson	123.8	5
Temporary Workspace	Jackson	124.4	1
Temporary Workspace	Jackson	124.6	28
Access Road	Jackson	129.6	4
Access Road	Putnam	134.7	13
Access Road	Putnam	138.3	4
Access Road	Putnam	139.4	52
Access Road	Putnam	143.1	5, 2
Access Road	Putnam	143.5	31
Access Road	Putnam	143.5	27
Additional Temporary Workspace	Putnam	146.8	52
Access Road	Putnam	152.0	50
Access Road	Cabell	157.7	32
Access Road	Cabell	157.9	32
Additional Temporary Workspace; Access Road	Cabell	158.0	19
Access Road	Cabell	160.5	24
Pipe Yard	Cabell	160.5	17
Permanent Right-of-Way	Cabell	161.0	48
Temporary Workspace	Cabell	161.1	33
Temporary Workspace	Cabell	161.2	42
Additional Temporary Workspace	Cabell	161.3	27
Temporary Workspace	Cabell	162.2	5
Temporary Workspace	Cabell	163.9	28
MXP-200			
Permanent Right-of-Way	Cabell	4.4	33
SM80 Line			
Additional Temporary Workspace	Cabell	21.0	32
SM80 Loop Line			
Access Road	Cabell	20.8	7
Access Road	Cabell	20.7	11
Access Road	Cabell	20.7	23

Columbia Gas has developed site-specific construction plans for residences within 50 feet of the new pipeline and associated workspace areas for the MXP. Appendix B-1 includes site-specific construction plans for residences within 25 feet or less of MXP workspaces. These plans

identify the mitigation measures to be implemented by Columbia Gas to further reduce impacts on residents during the construction period.

If any damages to residential property result from construction, Columbia Gas would repair the damaged property or provide appropriate compensation to the landowner. All disturbed areas on residential land would be restored as closely as possible to pre-construction conditions, or as negotiated with the landowner during right-of-way easement discussions.

After construction, the properties would be restored to preconstruction conditions as soon as practicable. Most uses of the land would be able to continue in accordance with easement agreements. However, new buildings, sheds, wells, reservoirs, pools, obstructions, or structures would not be permitted on the permanent pipeline rights-of-way. Construction of features such as lawns, roads or driveways, utility lines, and properly gated fences are generally permissible uses within the permanent easements.

We have reviewed the site-specific plans, mitigation, and associated workspace justifications and note that the distance between a residence and the construction work area is less than 25 feet for eight tracts (Tract WV-WZ-0429.000 near MP 24.8; Tract WV-WZ-0430.000 near MP 25.0; Tract WV-DO-0278.007 near MP 51.0; Tract WV-RI-0248.000 near MP 72.1; Tract WV-JA-0364.000 near MP 123.8; Tract WV-JA-0424.000 near MP 124.4; Tract WV-CB-0065.000 near MP 157.9; and Tract WV-CB-0208.000 near MP 162.2). In these locations, pipeline construction would be carried out so that the trench does not remain open overnight.

We note that residential driveways are crossed by the construction work area on eight tracts (Tract WV-WZ-0062.000 near MP 14.2; Tract WV-WZ-0429.000 near MP 24.8; Tract WV-RI-0078.000 near MP 68.0; Tract WV-JA-0364.000 near MP 123.8; Tract WV-JA-0364.003 near MP 124.3; Tract WV-JA-0368.000 near MP 124.6; and Tract WV-CB-0208.000 near MP 162.2 of the MXP-100; and Tract WV-CB-0805.000 near MP 21.0 of the SM80 Line). The plans indicate that vehicle access to residences would be maintained at all times, or other accommodations would be made with each respective landowner.

We note a fenced corral and a shed within the construction work area on Tract WV-DO-0278.007 near MP 51.0 and Tract WV-JA-0368.000 near MP 124.6, respectively). The plans generally indicate that these and other physical features that need to be protected would be enclosed in safety fence to avoid disturbance during construction. However, it appears that these particular structures may need to be removed or relocated to accommodate construction. Given that Columbia Gas has not demonstrated landowner agreement to have these structures removed, **we recommend that:**

- **<u>Prior to construction</u>, Columbia Gas should file with the Secretary, an updated site-specific plan for Tract WV-DO-0278.007 near milepost 51.0 and Tract WV-JA-0368.000 near milepost 124.6 that includes specific impact avoidance or minimization measures for the fenced corral and shed.**

We note water wells outside of but in proximity to the construction work area on two tracts (Tract WV-WZ-0062.000 near milepost 14.2 and Tract WV-RI-0248.000 near milepost 72.1).

These wells would be subject to Columbia Gas' well protection measures as described in its SPCC Plan.

Based on our review, we have found the site-specific plans and mitigation acceptable, with the exception of the two structures (fenced corral and shed) covered by our recommendation above.

Our experience has shown that when project sponsors maintain communication with landowners during the construction and restoration phases, issues in and near residential areas can be effectively managed and resolved. Columbia Gas would implement an environmental complaint resolution procedure during construction and for a period of at least 2 years following the completion of construction. The procedure would provide landowners with clear and simple directions for identifying and resolving problems or concerns during construction of the MXP and restoration of the rights-of-way. Prior to construction, Columbia Gas would mail a letter describing the procedures to landowners whose properties would be affected by the project. Columbia Gas' letter would:

- Provide the contact information for a local Columbia Gas representative who landowners should call first with their concerns. The letter would indicate how soon landowners should expect a response from Columbia Gas' local representative;
- Instruct landowners that they should call Columbia Gas' toll-free number if they are not satisfied with the response from the local representative. The letter would indicate how soon landowners should expect a response from Columbia Gas; and
- Instruct landowners that they should contact the Commission's Landowner Helpline at (877) 337-2237 or by email at LandownerHelp@ferc.gov if they are not satisfied with the response received from Columbia Gas' toll-free number.

4.8.1.3.2 Gulf XPress Project

Table 4.8-5 lists the three residences and four other structures within 100 feet of GXP construction work areas and indicates the distance of each from the work areas.

Table 4.8-5
Structures within 100 feet of the GXP

Aboveground Facilities	Distance from Compressor Station Workspace (feet)	Type of Structure	Ownership	Type of Workspace
New Compressor Stations				
Morehead Compressor Station	29	Abandoned barn	Columbia Gulf	Temporary workspace
	100	Former residence	Columbia Gulf	Temporary workspace
Cane Ridge Compressor Station	56	Abandoned shed	Columbia Gulf	Temporary workspace
	95	Former residence	Columbia Gulf	Temporary workspace
	83	Former residence	Columbia Gulf	Temporary workspace

Table 4.8-5
Structures within 100 feet of the GXP

Aboveground Facilities	Distance from Compressor Station Workspace (feet)	Type of Structure	Ownership	Type of Workspace
Pending Compressor Station				
Grayson Compressor Station a/	45	Church	Private	Temporary workspace
Existing Meter Station				
Leach C Meter Station	61	Shed	Private	Temporary workspace

a Pending compressor station proposed by Columbia Gulf under the Rayne XPress Project (Docket No. CP15-539-000).

Residences within 50 feet of the construction work areas would experience higher effects of project construction. As the distance from the construction work area increases, the impacts on residences decrease. No residences are located within 50 feet of either the temporary or permanent workspace of any of the GXP facilities. Therefore, the development of site-specific residential plans is not necessary. However, the Cane Ridge site is in a suburban area, and several current occupied residences are located within 500 feet of the temporary construction work area. Temporary impacts on residential areas include noise and fugitive dust during construction activities, altered traffic patterns, and increased traffic in the area of the facilities. To minimize any disturbance to residences within the vicinity of the facilities, Columbia Gulf would follow all mitigation measures in its ECS as well as the measures listed at the beginning of this section (where applicable).

4.8.1.4 Planned Developments

4.8.1.4.1 Mountaineer XPress Project

Columbia Gas contacted local officials and reviewed land use plans and zoning restrictions to identify planned residential, commercial, or industrial developments in the project area. Columbia Gas also examined existing land use patterns and developments to determine the types of existing land uses and the possibility for future large-scale developments or subdivisions to be located near project components. To date, no planned developments have been identified that would be affected by the MXP. Columbia Gas would continue to consult with state and local authorities to determine if any planned developments could be affected by the MXP.

4.8.1.4.2 Gulf XPress Project

Columbia Gulf contacted local officials and reviewed land use plans and zoning restrictions to identify planned residential, commercial, or industrial developments in the project areas. With the exception of the Cane Ridge site, the compressor station sites are in rural areas with no zoning or land use regulations. Columbia Gulf also examined existing land use patterns and developments to determine the types of existing land uses and the possibility for future large-scale developments or subdivisions to be located near project components. To date, no planned developments have been identified that would be affected by construction of the Morehead, Paint Lick, Goodluck, Clifton Junction, New Albany, or Holcomb Compressor Stations or by the modifications to the

Grayson Compressor Station and Leach C Meter Station. Columbia Gulf would continue to consult with state and local authorities to determine if any additional planned developments could be affected by these facilities. There is one planned development, the Delvin Downs Subdivision, located about 0.2 mile southwest of the Cane Ridge site across Barnes Road. This subdivision was platted in 2007 and portions have not been developed (Wood, 2016). The Cane Ridge site is owned by Columbia Gulf and is not a part of this subdivision. Construction of the Cane Ridge station would not preclude the future development of the remaining portions of the subdivision.

During public scoping, we received multiple comments regarding a zoning ordinance amendment (Ordinance No. BL2015-1210) enacted in August 2015 by the Metropolitan Government of Nashville and Davidson County requiring that natural gas compressor stations be sited within an industrial zoning district.[34] The Cane Ridge site is currently zoned agricultural (Metro Government of Nashville and Davidson County, Tennessee, 2016). Columbia Gulf would consult with the Metropolitan Government to identify recommended site development measures for this property.

4.8.2 Recreation and Special Interest Areas

One of the primary concerns when routing or siting project facilities near recreation or special interest areas is the impact of construction and operation on the purpose for which the area was established (e.g., the recreational activities, public access, and resources the area aims to protect). Construction could alter visual aesthetics by removing existing vegetation and disturbing soils. It could also generate dust and noise, which could be a nuisance to recreational users. Pipeline construction could interfere with or diminish the quality of the recreational experience by affecting wildlife movements or disturbing hikers while using trails. During operation, the presence of aboveground facilities could alter visual aesthetics and, therefore, interfere with the quality of the recreational experience. These potential visual impacts are discussed in section 4.8.3. On a long-term basis, land management agencies may be precluded from placing new structures over or in proximity to the pipelines.

4.8.2.1 Federally Managed Land

4.8.2.1.1 Mountaineer XPress Project

No federally managed lands would be crossed by or are within 0.25 mile of the MXP.

4.8.2.1.2 Gulf XPress Project

A GXP facility would be located within 0.25 mile of the Daniel Boone National Forest (DBNF). Specifically, a portion of the DBNF is about 600 feet east of the Morehead Compressor Station site in Kentucky. The DBNF is comprised of 708,000 acres in 21 counties in southern and eastern Kentucky. Public recreational uses of the DBNF include camping, horseback riding, swimming, hiking, target shooting, caving, geocaching, wildlife viewing, boating, and fishing

[34] The Commission's authority under the NGA preempts county zoning ordinances. .. The Commission does, however, encourage cooperation between interstate pipeline companies and local authorities to the maximum extent practical.

(U.S. Forest Service, 2016). The GXP would not affect the recreational use or experience of the DBNF. I-64 is located between the compressor station site and the DBNF, and, therefore, construction and operation of the station would likely not be noticeable from the DBNF. Columbia Gulf contacted representatives from the DBNF, who indicated that they had no concerns regarding the project because the compressor station site is on private lands (Rogers, 2016).

4.8.2.2 State-Managed Land

Both projects could result in impacts on WMAs. The WMAs are generally managed for public recreational use, including fishing, hunting, and camping, and for the protection of local biodiversity. Hunting season varies by species but generally occurs from early fall to early winter.

4.8.2.2.1 Mountaineer XPress Project

The MXP would cross or pass within 0.25 mile of five WMAs managed by the WVDNR and one West Virginia Scenic Byway (see table 4.8-6).

Table 4.8-6
Publicly Owned or Managed Lands Crossed or within 0.25 mile of the MXP

Project Facility/ Jurisdiction	Agency	Name	Begin Milepost	End Milepost	Miles Crossed or Distance to Nearest Project Facility	Primary Uses
State						
MXP-100	WVDNR	Cecil H. Underwood WMA	9.2	9.4	0.2	Fishing and hunting
MXP-100	WVDNR	Lewis Wetzel WMA	28.3	33.4	4.1	Fishing, hunting, and camping
MXP-100	WVDNR	Little Kanawha Parkway	94.1	94.1	<0.1	West Virginia Scenic Byway
MXP-100	WVDNR	Frozen Camp WMA	113.2	114.4	0.9	Fishing and hunting
MXP-100	WVDNR	O'Brien Lake WMA	120.4	121.5	0.6	Fishing and hunting
MXP-100	WVDNR	O'Brien Lake WMA	N/A **a**/	N/A	<0.1	Fishing and hunting
MXP-100	WVDNR	Lantz Farm and Nature Preserve Easement	N/A **a**/	N/A	0.2	Farm
MXP-100	WVDNR	Elk Fork Lake WMA	NA **a**/	N/A	0.2	Fishing and hunting
MXP-100 Access Road ARPY125.1	WVDNR	Sportsman Park	NA **a**/	N/A	<0.1	Fishing and hunting
Elk River Compressor Station	WVDNR	Morris Creek WMA	N/A **a**/	N/A	<0.1	Fishing and hunting

Table 4.8-6
Publicly Owned or Managed Lands Crossed or within 0.25 mile of the MXP

Project Facility/ Jurisdiction	Agency	Name	Begin Milepost	End Milepost	Miles Crossed or Distance to Nearest Project Facility	Primary Uses
Local						
MXP-100	Putnam County Development Authority Inc.	Unnamed	147.4	148.6	1.1	Open space
MXP-100	City of Milton	Unnamed	160.8	161.4	0.6	Open space
MXP-100	Jackson County Board of Education	Roana Jackson Technical Center	N/A **a**/	N/A	<0.1	Education
MXP-100 Proposed Yard 130	Jackson County Board of Education	Fairplain Elementary School	N/A **a**/	N/A	<0.1	Education
Sherwood Compressor Station	Doddridge County	Doddridge County Park	N/A **a**/	N/A	<0.1	Day recreation

a Not crossed by pipeline or workspaces, but within 0.25 mile of project.

During public scoping, we received comments regarding concerns with impacts on recreational areas used for hunting. Columbia Gas would work with WVDNR officials to maintain the continued public recreational use of affected WMAs during construction of the MXP. Columbia Gas would adhere to its ECS and WVDNR requirements when constructing facilities within the WMA. Once construction is complete, the MXP is not expected to have permanent impacts on the WMAs' ability to continue to serve as a public recreational resource and to protect biodiversity. Following construction, WMA activities such as hunting, would be able to continue. Columbia Gas would enter into an agreement with the WVDNR to obtain easement rights through the WMAs for a term of 15 years, which would be renewable. Columbia Gas is continuing discussions about the MXP with the WVDNR for each of the WMAs.

The MXP would cross the western unit of the Cecil H. Underwood WMA in southern Marshall County. The WMA is on 2,072 acres comprising mixed hardwood forest in steep-to-moderate terrain (WVDNR, 2016b). Temporary impacts would include disturbance of approximately 1.8 acres of forested lands during construction. Permanent impacts would include the conversion of 1.2 acres of forested lands to permanently maintained open lands for the right-of-way.

The Lewis Wetzel WMA consists of 13,590 acres of steep forested woodlands dominated by oak-hickory and cove hardwood in Wetzel County (WVDNR, 2016c). Columbia Gas anticipates temporary and permanent impacts on the WMA, including impacts on forested lands disturbed during construction and the conversion of forested lands to permanently maintained open lands for the right-of-way. Because a portion of this WMA was acquired with a Wildlife and Sport Fish Restoration grant from the USFWS, an opinion from USFWS for non-interference of the grant purpose would be necessary under the authority established in 50 CFR 80 prior to WVDNR

approving the pipeline easement across the WMA. The WVDNR would provide summary information to the USFWS to aid in determination of non-interference.

The Frozen Camp WMA, located in Jackson County, consists of 2,587 acres of hilly forested woodlands and open bottomland (WVDNR, 2016d). The MXP would cross this WMA and would temporarily affect 12 acres of forested and open lands associated with construction workspace. The new permanent right-of-way for the MXP would include the conversion of 5.2 acres of forested and open lands to permanently maintained right-of-way.

The O'Brien Lake WMA is composed of 217 acres of hilly forested woodlands in Jackson County (WVDNR, 2016e). The MXP would cross the WMA, disturbing 9 acres of forested lands during construction. Permanent impacts would include the conversion of 3.7 acres of forested lands to permanently maintained open lands for the right-of-way.

The Elk Fork Lake WMA is located in Jackson County about 0.2 mile north of the MXP near MP 119.0. This WMA is 1,418 acres and contains Elk Fork Lake and adjacent hilly oak-hickory forests (WVDNR, 2016b). The WMA is owned by the West Virginia State Soil Conservation Committee and is managed by the WVDNR for fishing and hunting. The MXP would not cross or directly affect the Elk Fork WMA.

Sportsman Park is a community park located north of State Route 14 on the Little Kanawha River in Elizabeth, Wirt County, West Virginia. It has shelters, walking trails, a playground, basketball court, tennis court, pavilion, restrooms, horseshoe pitching, volleyball court, boat ramp and electrical lighting and outlets (West Virginia University, 2016b). The MXP Pipe Yard 125 is located within 0.25 mile to the southeast of Sportsman Park. No direct impacts on Sportsman Park are anticipated from the use of Pipe Yard 125.

The MXP-100 pipeline crosses property administered by the Putnam County Development Authority between MP 147.4 and MP 148.6 in Putnam County. The Putnam County Development Authority's mission is to attract businesses to Putnam County, and Columbia Gas would contract for use of properties southwest of Highway 35 as project staging contractor yards. The pipeline also crosses property owned by the City of Milton between MPs 160.8 and 161.4.

At approximately MP 112.8, the pipeline passes approximately 0.6 mile east of the Roane-Jackson Technical Center in LeRoy. Additionally, the Fairplain Elementary School is approximately 0.6 mile north of the MXP-100 pipeline and Mount Olive Compressor Station at MP 124. No project impacts are anticipated on the technical center or the elementary school.

The Morris Creek WMA is approximately 0.1 mile south of the pending Elk River Compressor Station in Kanawha County. This WMA consists of 9,847 acres of steep forested woodlands and is leased by the WVDNR from a private landowner, the Bruce B. Cameron Foundation, Inc. and B.B. and Louise W. Cameron Charitable Trust (WVDNR, 2016f). The WVDNR manages this WMA for biodiversity and the suppression of disturbance events in the WMA. The MXP would not directly affect the Morris Creek WMA, because modifications of the pending Elk River station associated with the MXP would not expand the footprint of the facility, and construction activities would be restricted to previously disturbed areas.

The Little Kanawha Parkway is designated as a West Virginia Scenic Byway. The MXP crosses the Little Kanawha Parkway at approximately MP 94.1, in an area that is forested on the north side of the road and open land on the south side. After crossing the parkway, the pipeline route turns and runs adjacent to the parkway for approximately 0.3 mile through the forested area. A corridor would be cleared through the forest for pipeline construction, resulting in a change in the visual appearance of these adjacent lands, as viewed from the parkway. After construction, the disturbed areas closest to the parkway would be outside of the permanent right-of-way and would be allowed to return to pre-construction conditions. However, because these areas are forested, comparable vegetation would take many years to regenerate. Although these changes in the visual landscape would be noticeable to travelers along the parkway for a very brief period as they drive by, the visual impact on the overall viewshed along the parkway would be negligible.

The overall viewshed contains a variety of land uses, vegetation cover, and development that create visual breaks in the forested land, and the addition of a cleared pipeline corridor to the overall viewshed would be consistent with the existing visual features. The parkway would be crossed by boring beneath it, thus no road surface disturbance is anticipated. Columbia Gas would work with West Virginia Department of Transportation (WVDOT) officials to avoid or minimize potential impacts on the parkway and would establish safety protocols at the crossing. These protocols may include installation of safety fencing, a traffic management plan, protection of the road surface during equipment crossings, and public notification of construction. Columbia Gas would coordinate with the WVDOT to publish construction alerts on information websites and in local newspapers providing schedules of the anticipated time and duration of disruptions associated with construction.

The proposed Sherwood Compressor Station site is about 250 feet from the Doddridge County Park. The park includes a playground, swimming pool, volleyball courts, basketball courts, multi-purpose building, picnic shelter, a baseball field, and access to the Meathouse Fork Creek for fishing. Construction and operation of the station could result in temporary visual impacts on the park. However, Columbia Gas intends to maintain the approximately 225 feet of existing forested buffer area between the station site and the park, which would provide visual screening. Visual impacts for MXP are discussed in section 4.8.3. Noise would also be generated by operation of the Sherwood Compressor Station. However, as discussed in section 4.11.2, the noise levels would remain below applicable noise criteria.

4.8.2.2.2 Gulf XPress Project

A GXP facility would be located within 0.25 mile of the Malmaison WMA. Specifically, a portion of the Malmaison WMA is about 1,000 feet west of the proposed Holcomb Compressor Station site in Mississippi. The 9,483-acre WMA is located in Grenada, Carroll, and Leflore Counties, and is used for hunting, fishing, wildlife viewing and hiking. The WMA has forested areas, swamps, wetlands, hiking trails, rivers, lakes, former agricultural fields, and managed wildlife openings, and is popular with residents from the surrounding towns as well as visitors from the rest of the state (MDWFP, 2016b). Construction and operation of the Holcomb station could result in temporary and permanent visual impacts on the WMA. However, the presence of about 1,500 feet of forested area buffer between the compressor station site and the WMA, as well as the forest within the WMA itself, would provide visual screening. Noise would also be generated by operation of the Holcomb station. As discussed in section 4.11.2, the noise levels

would remain below the applicable criterion. Columbia Gulf attempted to contact representatives of the WMA; however, no responses were received.

We received numerous comments throughout public scoping regarding impacts on the Mill Creek Greenway from the proposed Cane Ridge Compressor Station. The Cane Ridge station would not be within or adjacent to any parks. The Mill Creek Park and Mill Creek Greenway are approximately 0.4 mile south of the station site. Due to the distance, existing tree cover, existing roadways, and existing residential developments that abut the park, any visual and/or noise impacts on trail- and park-users of the Mill Creek Park and Greenway would be negligible.

4.8.2.3 Conservation Easements

Conservation easements are legally binding agreements between landowners and government agencies that limit certain types of use and prevent development from occurring on the land in perpetuity.

4.8.2.3.1 Mountaineer XPress Project

About 0.2 mile of an MXP access road would cross a conservation easement on the Lantz Farm and Nature Preserve, in the vicinity of MP 29.0 in Wetzel County. The property is owned by the Wheeling Jesuit University and cooperatively managed by the WVDNR as a WMA. The property is composed of 555 acres of gently rolling to moderately steep forested woodlands dominated by old growth oak-hickory, cove hardwood forests, and large open fields (WVDNR, 2016g). The property has multiple natural gas developments recently constructed or proposed to be constructed, including gas wells, gathering/production pipelines, and other transmission lines. The conservation easement that binds the property does not specifically restrict a natural gas pipeline. Columbia Gas proposes to use an existing road (National Conservation Easement Database, 2016) to access the construction area. Columbia Gas met with the WVDNR on September 7, 2016, to discuss the project and the current proposed route. Based on the meeting, it appears that Columbia Gas and the WVDNR can successfully execute a license agreement for the current proposed route or the route with slight modifications. Columbia Gas would continue to work with the WVDNR to finalize the route. Once finalized, Columbia Gas would provide us with an update and summarize the associated impacts. Because a portion of the property was acquired with a Wildlife and Sport Fish Restoration grant from the USFWS, an opinion from USFWS for non-interference of the grant purpose would also be required under the authority established in 50 CFR 80 prior to the WVDNR approving the pipeline easement across the WMA. The WVDNR would provide summary information to the USFWS to aid in a determination of non-interference.

4.8.2.3.2 Gulf XPress Project

No conservation easements are in place on lands affected by the GXP.

4.8.2.4 Natural, Recreational, or Scenic Rivers and Trails

4.8.2.4.1 Mountaineer XPress Project

The MXP would not cross any current or proposed candidate state or federal wild or scenic rivers or be located within the Coastal Zone as established in the CZMA. The project would, however, cross the Little Kanawha River and the Mud River, which are both listed in the NRI. Columbia Gas consulted with the NPS regarding these crossings.

The MXP would cross the Little Kanawha River within a 30-mile segment of the waterway listed on the NRI as having historic value (NPS, 2011). This river segment includes the Burning Springs Complex, a historic district listed on the NRHP. The Burnings Springs Complex was the site of the world's second oil field. The Little Kanawha River crossing point (MP 94.8 in Wirt County) is approximately 5 river miles upstream of the Burning Springs Complex historic district. The MXP would not be expected to significantly impact the downstream historic district or other historic values associated with the Little Kanawha River. Additional details regarding cultural investigations are included in section 4.10.1.

The crossing of the Mud River (approximate MP 163.4 in Cabell County) is within a segment of the river designated as having historic value associated with the Mud River Covered Bridge, a National Historic Landmark (NPS, 2011). Since being listed as a National Historic Landmark, the bridge has been moved from its original location on the Mud River to an isolated pond within the Cabell County Fairgrounds in Milton, West Virginia. The current location of the bridge is approximately 1.5 miles north of the proposed Mud River crossing (WVDOT, 2016a). The MXP would not be expected to significantly impact the historic values associated with the Mud River. Additional details regarding architectural investigations are included in section 4.10.1.1.2.

The MXP would cross several recreational trails managed by state, local, and private entities (see table 4.8-7). The WVDNR manages trails throughout the state, including trails located within WMAs. Within the Lewis Wetzel WMA, the MXP would cross four designated trails and is within 0.25 mile of two additional trails. These trails are consistent with the aforementioned purposes of the WMAs to promote recreational activities. The MXP would also cross the North Bend Trail, which is a 72-mile-long rail-trail managed by the WVDNR for multi-use recreational activities (North Bend Rails to Trails Foundation Inc., 2016).

Table 4.8-7
Trails Crossed or within 0.25 mile of the Mountaineer XPress Project a/

Trail Name	Ownership	Begin Milepost or Nearest Milepost	End Milepost	Miles Crossed	Primary Use	Trail Surface
Project Facilities						
MXP-100						
Clendenin Walking Trail	Unknown	N/A	N/A	0.1	Unknown	Gravel
Elk River Water Trail	Elk River Water Trail Group	N/A	N/A	<0.1	Unknown	Water
Sportman Park Walking Trail	Wirt County Commission	N/A	N/A	<0.1	Unknown	Asphalt

Table 4.8-7
Trails Crossed or within 0.25 mile of the Mountaineer XPress Project a/

Trail Name	Ownership	Begin Milepost or Nearest Milepost	End Milepost	Miles Crossed	Primary Use	Trail Surface
Warrior Trail	Warrior Trail Association	2.1	2.3	0.1	Unknown	Dirt/grass
Hickory Ridge Trail	WVDNR	28.7	28.7	<0.1	Recreation	Dirt/grass
Sees Run Trail	WVDNR	28.8	28.8	<0.1	Unknown	Dirt/grass
Huss Pen Run Trail	WVDNR	30.1	N/A	0.1	Unknown	Dirt/grass
Locust Ridge Trail **b**/	WVDNR	30.2	30.3	0.3	Unknown	Dirt/grass
Eckleberry Trail	WVDNR	30.3	30.3	<0.1	Recreation	Dirt/grass
Cale Run Trail	WVDNR	32.1	N/A	N/A	Recreation	Dirt/grass
North Bend Rail Trail	WVDNR	48.7	48.7	<0.1	Recreation	Asphalt/ gravel
Log Haul Road Trail	Roane-Jackson Technical Center	114.3	N/A	0.2	Recreation	Gravel
Bryant Trail	Roane-Jackson Technical Center	114.2	N/A	0.2	Recreation	Dirt/grass
Groscup Trail	Roane-Jackson Technical Center	114.3	N/A	0.2	Recreation	Dirt/grass
Davisson Trail and Loop Trail	West Virginia Division of Natural Resources	114.3	114.3	0.3	Recreation	Dirt/grass
			Subtotal	**1.5**	--	--
Access Roads						
Oak Ridge Trail	WVDNR	28.9	28.9	1.0	Recreation	Dirt/grass
Unnamed Trail	WVDNR	29.9	29.9	0.6	Unknown	Dirt/grass
Laurel Run Trail	WVDNR	30.1	30.1	<0.1	Recreation	Dirt/grass
Locust Ridge Trail	WVDNR	20.9	20.9	0.3	Unknown	Dirt/grass
			Subtotal	**2.1**	--	--
			Total	**3.6**	--	--

a N/A = within 0.25 mile but not crossed by the project.
b The Locust Ridge Trail would be crossed by the project and be adjacent to it for 0.4 miles.

In addition to the state-maintained trails, the MXP-100 would cross a 2-mile-long nature trail owned by the Roane-Jackson Technical Center and used for outdoor learning associated with the technical center and general recreation (Roane-Jackson Technical Center, 2016). In Marshall County, the MXP would also cross the 67-mile-long Warrior Trail, which is managed by the River Town Program to promote outdoor recreation and sustainability (River Town Program, 2016).

Construction of the MXP could temporarily impact the quality of trail user's recreational experience, as well as affect visual elements for trail users hiking in areas near project construction

activities. These impacts would be limited to the active construction periods. Columbia Gas would work with the respective trail management agencies to develop site-specific crossing methods and restoration plans for each trail crossing. Site-specific restoration plans may include installation of visual screening, such as special plantings.

Columbia Gas would work with the respective trail management agency to establish safety protocols at each crossing. These protocols may include installation of safety fencing, informational signs/placards, and stationing of personnel at each side of the trail crossing to assist trail users through the construction work area during active construction periods. Columbia Gas would make efforts to alert recreational users of trails and other recreation areas of the anticipated time and duration of disruptions associated with construction. Columbia Gas would work with the agency or trail steward to determine the most efficient method for notification. Such notifications could include mailings, an informational notice posted on the management agency's website, advertisements in local media, and/or notices posted in public areas.

4.8.2.4.2 Gulf XPress Project

The GXP would not affect any current or proposed candidate state or federal wild and scenic rivers or be located within the Coastal Zone as established in the CZMA.

4.8.3 Visual Resources

"Visual resources" refers to the composite of basic terrain features, geologic features, hydrologic features, vegetation patterns, and anthropogenic features that influence the visual appeal of an area for residents or visitors. The visual quality or character of the landscape is the baseline against which the visual effects of a proposed action or its alternative are measured. Existing visual character is used as a point of reference to determine if a proposed project would be compatible or inconsistent with the existing visual character of an area.

The MXP would cross state and privately owned lands. No federal lands or national- or state-designated wild or scenic rivers would be crossed. The GXP facilities are all located on private lands and, with the exception of the Cane Ridge Compressor Station site, within rural, agricultural areas. The Cane Ridge site is located in a rural-residential and suburban area.

4.8.3.1 Mountaineer XPress Project

The MXP facilities would cross a range of visual landscapes, including mountainous areas, mosaics of forest and farmland, and low-density residential development. Surface mining activities are common in the northern portions of the project area, resulting in sections of highly modified landscapes with original contours often leveled and deforested or partially reforested.

4.8.3.1.1 Pipeline Facilities

A portion of the pipeline (about 22 percent) would be co-located with existing utility rights-of-way. As a result, the visual resources along this portion of the project have been previously affected by other similar activities. Visual impacts associated with the construction right-of-way and extra workspaces include the removal of existing vegetation and the exposure of bare soils, as well as earthwork and grading scars associated with heavy equipment tracks, trenching, blasting

(if required), and temporary machinery and tool storage. Other visual effects could result from the removal of large individual trees that have intrinsic aesthetic value; the removal or alteration of vegetation that may currently provide a visual barrier; or landform changes that introduce contrasts in visual scale, spatial characteristics, form, line, color, or texture.

Visual impacts would be greatest where the pipeline route parallels or crosses roads and the pipeline right-of-way may be seen by passing motorists; from residences where vegetation used for visual screening or for ornamental value is removed; and where the pipeline is routed through forested areas. The duration of visual impacts would depend on the type of vegetation that is cleared or altered. The duration of impact from clearing would be shortest in open areas where the re-establishment of vegetation following construction would be relatively rapid (generally less than 5 years). The duration would be greater in forested land, which would take many years to regenerate. The greatest potential visual impact would result from the removal of large specimen trees, which would take longer than other vegetation to regenerate and would be prevented from re-establishing on the permanent right-of-way.

Approximately 130 miles of the 170 miles of the proposed pipelines would pass through forested areas. There would be a permanent change in the visual appearance to forested lands within the permanent easement (50 feet wide for the pipelines), because the permanent easement would be maintained in an herbaceous state for pipeline surveillance and operations purposes. After construction, all disturbed areas would be revegetated in accordance with the ECS, and areas outside of the permanent right-of-way would be allowed to return to pre-construction conditions in compliance with federal, state, and local permits; landowner agreements; and Columbia Gas's easement requirements. Completion of the project would result in a permanent visual corridor through forested areas.

4.8.3.1.2 Aboveground Facilities

The visual effects of constructing the aboveground facilities would be similar to the construction impacts discussed above, and the new aboveground structures would result in a permanent visual impact throughout the operational life of the project. The impacts on visual resources from each individual facility would depend on the preconstruction condition and the visibility from the surrounding area. The compressor stations, in general, would include a paved access road, control building, auxiliary building, and compressor building, as well as a stack. Additionally, all facilities include a security chain link fence around the perimeter of the permanent facility, which is typically about 8 feet high. The lighting system for compressor stations, in general, include lighting around the compressor station operations, security lighting around the periphery, and emergency lighting, used as backup in the event of a power outage from weather events or interrupted service from the electricity provider.

New aboveground facilities for the MXP include the Sherwood Compressor Station in Doddridge County, the White Oak Compressor Station in Calhoun County, and the Mount Olive Compressor Station in Jackson County. As new facilities, these stations would have the highest potential to result in visual impacts. Columbia Gas conducted a viewshed analysis of the three compressor station sites. Appendix M-1 includes maps depicting where the tallest portion of each compressor station would be visible from the ground, assuming no vegetative cover would hinder the view.

The Sherwood site is near a cluster of low-density residential development. The nearest residential structure to the station property is approximately 412 feet west and is part of the property Columbia Gas has acquired. This additional acreage would act and be maintained as a visual buffer between the neighboring parcels and the compressor stations, and would lessen the impact on the viewsheds of the adjacent residential structures.

In addition to nearby residences, the Sherwood Station is about 250 feet from the Doddridge County Park. Columbia Gas intends to maintain the approximately 225 feet of existing forested buffer area between the Sherwood station and the park, which would largely mitigate visual concerns. Additionally, Columbia Gas would work with the park to address visual concerns regarding the proximity of the station to the park.

The White Oak Compressor Station site is in a rural area of Calhoun County on a forested parcel. The closest residential structures to the site are between 500 and 700 feet away. Similar to the Sherwood station site, mature vegetation surrounds the White Oak site, mitigating potential visual impacts. Due to the rural nature of the area and the existing natural screening, it is unlikely that the White Oak station would significantly alter the visual landscape of the area around which the facility is proposed.

The Mount Olive Compressor Station site is on a wooded parcel between Parkersburg Road and I-77. A residential area is within 100 feet of the station property. This site, similar to the other compressor station sties, has significant mature vegetation, which would provide visual screening between the facility and the residential development. Due to the location of I-77 on the eastern property line, the facility can be placed away from residential structures, providing a minimum of 100 feet of vegetation buffer. Given the ability to screen the facility from the adjacent residential development, it is unlikely that the station would have a significant visual impact on nearby residences.

Modifications to the existing Ceredo and pending Elk River stations would not expand the facilities beyond their existing footprint, and, therefore, only minor incremental additional visual impact would result from the modifications. Additionally, the Ceredo and Elk River stations are located near existing natural gas and other existing public utility facilities, which would limit the visual impact of the construction and operation of these facilities.

4.8.3.2 Gulf XPress Project

During construction, the visual impacts associated with the GXP would be from the presence of construction equipment and clearing, grading, and facility erection activities at the compressor station sites. Following the completion of construction, an aboveground facility consisting of structures, lighting, fencing, valves, and piping would become a permanent part of the landscape. Columbia Gulf would develop site-specific landscape plans for all of the new stations to provide visual screening where visual impacts would be more prominent. Modifications to the approved Grayson Compressor Station and the existing Leach C Meter Station would not expand the facilities beyond their existing footprint and, therefore, only incremental additional visual impact would result from the modifications.

Nighttime lighting could also contribute to visual impacts. Outdoor lighting would be installed at the seven compressor stations to provide adequate illumination for personnel safety and facility security. Outdoor lighting would be designed and constructed in accordance with applicable codes and Columbia Gulf requirements. During public scoping, we received a comment about existing light issues at the Leach C Meter Station. Columbia Gulf would consider design alternatives to control light trespass onto adjacent properties. Examples of design alternatives include lighting intensities, reflectors, and sensors.

During public scoping, we received comments regarding concerns with visual impacts at the Morehead, Paint Lick, and Cane Ridge Compressor Stations.

For the Cane Ridge site, Columbia Gulf conducted a viewshed analysis and developed a visual simulation as seen from various locations along Barnes Road, including views from Stanford Village and Black Pool Drive. The visual simulation includes conceptual buildings and landscaping. The simulation is available via the internet and can be viewed at https://vimeo.com/157226097. Columbia Gulf would incorporate design aspects similar to those included in the simulation to reduce visual impacts from the Cane Ridge station. Columbia Gulf intends to use its standard colors (primarily Columbia green) and architectural designs, supplemented by landscaping. Columbia Gulf also intends to maintain the natural vegetative buffer between the facility and the surrounding community to the extent practicable.

Columbia Gulf conducted a viewshed analysis to evaluate current conditions and potential visual impacts on nearby residences at the Morehead, Paint Lick, and Cane Ridge Compressor Stations. Appendix M-2 includes maps depicting where the tallest portion of each compressor station would be visible from the ground, taking existing topography, vegetation, and residences into account.

Columbia Gulf also conducted a visual assessment for the Morehead, Paint Lick, and Cane Ridge Compressor Stations, which was filed to the docket (CP16-361) on November 3, 2016. For all three compressor stations, Columbia Gulf assessed the current conditions and potential visual impacts on sensitive features near the compressor stations. Sensitive features include residential and recreational land use areas. Transportation corridors, agricultural fields, and commercial use areas were not considered sensitive areas. The assessments took into account a 2-mile-wide buffer around each station to capture the areas in which a visual impact could occur. Visual impacts on sensitive features would occur at each of the three compressor stations. Additionally, night-time lighting would increase the visibility of the compressor stations from sensitive views.

Columbia Gulf proposed the following mitigation in its visual assessment:

- Maintain the exterior color of proposed buildings in “Columbia Green” which would help the facilities blend into the existing vegetation color.
- Paint the exhaust stack of the turbine a non-reflective neutral gray, which, when viewed against the background sky, would minimize the visual contrast.
- Implement a landscape plan to screen the facility along it’s boundary to sensitive features. The landscape plan would include plantings of native evergreen shrubs and trees in certain areas.

- Establish a lighting plan that conforms to applicable regulatory requirements, but also minimizes light pollution in the surrounding environment.

The Cane Ridge Compressor Station visual assessment identified residences along Barnes Road, residences within the Mill Run subdivision, and residences along Hidden Creek Dive that may have a view of the compressor station. Based on the analysis, the most visible part of the compressor station would be the exhaust stack; however, portions of compressor station buildings may be visible above the trees, through gaps in vegetation, or during winter months when leaves have fallen. As previously stated, the facilities and buildings would be painted "Columbia Green" to help blend into the background. The stack would be painted a neutral gray to help blend in to the sky. Landscaping would be established along Barns Road to shield the security fencing. Outdoor lighting at the facility would be aimed inward to reduce light pollution beyond the facility fencing. Additionally, dark-sky compliant lighting would be installed to further reduce light pollution. We find this plan acceptable.

In order to address existing lighting issues at the Leach C Meter Station, w**e recommend that:**

- **Prior to the end of the draft EIS comment period, Columbia Gulf should file with the Secretary a site-specific report for the Leach C Meter Station describing existing and proposed visual impacts from nighttime lighting, proposed mitigation including lighting controls, or justification for why no such mitigation measures are required.**

4.8.3.3 Conclusion

4.8.3.3.1 Mountaineer XPress Project

Land use-related impacts associated with the MXP would include the disturbance of existing uses within the rights-of-way during construction and maintenance of new permanent rights-of-way for operation of the pipelines. Additional land would be disturbed by construction of the aboveground facilities, and land within the facility footprints would be permanently retained for operation. The primary land use types impacted would be forested, agricultural land, and open lands. In forested areas, trees and shrubs would be removed from the construction work areas, and the maintained portion of the rights-of-way would be permanently converted to a non-forested condition. Land outside of the permanent pipeline easement would be allowed to revert to its prior condition, although this process would take many years. Impacts on agricultural lands would be short-term and limited to the growing season concurrent with construction. Following construction, agricultural practices within the pipeline rights-of-way would be allowed to resume. Impacts on open land areas would be temporary and short-term, and would be minimized by the implementation of Columbia Gas's ECS. Open land areas within the temporary and permanent rights-of-way are expected to revert to their preconstruction land use after completion of construction. However, some activities, such as the building of new structures, would be prohibited on the permanent rights-of-way.

Columbia Gas' proposed construction work areas would be located within about 50 feet of 49 houses. To address impacts on residences, Columbia Gas developed site-specific construction plans for each of the residences. These plans identify the mitigation measures to be implemented

by Columbia Gas to promote safe and efficient installation of the pipelines with limited impacts on landowners. We have also added a recommendation to ensure impacts on two structures within the MXP work area are avoided or minimized.

In general, project impacts on recreational and special interest areas would be temporary and limited to the period of active construction. These impacts would be minimized by implementation of Columbia Gas' ECS.

The primary visual effects of constructing the MXP facilities would include the removal of existing vegetation and the temporary storage of machinery and tools. After construction, disturbed areas would be revegetated in accordance with Columbia Gas' ECS. There would be a permanent change in the visual appearance to forested lands within the permanent easement, because they would be maintained in an herbaceous state for pipeline surveillance and operations purposes. The new aboveground structures would result in a permanent visual impact throughout the operational life of the project, although this impact is not expected to be significant due to the visual buffering provided by wooded areas at each location. The impacts on visual resources from each individual facility would depend on the preconstruction condition and the visibility from the surrounding area.

4.8.3.3.2 Gulf XPress

Land use-related impacts associated with the GXP would include temporary and permanent disturbance at new and existing aboveground facilities. Once construction is complete, land within the facility footprints would be permanently retained for operation. The primary land use types impacted during construction would be agricultural, forested, open land, and developed land. Areas used for TWS at each facility would be restored and maintained as open land or allowed to revert to pre-construction land use cover. No permanent impacts would occur as a result of the modifications at the approved and existing stations, as the facility footprints would not be expanded and the present visual character would not be changed. No residences are within 50 feet of either the temporary or permanent workspace of any of the facilities.

The GXP facilities would be within 0.25 mile of two publicly owned lands, the DBNF and the Malmaison WMA. The GXP would not affect the recreational use or experience of the DBNF. The GXP could result in temporary and visual impacts on the Malmaison WMA. However, the presence of forested areas between the compressor station site and the WMA would provide visual screening.

The new aboveground structures would result in a permanent visual impact throughout the operational life of the project. Columbia Gulf's Visual Impact Assessment is available in appendix M-2 (public version; i.e., without critical energy infrastructure information included).

4.9 SOCIOECONOMICS

Construction and operation of the MXP and GXP could result in socioeconomic effects in the communities where the facilities would be located. These effects could be negative or positive and may include increased demand for housing or public services; increased employment; localized transportation congestion; and changes in state and local property, sales, and payroll tax collections. We have generally defined the region of influence for this analysis to include the

counties containing project facilities. The socioeconomic conditions and effects associated with construction and operation of the MXP in West Virginia and the GXP in Kentucky, Tennessee, and Mississippi are discussed below. Section 4.9.9 contains an evaluation of the potential impact on environmental justice communities.

The MXP facilities would be constructed in 13 counties in West Virginia (listed from north to south): Marshall, Wetzel, Tyler, Doddridge, Ritchie, Calhoun, Wirt, Roane, Jackson, Putnam, Mason, Cabell, and Kanawha.

The GXP would be constructed in Kentucky, Tennessee, and Mississippi. New aboveground compressor facilities in Kentucky would consist of the Paint Lick station in Garrard County, the Goodluck station in Metcalfe County, and the Morehead station in Rowan County. In Tennessee, new compressor facilities would consist of the Cane Ridge station in Davidson County and the Clifton Junction station in Wayne County. New compressor facilities in Mississippi would consist of the New Albany station in Union County and the Holcomb station in Grenada County. The two aboveground facilities to be modified are in Kentucky and consist of the approved Grayson Compressor Station in Carter County and the existing Leach C Meter Station in Boyd County.

4.9.1 Population and Employment

4.9.1.1 Mountaineer XPress Project

Table 4.9-1 provides a summary of relevant demographic and socioeconomic conditions for the communities that would be affected by the MXP. The major occupations throughout the project area are in education and health services; manufacturing; natural resource mining and agriculture; retail trade; and construction. Counties with larger populations have more diverse ranges of labor categories represented. Kanawha, Putnam, and Cabell Counties have the largest populations and the highest percentages of the labor force in the professional and business services category. Additionally, manufacturing represents a large percentage of the labor force in Jackson, Tyler, and Ritchie Counties.

Table 4.9-1
Existing Socioeconomic Conditions by Geographic Area for the MXP

Geographic Area	Population Estimate (2015) a/	Population Density (persons / sq. mile) b/	Median Household Income (2010-2014) c/	Unemployment Rate (percent) (2015) d/	Civilian Workforce (2015) d/	Top Three Industries (2010-2014) c/, e/
West Virginia	**1,844,128**	**77.1**	**$41,576**	**6.7**	**785,049**	**E,W,A**
Marshall County	31,978	108.4	$41,978	8.4	14,218	E,R,A
Wetzel County	15,816	46.3	$38,066	10.0	7,193	E,C,R
Tyler County	8,975	35.9	$39,974	9.4	3,647	E,M,R
Doddridge County	8,176	25.7	$40,329	5.7	3,638	E,N,R
Ritchie County	9,982	23.1	$39,118	7.0	4,481	E,M,R
Calhoun County	7,470	27.3	$31,017	12.5	2,772	E,N,C
Wirt County	5,880	24.6	$37,117	10.3	2,278	M,E,C
Roane County	14,435	30.9	$30,104	11.5	5,247	E,N,C

Table 4.9-1
Existing Socioeconomic Conditions by Geographic Area for the MXP

Geographic Area	Population Estimate (2015) a/	Population Density (persons / sq. mile) b/	Median Household Income (2010-2014) c/	Unemployment Rate (percent) (2015) d/	Civilian Workforce (2015) d/	Top Three Industries (2010-2014) c/, e/
Jackson County	29,237	62.9	$40,733	7.2	11,962	E,M,R
Mason County	27,037	63.4	$38,297	8.5	9,966	E,M,R
Putnam County	56,848	160.5	$55,939	5.5	25,693	E,R,M
Cabell County	96,844	342.8	$37,716	5.4	41,710	E,R,A
Kanawha County	188,332	214.1	$46,583	6.0	87,425	E,R,P

Sources:

a U.S. Census Bureau, 2015.

b U.S. Census Bureau, 2010.

c U.S. Census Bureau, 2014.

d Bureau of Labor Statistics (BLS), 2015.

e Industries: A = Arts, Entertainment & Recreation; C = Construction; E = Education & Health Services; M = Manufacturing; N = Natural Resource Mining & Agriculture; P = Professional & Business Services; R = Retail Trade; W = Wholesale Trade

The population of the impacted counties range from approximately 5,880 to 188,332 (U.S. Census Bureau, 2015). Population densities vary from approximately 23.1 to 342.8 persons per square mile (U.S. Census Bureau, 2010), and the county-level civilian workforces range from 2,278 in Wirt County to 87,425 people in Kanawha County (Bureau of Labor Statistics [BLS], 2015). Based on the 2010-2014 data, the median household incomes within the affected counties range from $30,104 to $55,939, while the median household income for the State of West Virginia is $41,576. The state unemployment rate in 2015 was 6.7 percent (BLS, 2015). The unemployment rates ranged from 5.4 to 12.5 percent for the affected counties, and four counties (Doddridge, Putnam, Cabell, and Kanawha) had unemployment rates lower than the state average.

The primary population centers in the project area include the Charleston Metropolitan Statistical Area (MSA), Wheeling MSA, and Huntington-Ashland MSA. In addition to the aforementioned, Wirt County is located in the Parkersburg-Marietta-Vienna MSA. An MSA is a geographical region with a relatively high population density at its core and close economic ties throughout the area. The Charleston, Huntington-Ashland, Parkersburg-Marietta-Vienna, and Wheeling MSAs are the top four most populated MSAs in the state, with the Charleston metro area having the largest population.

The impacted counties have a diverse range of employers representing both the public and private sector. The Marcellus shale gas industry has a significant presence in the area, particularly in Wetzel County, where 17 percent of West Virginia's shale gas is produced (West Virginia Center on Budget & Policy, 2014). According to the West Virginia Center on Budget & Policy's *Impacts of Gas Drilling in Wetzel County*, the upstream drilling industry represents a major industry, but there has not been a notable increase in regional employment from drilling activities. Thus, despite the pronounced interest and investment in the shale gas industry in the area, it has not had a major impact on the unemployment rates of the counties where the activities are located (West Virginia Center on Budget & Policy, 2014).

In addition to upstream natural gas development, the area is also experiencing growth in the midstream natural gas transmission industry. Within the 12 impacted counties, there are 7 new natural gas transmission pipeline projects, including the MXP, proposed to be completed before the end of 2020. These projects collectively represent a major economic investment in the affected counties.

Despite the reduction of coal mining output statewide, the industry still maintains a large presence in the northern part of the state (West Virginia University, 2015). Coal's primary use is for electric power generation; however, as electric utilities have diversified their generation portfolios away from coal-fired facilities, national consumption of the commodity has continued to decline (West Virginia University, 2015). As a result of the drop in coal mining demand and minimal employment requirements of the shale gas industry, employment levels within this region have declined. The decline has resulted in median household incomes and employment rates generally lower than state averages. The reduction in the importance of coal in electric power generation may contribute to conditions in the project area economy, including population loss, and subsequent loss of available civilian labor force (West Virginia University, 2015).

The three compressor stations to be modified (Ceredo, Elk River, and Lone Oak) are located in Wayne, Kanawha, and Marshall Counties, West Virginia. The Ceredo Compressor Station is an existing facility, and the proposed improvements would require a limited construction workforce and would not require additional permanent operations personnel. The impacts from the pending construction of the Elk River Compressor Station were evaluated in conjunction with Columbia Gas's WBX (Docket No. CP16-38-000). For WBX, Elk River would require a peak construction workforce of about 55 to 60 workers with 1 or 2 inspection personnel and an operational workforce of about 4 new employees. For MXP, Columbia Gas would add compression but not enlarge the Elk River facility beyond the proposed footprint associated with WBX, nor would additional permanent staff be required to operate the facility. The approved Lone Oak Compressor Station is associated with Columbia's LXP project (Docket No. CP15-514-000), and impacts were evaluated in conjunction with that project. For LXP, Lone Oak would require a peak construction workforce of about 70 workers with 1 or 2 inspection personnel and an operational workforce of about 4 new employees. Columbia Gas would neither enlarge the Lone Oak facility beyond the proposed footprint associated with LXP, nor require additional permanent staff to operate the facility.

Construction of the MXP would temporarily increase the population in the general vicinity of the project. The peak construction workforce planned for the MXP would be approximately 4,200 workers (see table 4.9-2). The peak construction period would last about 2 to 3 months, and the total duration of construction would be about 9 to 12 months. The average number of workers per construction spread is estimated to be about 250 to 300 personnel for the duration of construction, and there would be a total of eight spreads. The new compressor stations would require a construction peak workforce of about 400 per station, and work at existing facilities would require a construction workforce of about 50. Construction is currently scheduled by Columbia Gas to begin in November 2017 and be completed by November 2018, although this depends on several important factors, such as receiving a FERC Certificate and other required permits and authorizations. Construction of project facilities would be performed in a phased sequence, with some facility construction occurring concurrently. Once project construction is

complete, Columbia Gas anticipates hiring approximately 29 new employees for operation and maintenance of the new aboveground facilities.

Table 4.9-2
Construction and Operational Workforce for the MXP

Phase / Facility	Total Workforce (number)	Total Duration	Workforce Local / Non-local (percent)
Construction			
Pipeline System	--	9-10 months	50 / 50
Initial	900		
Average	2,500		
Peak	2,900		
Aboveground Facilities		9-12 months	50 / 50
Initial	300		
Average	1,100		
Peak	1,300		
Operations	--		
Pipeline System	Not applicable	Not applicable	Not applicable
Aboveground Facilities	29	30 years (minimum)	65 / 35

Columbia Gas estimates that total worker payroll would average about $3.6 million per week per spread. The total for eight pipeline spreads would be $28.8 million per week.

Columbia Gas estimates that about 50 percent of the construction workforce and 50 to 85 percent of the permanent workforce would be sourced locally. It is Columbia Gas' intent that its contractors employ local union labor; however, if the local workforce is constrained by other commitments, Columbia Gas and its contractors will seek to fill construction positions with others who may not be affiliated with unions or based in West Virginia. Given the rural nature and low population density of the project area, there would be a temporary impact on employment rates in the affected counties as a result of project construction workforce requirements. The southern end of the affected area is better suited to support large projects because the two largest MSAs in the state, Charleston and Huntington, have more labor resources than the rural areas such as Tyler, Calhoun, and Wirt Counties. Given the location of these population centers, it is likely that many local hires for the MXP would come from the Charleston and Huntington MSA areas.

Western West Virginia has experienced higher unemployment and sluggish population growth when compared to the rest of the state. The MXP would temporarily boost employment in this area. The total population change would equal the total number of non-local construction workers plus any family members accompanying them. However, given the brief construction period and based on experience from previous Columbia Gas projects, most non-local construction workers would not be expected to be accompanied by their families. Based on the county populations within the project area, the additional people that might temporarily relocate to the area would not result in a significant change. Additionally, this temporary increase in population would be distributed along the length of the project and would not have a permanent impact on the

population. A brief (1-year) decrease in the unemployment rate could occur as a result of hiring local workers for construction and increased demands on the local economy for goods and services.

As listed in table 4.9-2, the MXP would require a substantial construction workforce which would contribute favorably to the region by consuming goods and services offered by local businesses. During construction, the project area economy may see a temporary boost, as short-term construction personnel contribute to the local economy by purchasing consumer goods and food and paying for living expenses. After the roughly yearlong construction duration, however, operational impacts on the local economy would be much smaller, as only 29 permanent employees are anticipated for project operation. These 29 employees likely would have a positive but negligible impact on the local economy.

4.9.1.2 Gulf XPress Project

Table 4.9-3 provides a summary of selected demographic and socioeconomic conditions for the counties that would be affected by the GXP in Kentucky, Tennessee, and Mississippi. The major occupations throughout the project areas are in education and health services, manufacturing, and retail trade.

Table 4.9-3
Existing Economic Conditions by Geographic Area for the GXP

State / County	Population Estimate (2015) a/	Population Density (Persons / sq. mile) b/	Median Household Income (2010-2014) c/	Unemployment Rate 2015 (percent) d/	Civilian Workforce (2015) d/	Top Three Industries (2010-2014) c/, e/
Kentucky	**4,425,092**	**109.9**	**$43,342**	**5.4**	**1,953,393**	**E,M,R**
Boyd	48,325	309.9	$41,739	7.0	18,211	E,R,A
Carter	27,158	67.7	$37,139	10.0	10,118	E,R,M
Garrard	17,237	73.5	$44,304	5.2	7,492	E,M,C
Metcalfe	9,909	34.9	$30,453	5.3	4,004	M,E,R
Rowan	23,892	83.4	$40,697	6.0	10,279	E,R,M
Tennessee	**6,600,299**	**153.9**	**$44,621**	**5.8**	**3,062,775**	**E,M,R**
Davidson	678,889	1,243.3	$47,434	4.5	364,254	E,A,P
Wayne	16,748	23.2	$31,225	7.4	6,311	E,M,R
Mississippi	**2,992,333**	**63.2**	**$39,464**	**6.5**	**1,272,657**	**E,M,R**
Grenada	21,578	51.9	$33,067	6.1	9,549	M,E,R
Union	28,429	65.3	$35,389	5.2	13,347	M,E,R

Sources:
a U.S. Census Bureau, 2015.
b U.S. Census Bureau, 2010.
c U.S. Census Bureau, 2014.
d BLS, 2015.
e Industries: A = Arts, Entertainment & Recreation; C = Construction; E = Education & Health Services; M = Manufacturing; P = Professional & Business Services; R = Retail Trade

The GXP station sites are geographically separated from one another; therefore, nine unique localities were analyzed. Generally, the station sites are in rural areas with population

densities less than the statewide averages, with the exception of the Cane Ridge site in Davidson County, Tennessee, near Nashville, the largest metropolitan area in the state.

The populations of the five counties in Kentucky affected by project construction range from 9,909 to 48,325 (U.S. Census Bureau, 2015). Population densities in these counties vary from approximately 35 to 310 people per square mile (U.S. Census Bureau, 2010), and the county-level civilian workforces range from 4,004 to 18,211 people (BLS, 2015). Unemployment rates within the affected Kentucky counties range from 5.2 to 10.0 percent (BLS, 2015). Based on the 2010-2014 data, the median household incomes for these counties range from $30,453 to $44,304.

In Tennessee, two counties would be affected by project construction: Davidson and Wayne Counties. Davidson is the second largest population center in the state and is part of the Nashville-Davidson-Murfreesboro-Franklin MSA, the largest MSA in the state and with more than 1,700,00 residents. Davidson County has a population of 678,889, a population density of 1,243 people per square mile, an unemployment rate of 4.5 percent, and a median household income of $47,434 (U.S. Census Bureau, 2010, 2014, 2015; BLS, 2015). Wayne County is considerably more rural with a population of 16,748, a population density of 23.2 people per square mile, an unemployment rate of 7.4 percent, and a median household income of $31,225 (U.S. Census Bureau, 2010, 2014, 2015; BLS, 2015).

Grenada County and Union County would be affected by project construction in Mississippi. Grenada County has a population of 21,578, a population density of 51.9 people per square mile, an unemployment rate of 6.1 percent, and a median household income of $33,069 (U.S. Census Bureau, 2010, 2014, 2015; BLS, 2015). Union County has a population of 28,429, a population density of 65.3 people per square mile, an unemployment rate of 5.2 percent, and a median household income of $35,389 (U.S. Census Bureau, 2010, 2014, 2015; BLS, 2015).

Construction of the GXP would temporarily increase the population in the general vicinity of each compressor or meter station site. Columbia Gulf anticipates that there would be a peak workforce of approximately 120 contractor personnel and approximately 20 inspection personnel for a total peak workforce of approximately 140 temporary workers for construction at each new station site (see table 4.9-4). There would be a peak workforce of 24 to 30 workers for the modifications at the approved Grayson Compressor Station and a peak workforce of 16 to 24 workers for the modifications at the existing Leach C Meter Station. The workforce would fluctuate from the commencement of the project to completion (see table 4.9-5). Construction is currently scheduled by Columbia Gulf to begin in October 2017 and be completed by November 2018, with activities conducted concurrently. However, we note that this depends on several important factors, such as receiving a FERC Certificate and other required permits and authorizations. Once construction of the project is complete, Columbia Gulf anticipates hiring approximately 14 new employees (2 persons for each new compressor station) for operation and maintenance of the new GXP aboveground facilities.

Table 4.9-4
Estimated Workforce and Work Schedule for the GXP

Aboveground Facilities	County	Duration	Peak Workforce
New Compressor Stations			
Kentucky			
Morehead	Rowan	10 months	140
Paint Lick	Garrard	10 months	140
Goodluck	Metcalfe	10 months	140
Tennessee			
Cane Ridge	Davidson	10 months	140
Clifton Junction	Wayne	10 months	140
Mississippi			
New Albany	Union	10 months	140
Holcomb	Grenada	10 months	140
Modifications to Facilities			
Kentucky			
Approved Grayson Compressor Station	Carter	3 to 3.5 months	24 to 30
Existing Leach C Meter Station	Boyd	2 to 3 months	16 to 24

Table 4.9-5
GXP Estimated Workforce

Months	Construction Site													
	Morehead Compressor Station		Pant Lick Compressor Station		Goodluck Compressor Station		Cane Ridge Compressor Station		Clifton Junction Compressor Station		New Albany Compressor Station		Holcomb Compressor Station	
	Non-local	Local	Non-local	Local	Non-local	Local	Non-local	Local	Non-local	Local	Non-local	Local	Non-local	Local
Construction														
Month 1	18	2	18	2	18	2	18	2	18	2	18	2	18	2
Month 2	108	12	108	12	108	12	108	12	108	12	108	12	108	12
Month 3	126	14	126	14	126	14	126	14	126	14	126	14	126	14
Month 4	126	14	126	14	126	14	126	14	126	14	126	14	126	14
Month 5	126	14	126	14	126	14	126	14	126	14	126	14	126	14
Month 6	126	14	126	14	126	14	126	14	126	14	126	14	126	14
Month 7	107	13	107	13	107	13	107	13	107	13	107	13	107	13
Month 8	72	8	72	8	72	8	72	8	72	8	72	8	72	8
Month 9	45	5	45	5	45	5	45	5	45	5	45	5	45	5
Month 10	27	3	27	3	27	3	27	3	27	3	27	3	27	3
Operation	2	--	2	--	2	--	2	--	2	--	2	--	2	--

Based on recent experience on other projects, Columbia Gulf estimates that about 10 percent of the construction workforce at each compressor station site would be local hires, while the remaining 90 percent would be workers with specialized skills who would temporarily relocate to the project area. Given the geographic distance between each of the stations, the peak workforce planned for each of the facilities is unlikely to have a significant impact on the population of each area.

The total population change would equal the total number of non-local construction workers plus any family members accompanying them. Given the brief construction period and based on experience from previous Columbia Gulf projects, most non-local workers would not be expected to be accompanied by their families. The temporary relocation of 140 workers to each of the affected counties is unlikely to result in a significant change in the population level of any given project area. The estimated two new full-time workers per facility that would be hired to operate the facilities would likely not be local. However, the relocation of these workers and their families to the project area would have a negligible impact on the population of the affected counties.

4.9.2 Housing

4.9.2.1 Mountaineer XPress Project

The workforce required to construct the MXP would temporarily decrease the availability of housing in the area. The project could have a short-term positive impact on the area rental industry through increased demand and higher rates of occupancy; however, no significant long-term impacts on the local housing markets would be expected. About half of the construction personnel would be transient and need accommodations to satisfy temporary work assignments. Therefore, temporary housing would be needed during the approximately 1-year construction phase of the project. These housing types include rental units, hotels and motels, campgrounds, and recreational vehicle (RV) parks.

Housing statistics for the counties affected by the MXP are presented in table 4.9-6. The 5-year average (2010-2014) number of vacant housing units across the potentially affected counties ranged from a high of 9,907 vacant units in Kanawha County to a low of 695 vacant units in Calhoun County (U.S. Census Bureau, 2016c). Rental vacancy rates varied from 3.4 percent in Wirt County to 8.7 percent in Wetzel County. Kanawha and Cabell Counties, which contain the two largest cities in the state (Charleston and Huntington), have the largest number of hotels in the project area.

For non-local construction workers, the existing temporary housing stock available for the project would be sufficient. Assuming that about 50 percent of the construction workforce would be non-local, temporary housing for 2,100 workers would be needed during peak construction. Given the rental vacancy rates (3.4 to 8.7 percent) and the number of vacant housing units in the counties that would be affected by the project (33,090 units), construction crews should not encounter difficulty in finding temporary housing. At a maximum, the workforce would utilize about 6.3 percent of the vacant housing units. In addition, 68 hotels/motels and 15 RV parks/campgrounds are in the affected counties and could house some of the temporary workforce. The exclusive use of the hotels/motels and RV parks/campgrounds could strain these businesses' ability to cater to tourists in the area. Given that there is a significant inventory of rental properties

available, Columbia Gas would work with construction contractors to encourage the temporary workforce to use the diverse availability of housing across the project area.

Based on the availability of housing, the demand from the estimated 29 new permanent employees required for the MXP would have no measureable impact on housing stocks in the project area.

Table 4.9-6
Housing Statistics by County in the Vicinity of the MXP

County	Owner Occupied a/	Renter Occupied a/	Median Monthly Owner Occupied Housing Costs a/	Median Monthly Renter Occupied Housing Costs a/	Vacant Housing Units a/	Rental Vacancy Rate (percent) a/	Number of Hotels/ Motels b/	Extended Stay RV Parks / Campgrounds (number) b/
Marshall	10,691	3,156	$846	$513	2,019	7.4	4	0
Wetzel	5,724	1,460	$827	$509	1,414	8.7	5	0
Tyler	2,996	754	$786	$484	1,243	5.2	1	1
Doddridge	2,339	422	$817	$537	1,179	7.5	0	0
Ritchie	3,175	848	$741	$554	1,806	7.1	2	1
Calhoun	2,466	646	$647	$500	695	6.6	1	1
Wirt	1,999	426	$748	$481	840	3.4	0	0
Roane	4,471	1,431	$876	$487	1,483	7.9	3	0
Jackson	8,674	2,568	$907	$558	2,046	6.4	5	3
Mason	8,686	2,043	$788	$493	2,261	8.4	2	4
Putnam	17,807	3,646	$1,159	$744	2,155	5.6	6	0
Cabell	24,380	15,840	$985	$647	6,042	6.2	14	3
Kanawha	58,104	24,427	$988	$688	9,907	6.3	25	2

a U.S. Census Bureau, 2014.

b Cabell Huntington Convention and Visitors Bureau, 2016; RVParking.com, 2016; West Virginia Department of Commerce, 2016; Charleston Convention and Visitors Bureau, 2016.

4.9.2.2 Gulf XPress Project

Housing statistics for the counties affected by the GXP are presented in table 4.9-7. Temporary housing availability varies geographically within the counties near the station sites. Temporary housing is available in the form of daily, weekly, or monthly rentals in hotels and motels. In 2014, the number of vacant housing units across the nine affected counties in Kentucky, Tennessee, and Mississippi ranged from a high of 28,267 units in Davidson County, Tennessee, to a low of 753 vacant units in Metcalfe County, Kentucky. Rental vacancy rates varied from 38.9 percent in Grenada County, Mississippi, to 2.5 percent in Metcalfe County, Kentucky.

In addition to vacant housing, numerous hotels/motels and campgrounds/RV parks are in the project areas. Tennessee has the highest number of hotels/motels and campgrounds/RV parks at a combined total of 334, compared to Kentucky with a combined total of 31 and Mississippi with a total of 17. Davidson County in Tennessee has the highest number of hotels/motels at 320 units, compared to Garrard County in Kentucky, which doesn't have any.

Construction of the GXP could temporarily decrease the availability of housing in the station site areas. The project could have a short-term positive impact on the area rental industry through increased demand and higher rates of occupancy; however, no long-term negative impacts on the local housing markets would be expected. A portion of the construction personnel would be transient and may need accommodations to satisfy temporary work assignments. Therefore, temporary housing would be needed during the construction phase of the project. These housing types include rental units, hotels and motels, campgrounds, and RV parks.

For non-local construction workers, the existing temporary housing stock available in the nine affected counties would be sufficient to meet demand. Assuming that about 90 percent of the construction workforce would be non-local, temporary housing for 126 workers would be needed during peak construction at each station site. Given the rental vacancy rates (2.5 to 38.9 percent) and the number of vacant housing units in the counties that would be affected by the project (7,308 in Kentucky, 29,521 in Tennessee, and 3,932 in Mississippi), construction crews should not encounter difficulty in finding temporary housing. In a worst-case, the GXP workforce would utilize about 17 percent of the vacant housing units (126 of the 753 vacant units) in Metcalfe County, Kentucky. In addition, there are 358 hotels/motels and 24 RV parks/campgrounds combined in the affected counties that could house the temporary workforce. The exclusive use of the hotels/motels and RV parks/campgrounds could strain these businesses ability to cater to tourists in the area. Given that there is a significant inventory of rental properties available, Columbia Gulf would work with construction contractors to encourage the temporary workforce to use the diverse availability of housing across the project area.

The estimated 14 new permanent employees required for the GXP would not have a substantial impact on housing stocks in the project area spread across three states.

Table 4.9-7
Housing Statistics by County in the Vicinity of the GXP

County	Owner Occupied Housing Units 2014 (number) a/	Occupied Rental Units 2014 (number) a/	Median Owner Occupied Housing Costs ($/month) a/	Median Renter Occupied Housing Costs ($/month) a/	Total Vacant Housing Units 2014 (number) a/	Rental Vacancy Rate (percent) a/	Number of Hotels/ Motels (number) b/	Extended Stay RV Parks / Campgrounds (number) c/
Kentucky								
Boyd	13,497	6,036	982	602	2,195	6.8	12	1
Carter	8,160	2,365	916	559	1,762	3.0	4	1
Garrard	5,036	1,531	1,121	632	893	6.9	0	1
Metcalfe	2,974	944	803	512	753	2.5	1	0
Rowan	5,494	2,913	979	635	1,705	12.7	7	4
Tennessee								
Davidson	140,219	119,338	1,371	859	28,267	6.2	320	11
Wayne	4,938	1,080	799	470	1,254	6.0	2	1
Mississippi								
Grenada	5,704	1,877	896	535	2,592	38.9	8	5
Union	7,394	2,898	940	676	1,340	11.8	4	0

Sources:
a U.S. Census Bureau, 2014.
b Kentucky Department of Travel and Tourism, 2016; HVS Global Hospitality Service, 2016; Tennessee Department of Tourism Development, 2016; Visit Mississippi, 2016.
c RVParking.com, 2016.

4.9.3 Public Services

4.9.3.1 Mountaineer XPress Project

Public services and facilities in each county in the project area include full-service law enforcement, paid and volunteer fire departments, schools, and hospitals. Table 4.9-8 provides an overview of selected public services available in the affected counties.

Table 4.9-8
Public Service Infrastructure for the MXP

County	Number of Fire Departments a/	Number of Police Precincts / Departments b/	Number of Schools (students enrolled) c/	Number of Hospitals (number of beds) d/
Marshall	12	7	13 (4,821)	1 (99)
Wetzel	10	3	8 (2,864)	1 (44)
Tyler	4	3	4 (1,482)	1 (12)
Doddridge	4	2	3 (1,169)	0
Ritchie	5	4	6 (1,626)	0
Calhoun	2	3	3 (1,104)	0
Wirt	1	2	3 (967)	0
Roane	4	3	6 (2,554)	1 (60)
Jackson	4	4	12 (5,040)	1 (36)
Mason	6	5	10 (4,308)	1 (201)
Putnam	9	6	22 (9,517)	1 (70)
Cabell	9	5	26 (13,732)	2 (693)
Kanawha	30	18	68 (28,130)	4 (1,172)

a U.S. Fire Administration, 2016.
b USACops, 2016; West Virginia State Police, 2016.
c Public Schools K12, 2016.
d U.S. News and World Report, 2016; WVDHHR, 2016b.

Based on the number of police and fire stations, schools, and hospitals, public service infrastructure in the project vicinity appears adequate to accommodate the temporary needs of the 2,100 non-local construction workers and their families.

All of the counties in the project area have a County Sheriff's Department. In addition, 43 cities and towns within the project area have municipal police departments. The West Virginia State Police also maintains detachments throughout the state, including 11 detachments in the potentially impacted counties that provide extra patrol efforts to supplement county and municipal law enforcement agencies. Fire protection within the region is administered by local governments. The majority of the project area is covered by volunteer fire departments, but four full-time career fire departments are located in the large population areas.

Columbia Gas has developed and implemented a liaison program with public safety and emergency response organizations throughout West Virginia. Operations personnel advise emergency response, government, and public safety officials on how to prevent damage to company facilities and how to recognize and report a gas pipeline emergency to the company or

the appropriate public safety officials. (More information on this topic is presented in section 4.12). In addition, prior to construction, all construction contractors would be required to develop and submit individual emergency services coordination plans specific to the project to the local areas involved. These plans would contain communication and coordination processes developed with local emergency service organizations and address traffic control, medical emergencies, fires, inclement weather emergencies, etc. Columbia Gas anticipates that coordination would commence several months prior to contractor mobilization and would be on-going throughout the duration of construction.

Existing healthcare resources are adequate to meet the anticipated needs of the construction and operational workforce for the MXP and to provide emergency medical care, if needed. The study area has 13 hospitals providing about 2,390 hospital beds combined. The largest hospitals are in Cabell and Kanawha Counties, in the southern end of the study area. In addition, adjacent to Marshall County in the northern end of the study area, Ohio County (West Virginia) has two hospitals providing about 390 hospital beds, combined. Columbia Gas would coordinate with local emergency medical service departments during construction. Coordination would allow the departments to sustain current levels of service through the duration of construction and support the construction staff along the entire route, including counties that do not have medical facilities. Given the available health care resources, we do not anticipate the MXP would have an adverse impact on health care facilities or services.

The 2014-2015 public school system enrollment for the project area was 77,314 students. There are a total of 184 schools serving students from pre-kindergarten through 12th grade. Many of the non-local workers are not typically accompanied by their families or their children because of the short-term nature of the work. Those students that are relocated would reside throughout the project area and would be dispersed among multiple schools and school districts. Based on the number and size of schools in the affected counties, the project area appears to have sufficient educational resources to accommodate school age children of workers during temporary relocation.

The impacts on public services due to the addition of 29 operational employees would be negligible, but permanent. In summary, ample public services are available in the area to meet the needs of the MXP. Short-term impacts on certain other public services are possible, including the need for localized police assistance or certified flaggers to control traffic flow during construction activities. Additional discussion of these topics is provided in section 4.9.5.1.

4.9.3.2 Gulf XPress Project

Public services and facilities present in each county where project facilities would be constructed include full-service law enforcement, paid and volunteer fire departments, schools, and hospitals. Table 4.9-9 provides an overview of selected public services available in the affected counties.

Table 4.9-9
Public Service Infrastructure for the GXP

County	Number of Fire Departments a/	Number of Police Precincts / Departments b/	Number of Schools (students enrolled) c/	Number of Hospitals (number of beds) d/
Kentucky				
Boyd	8	4	23 (7,044)	2 (679)
Carter	5	3	11 (5,009)	0
Garrard	4	2	6 (2,687)	0
Metcalfe	3	2	7 (1,700)	0
Rowan	5	3	9 (3,393)	1 (133)
Tennessee				
Davidson	4	6	134 (75,227)	9 (3,539)
Wayne	6	3	7 (2,564)	1 (78)
Mississippi				
Grenada	5	2	5 (4,419)	1 (140)
Union	8	3	7 / (4891)	1 (153)

a U.S. Fire Administration, 2016.
b USACops, 2016; Kentucky State Police, 2016; Tennessee Highway Patrol, 2016; Mississippi Highway Patrol, 2016.
c Public Schools K12, 2016.
d U.S. News and World Report, 2016.

Based on the number of police and fire stations, schools, and hospitals, public service infrastructure in the project vicinity appears adequate to accommodate the temporary needs of the 126 non-local construction workers and their families for each compressor station site.

All of the counties in the project area have a County Sheriff's Department. In addition, cities and towns may also have local municipal police departments. The respective state police departments also have patrol jurisdiction over the project sites. In Rowan County, Kentucky, and Davidson County, Tennessee, the state police maintain posts that increase the local presence of law enforcement. Fire protection within the affected counties is administered by local governments and volunteer fire departments. The majority of the compressor station sites are covered by volunteer fire departments. These departments may include both career firefighting staff and volunteers serving together in the same station. There are 12 full-time career fire departments located in the larger localities, the largest being the Nashville Fire Department.

Columbia Gulf's operations staff developed and continues to improve and maintain a liaison program with emergency response, government, and public safety officials in their responsible areas. These officials include local fire and law enforcement officials, emergency management services, ambulance services, HAZMAT groups, state police officials, local emergency planning coordinators, and town/city government representatives. Further discussion of Columbia Gulf's safety standards is included in section 4.12.

Healthcare infrastructure in the project localities varies by the size and population of the locality. Carter, Garrard, and Metcalfe Counties do not have hospitals within their jurisdictions; however, there are nearby (generally within 20 miles) hospitals in neighboring counties. Those

counties with larger population bases have at least one hospital, and Davidson County (the center of a major metropolitan area) has many hospitals serving its population. The healthcare resources are adequate to meet the needs of the local population. Columbia Gulf would coordinate with local emergency medical service departments during construction. Coordination would allow for the departments to sustain current levels of service through construction and support the construction staff, including counties that do not have medical facilities. Given the health care resources, a significant impact from the project on health care availability is not anticipated.

The public school system enrollment for the project localities was 106,934 students combined. A total of 205 schools serve students from kindergarten through 12th grade. Many of the non-local workers are not typically accompanied by their families or their children due to the transient nature of the work. Those students that are relocated would reside throughout the nine counties and would be dispersed among multiple schools and school districts. Based on the number and size of schools in the affected counties, the project area appears to have sufficient educational resources to accommodate school age children of workers during temporary relocation.

The impacts on public services due to the addition of 14 permanent employees throughout the 12 affected counties would be negligible. In summary, there are ample public services available in the area to meet the needs of the project. Short-term impacts on certain other public services are possible, which would include the need for localized police assistance or certified flaggers to control traffic flow during construction activities. Additional discussion of these topics is provided in section 4.9.5.2.

4.9.4 Public Utilities and Related Infrastructure

4.9.4.1 Mountaineer XPress Project

Electricity is provided by two investor-owned utilities, American Electric Power (Marshall, Jackson, Cabell, Roane, Mason, and Putnam Counties) and FirstEnergy's Mon Power subsidiary (Wetzel, Tyler, Doddridge, Ritchie, Wirt, and Jackson Counties). The compressor stations included in the MXP are proposed to be natural gas-powered, and as such, would not require significant electricity for operation. (Gas-powered emergency electric generators would be available at each compressor station.) Without significant demand for electricity at the compressor stations, the project would have little impact on electrical capacity in the area. Pending approval of the MXP, Mon Power would extend three-phase electrical power service about 13 miles to the White Oak Compressor Station. Service extensions are a typical activity of local electric power companies and are generally conducted by in-house and/or contractor staff. No significant impact on the ability of public utilities to provide service would result.

Water and sewer systems located in the project area are maintained by county or municipal local government entities. The project is not proposing any facilities that would require the substantial use of water and sewer resources. Columbia Gas is in the process of designing the respective compressor stations and would work with county health departments and other applicable agencies to design and permit onsite septic systems/water wells, or establish connections to existing water and sewer facilities, where available.

4.9.4.2 Gulf XPress Project

Electricity in the vicinity of the new compressor stations is provided by the following utilities:

- Holcomb Compressor Station – Delta Electric Power Association
- New Albany Compressor Station – New Albany Light, Gas & Water
- Clifton Junction Compressor Station – Tennessee Valley Electric Cooperative
- Cane Ridge Compressor Station – Nashville Electric Service
- Goodluck Compressor Station – Tri-County Electric Co-Op Inc.
- Paint Lick Compressor Station – Inter-County Energy Cooperative
- Morehead Compressor Station – Fleming-Mason Energy Cooperative

All of the new compressor stations would be natural gas-powered, and as such, would not require significant electricity for operation. (Gas-powered emergency electric generators would be available at each compressor station.) Without the need for significant electricity at the compressor stations, the project would have little impact on electrical capacity in the area. Pending approval of the GXP, Tri-County Electric Co-Op Inc., Nashville Electric Service, and Tennessee Valley Electric Cooperative would extend electrical powerlines to the Goodluck, Cane Ridge, and Clifton Junction stations, respectively. Short spans (fewer than 400 feet) of new overhead powerline would be installed at the Goodluck and Cane Ridge stations. At Clifton Junction, about 3,500 feet of new poles would be required to extend service from U.S. 64/SR 15 to the station. Again, these activities are relatively routine for local electric power companies. No significant impact on the ability of public utilities to provide service would result.

Water and sewer systems located in the project area are maintained by county or municipal local government entities. The project is not proposing any facilities that would require the substantial use of water and sewer resources. Columbia Gulf is in the process of designing the respective compressor stations and would work with county health departments and other applicable agencies to design and permit onsite septic systems/water wells, or establish connections to existing water and sewer where available.

4.9.5 Transportation and Traffic

4.9.5.1 Mountaineer XPress Project

The MXP would use road transportation corridors in the project area during construction and operation. Two interstate highways are in the project area; I-77 runs from north to south through Jackson County, and I-64 runs from east to west through Cabell and Putnam Counties. Other major roads in the project area include: U.S. 35 in Putnam County; U.S. 33 in Jackson, Roane, and Calhoun Counties; and U.S. 50 in Ritchie and Doddridge Counties. In addition to these larger arterial roadways, state and county roads serve project area localities. Ingress/egress to pipeline construction areas and construction access roads would more commonly occur from county and minor state roads that cross the pipeline routes.

Staging and delivery of pipeline construction personnel, equipment, and materials to project sites may temporarily impact the transportation system in the project area, but no long-term impacts would be anticipated. Materials and equipment would initially be brought to nearby contractor yards/staging areas and then delivered to their destinations along the rights-of-way. Construction traffic would primarily consist of vehicles traveling from staging areas to the individual work site locations delivering workers and material.

Before construction begins, Columbia Gas would work with local transportation officials to limit the effect of the project's construction to local roadways. Columbia Gas contractors would be made aware of road limitations, including weight limits and restrictions, and would comply with the WVDOT standards for road usage. Columbia Gas would also work with local transportation department offices to obtain necessary permits that may be required for construction entrances and maintenance of traffic.

The WVDOT has in place an Oil and Gas Road Policy, which addresses pipeline operations that would impact State roadways (WVDOT, 2012 and 2013). Columbia Gas is coordinating with the WVDOT to determine the current condition of public roads in and around the project area and to determine the adequacy of these roads to support construction and operation of the MXP. Columbia Gas assessed the anticipated use and potential impacts on the most likely public routes from interstate highways to the various state and county roads that would be traveled to access the project. Based on this assessment, portions of these public roads may require upgrades and/or improvements to safely allow both local general use and the additional construction and operations traffic. Improvements needed may include culvert replacements, turning radii improvements, widening, re-enforcement, and/or replacement.

Additionally, Columbia Gas and WVDOT have reached an agreement to undertake the public road improvements pursuant to WVDOT's Oil and Gas Road Policy. The public road improvements would be conducted by a third party contractor under the authority, jurisdiction, and pursuant to a permit issued by the WVDOT. The improvements would be subject to a traffic management plan and schedule reached in agreement with the WVDOT. Columbia Gas would direct and pay for the public road improvements, which would exclusively utilize WVDOT rights-of-way. The work would be consistent with WVDOT standards, specifications, and regulatory requirements and approvals and would be subject to WVDOT final approval and inspection.

Columbia Gas estimates approximately 250 to 300 daily trips would occur during peak construction traffic, or when pipe stringing trucks are most active. Daily construction traffic would taper off after pipe has been delivered to the construction rights-of-way. Parking would be available for daily commuters at many of the contractor yards located along the project. Columbia Gas anticipates that buses may transport some workers from central locations to work sites during construction. These central locations would be determined by the contractors upon mobilization to the project area. Bussing would help reduce impacts on the roadways and the need for parking at the job sites.

The existing traffic volumes vary widely across the project setting. On developed roads near the project, including major highways, the additional construction traffic would likely have a negligible impact on overall traffic volumes. On smaller roads in isolated areas, the increase could

disrupt local travel. Appropriate measures and notifications would be implemented to minimize these impacts on residents or businesses along these local roads.

The Sherwood Compressor Station site would have access from SR 18, which is classified as a feeder road. The WVDOT estimated that an average of 2,039 vehicle trips per day traveled on SR 18 near the station site in 2014. Feeder roads have a design volume of 5,000 to 15,000 vehicle trips per day, and SR 18 is currently operating well below this design capacity (WVDOT, 2016b; Federal Highway Administration [FHWA], 2016).

Similarly, the Mount Olive Compressor Station site is on County Highway 21, which is also classified as a feeder road. Traffic counts in the vicinity of the Mount Olive site are 2,219 average vehicle trips per day in 2014, which is also well below the 5,000 to 15,000 vehicle trip per day design volume for feeder roads (WVDOT, 2016b).

The White Oak Compressor Station site, in Calhoun County, would have ingress/egress from a local road. Local roads have a design capacity of 3,000 vehicle trips per day. The WVDOT estimates that County Road 2 and County Road 2/4 have averages of 142 and 132 vehicle trips per day, respectively, in the vicinity of the compressor station site (WVDOT, 2016b). These averages are well below the design capacity of these local roads.

Though there may be short-term traffic impacts during construction of the compressor stations, these would be temporary. To mitigate short-term construction impacts, Columbia Gas would coordinate with the WVDOT and county highway departments. Columbia Gas estimates approximately 70 to 90 daily trips would occur during peak construction traffic at each of the three compressor stations. Once the compressor stations are constructed, they would require a total of 29 permanent staff to operate the facilities. This would result in approximately 87 trips per day on roads accessing these three sites. This would not exceed the design capacity of the roads serving these facilities.

During pipeline operation, MXP-related vehicle traffic would be insignificant in counties without compressor stations.

4.9.5.2 Gulf XPress Project

The project would use public roads in the nine affected project counties during construction and operation of the stations. Before construction begins, Columbia Gulf would work with local transportation officials to develop plans to minimize the effect of the project's construction to local roadways. Columbia Gulf contractors would be made aware of road limitations, including weight limits and restrictions, and would comply with each state's department of transportation standards for road usage. Columbia Gulf would also work with local department of transportation offices to obtain necessary permits that may be required for construction entrances and maintenance of traffic, including the development of maintenance of traffic plans, as necessary.

The existing Leach C Meter Station has direct ingress/egress access to Bethel Lane, which in turn has access to Dog Fork Laurel Road. The Kentucky Transportation Cabinet identifies these roads as local roads, which are designed for 3,000 or fewer vehicle trips per day (FHWA, 2016). Vehicle trips to this site would increase during the 2- to 3-month construction period; however, after construction, the improved facility would not create more traffic than it currently generates.

The approved Grayson Compressor Station site has access to Beckwith Branch Road, which is classified as a local road, capable of a recommended traffic volume of 3,000 vehicle trips per day. The Kentucky Transportation Cabinet has measured 17 vehicle trips per day near the station site, which is well below the design traffic volume for Beckwith Branch Road. Similar to the Leach C station, traffic levels would increase during the 3- to 3.5-month construction period. Once the new compression is added, it is anticipated that traffic counts would go back to around 17 trips per day.

The Morehead Compressor Station site has direct ingress/egress to Kentucky SR 377. SR 377 is classified as a major collector and runs northeast-to-southwest. At its southwestern terminus, SR 377 meets SR 32, a principal arterial accessing the City of Morehead and I-64 (Kentucky Transportation Cabinet, 2016a). Collector roads are designed to accommodate traffic volumes of 5,000 to 15,000 vehicle trips per day. Within the vicinity of the compressor station site, SR 377 has an average of 3,502 vehicle trips per day, which is well within the design volume for collector roads (Kentucky Transportation Cabinet, 2016b). Taking into account workers commuting to the site and the regular delivery of materials and supplies, Columbia estimates between 200 and 300 vehicle trips per day. When this temporary increase of vehicles is factored with the existing traffic along SR 377, the estimated daily traffic volume would still be less than the FHWA-recommended traffic volume for this roadway. The project would not create enough vehicle traffic to affect the capacity of SR 377. Short-term construction activities could result in congestion and delays at the Morehead station driveway entrance on SR 377. Permanent operations would only require a few vehicle trips per day and would not impact the design capacity or require long-term improvements to SR 377.

The Paint Lick Compressor Station site has access to Kentucky SR 52. SR 52 is classified as a minor arterial and travels east to west across the county serving as a connection between Lancaster in Garrard County and Richmond in neighboring Madison County. Minor arterial roads have a design volume of 5,000 to 25,000 average vehicle trips per day (FHWA, 2016). SR 52 in the vicinity of the station site has an average of 2,730 vehicle trips per day, which is less than the design volume for a minor arterial highway (Kentucky Transportation Cabinet, 2016b). Taking into account workers commuting to the site and the regular delivery of materials and supplies, Columbia Gulf estimates between 200 and 300 vehicle trips per day. When this temporary increase of vehicles is factored with the existing traffic along SR 52, the estimated daily traffic volume would still be less than the FHWA recommended traffic volume for this roadway. Construction vehicles entering and exiting the site could result in congestion and delays at the compressor station site entrance on SR 52. Given the measured traffic levels along SR 52 near the facility and the functional classification and design capacity of SR 52, it is not expected that the station construction or operation would have substantial negative impacts on traffic in the area.

The Goodluck Compressor Station site has access to Kentucky SR 163, which travels north-to-south through the county, connecting Edmonton (the county seat) with Tompkinsville in neighboring Monroe County. The Kentucky Transportation Cabinet classifies SR 163 as a major collector. Major collectors have recommended traffic volumes of 5,000 to 15,000 vehicle trips per day (FHWA, 2016). SR 163 has average daily traffic counts of 2,652 vehicles per day north of the site and 1,784 vehicles south of the site (Kentucky Transportation Cabinet, 2016b). Taking into account workers commuting to the site and the regular delivery of materials and supplies, Columbia Gulf estimates between 200 and 300 vehicle trips per day. When this temporary increase

of vehicles is factored with the existing traffic along SR 163, the estimated daily traffic volume would still be less than the FHWA recommended traffic volume for this roadway. Therefore, construction of the compressor station should not substantially increase traffic volumes in the vicinity. Short-term construction activities would likely result in congestion and delays at the site driveway entrance on SR 163 during the 10-month construction period. Columbia would work with the KYTC to develop measures to minimize traffic impacts at this location. We do not anticipate that station construction or operation would have a significant impact on traffic or transportation in Metcalfe County.

Unlike the other proposed compressor stations that are located in rural settings, the Cane Ridge station would be located in an urban area, suburban Nashville. The site is on Barnes Road, approximately 0.5 mile west of Old Hickory Boulevard. The Tennessee Department of Transportation (TDOT) classifies Old Hickory Boulevard as an urban collector but does not have a designation for Barnes Road (TDOT, 2016). Without a TDOT classification, Columbia Gulf assumed that the road was classified as a local road, designed for a daily average of 3,000 vehicle trips per day (FHWA, 2016). Traffic volume data are not available within the vicinity of the station site. Columbia Gulf estimates that, at most, construction would result in approximately 280 to 300 vehicular trips per day to and from the site. This estimate is based on a planned construction workforce of 140 workers with 75 percent of those workers driving individual vehicles. The estimate also includes occasional deliveries to the site.

Given the urban setting of the area and the proximity of residential areas to the site, an increase in traffic volume along Barnes Road and turning movements from Old Hickory Boulevard onto Barnes Road and into and out of the compressor site on Barnes Road could result in delays to local commuters, especially during peak traffic hours. Given the possibility of traffic delays, Columbia Gulf would work with local transportation officials to mitigate transportation and traffic impacts on Barnes Road during the 10-month station construction period. Columbia Gulf does not anticipate a significant change in traffic patterns during the construction and eventual operation of the compressor station. Impacts on the local transportation network would be temporary, as the facility would be unmanned, and would only require a few vehicle trips per month once it is operational.

The Clifton Junction Compressor Station site has ingress/egress onto U.S. 64. This federal highway is a major transportation corridor in the county and the State of Tennessee. The highway is classified as a principal rural arterial, which has a recommended volume of 10,000 to 40,000 average vehicle trips per day (FHWA, 2016). TDOT data show that in the vicinity of the Clifton Junction site, U.S. 64 has an average daily trip count of 2,061 vehicles per day, which is well below the threshold for the functional classification of the roadway (TDOT, 2016). Taking into account workers commuting to the site and the regular delivery of materials and supplies, Columbia Gulf estimates between 200 and 300 vehicle trips per day. When this temporary increase of vehicles is factored with the existing traffic along U.S. 64, the estimated daily traffic volume would still be less than the FHWA recommended traffic volume for this roadway.

Short-term construction activities would likely result in congestion and delays at the site driveway entrance on U.S. 64 during the 10-month construction period. Columbia would work with the TDOT to design the site access driveway entrance and to develop measures to control vehicle traffic into and out of the site, thereby minimizing traffic impacts at this location. With

the low traffic volume in the area of the site, it is unlikely that there would be either short- or long-term transportation or traffic impacts in Wayne County.

The New Albany Compressor Station site is located off of County Road 137. The Mississippi Department of Transportation (MDOT) does not have a functional classification, or average daily vehicle data, for this roadway. There would not be a significant change in traffic patterns during the construction and eventual operation of the compressor station. Impacts on the local transportation network would be temporary, as the facility would be unmanned, and would only require a few vehicle trips per month once it is operational. Short-term construction activities may result in delays at the site driveway entrance on CR137 during the 10-month construction period. Columbia would work with the MDOT to develop measures to minimize traffic impacts at this location.

The Holcomb Compressor Station site is located off of Mississippi SR 7. The MDOT has classified Mississippi SR 7 as a major arterial, which, using FHWA guidelines, is designed for 5,000 to 25,000 average vehicle trips per day (FHWA, 2016). SR 7 in the vicinity of the station site registered 3,500 average daily vehicle trips in 2014, well below the minimum threshold for a major arterial (MDOT, 2016). Taking into account workers commuting to the site and the regular delivery of materials and supplies, Columbia Gulf estimates between 200 and 300 vehicle trips per day. When this temporary increase of vehicles is factored with the existing traffic along SR 7, the estimated daily traffic volume would still be less than the FHWA recommended traffic volume for this roadway. Construction vehicles entering and exiting the site could result in congestion and delays at the site entrance on SR 7. Given the modest traffic counts in the vicinity of the site, we do not anticipate that construction and operation of the Holcomb Compressor Station would have negative impacts on the SR 7 transportation corridor or local traffic in the station's vicinity.

4.9.6 Roadway and Railroad Crossings

4.9.6.1 Mountaineer XPress Project

The MXP would require approximately 130 public road crossings and 4 railroad crossings. The crossings would be accomplished using one of several possible methods. Railroads would be bored, and roads would either be open-cut, bored, or crossed by the Direct Pipe method. A summary of each of these crossing techniques is provided in section 2.4.4.3. The use of boring or Direct Pipe techniques would avoid road and rail surface impacts, while the use of the open-cut crossing method would not. Road crossing permits would be obtained from the railroads and applicable federal, state, and local agencies. These permits would dictate the specific requirements for the day-to-day construction activities at each crossing, and the restoration and repair of the areas after construction.

The majority of two-lane (or wider) paved roads, highways, and railroads would be crossed by boring methods. The open-cut crossing method would primarily be used to cross driveways, parking lots, and roads with low traffic volumes. The first step for an open-cut crossing would be to install traffic control devices and signage. Traffic would be detoured around the open trench during the installation process. The pipeline crossing would be installed one lane at a time, and, as the pipe is installed, successive lanes would alternately be taken out of service until the crossing is completed. Another option would be to temporarily close a portion of the road and detour traffic

around the work area and onto an adjacent roadway. In order to confirm that impacts from construction across and within roadways would be minor and temporary, **we recommend that:**

- **<u>Prior to construction</u>, Columbia Gas should file with the Secretary, a final traffic management plan for the MXP which includes:**
  - **proposed measures for implementing any detours on public roadways;**
  - **timing shifts and worker commutes as to avoid heavy traffic periods; and**
  - **proposed measures for restoration of roadways damaged by project-related activities upon completion of construction.**

4.9.6.2 Gulf XPress Project

Since the GXP involves only construction and operation activates at new and existing discreet facilities, there would not be any roadway crossings or railroad crossings associated with the project.

4.9.7 Property Values and Mortgages

During public scoping for the MXP and GXP, we received multiple comments regarding concerns with reductions in property values that could result from the construction and operation of natural gas facilities near homes, residential areas, or areas identified for future residential or commercial developments. The following sections discuss potential impacts on property values for homes and businesses within the project areas.

Landowners typically have the following concerns regarding potential impacts on property values:

- devaluation of property if encumbered by a pipeline easement;
- being the responsible party for property taxes on land containing a pipeline easement;
- paying landowner insurance premiums for project-related effects; and
- negative economic effects resulting from changes in land use.

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, which is designed to provide fair compensation to the landowner for the right to use the property for pipeline construction and operation. Appraisal methods used to value land are 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. A potential purchaser of property may make a decision to purchase land based on his or her planned use. An industrial user might find the pipeline (i.e., a potential source of energy for an industrial plant) preferable; a farmer looking for land for grazing or cropland may or may not find it objectionable; while a developer seeking to acquire the land for a residential subdivision may either use the open nature of a pipeline right-of-way as an advantage in subdivision design or rule out the parcel based on the pipeline's presence. Based on the presence of a pipeline, it is possible that a potential purchaser would decide

not to purchase the property; however, each potential purchaser has different criteria and differing capabilities for purchasing land.

Property taxes for a land parcel are generally based on the actual use of the land. Construction of the pipeline would not change the general use of the land but would preclude construction of aboveground structures on the permanent right-of-way. If a landowner believes that the presence of a pipeline easement impacts the value of his or her land, resulting in an overpayment of property taxes, he or she could appeal the issue of the assessment and subsequent property taxation to the local property tax agency. Pipelines are typically assessed as real property, and the pipeline company is the entity that would pay that tax. See section 4.9.8 for a discussion of potential effects to local tax revenue that could result from reductions in property values.

Several studies examined the effects of pipeline easements on sales and property values, and evaluated the impact of natural gas pipelines on real estate. The first study, *Pipeline Impact Study: Study of a Williams Natural Gas Pipeline on Residential Real Estate: Saddle Ridge Subdivision, Dallas Township, Luzerne County, Pennsylvania*, assessed the impact on the sale price of undeveloped lots and single-family residences that are crossed by a natural gas transmission pipeline easement (Allen, Williford & Seale, Inc., 2014). The report compared units in a subdivision in Luzerne County that had an existing natural gas transmission line located within it. Differences between the sale prices of undeveloped lots and houses with the pipeline easement and those that did not have an easement were analyzed. The report found that, when the sales prices of the encumbered residences were compared with the sales prices of the unencumbered residences, there was no indication that the pipeline easement had any effect on the sales prices of homes in Saddle Ridge. Likewise, when the sales prices of encumbered undeveloped lots were compared with the sales prices of unencumbered undeveloped lots, the differential in price could be explained by the reduction in lot size associated with the easement area.

Another study, by Diskin, et al. in 2011, looked at the effects of natural gas transmission pipelines on residential values in Arizona. The study concluded that there was no identifiable systemic relationship between proximity to a pipeline and residential sale price or value.

Studies conducted in 2008 by PGP Valuation Inc. (PGP, 2008) for Palomar Gas Transmission, Inc. and by ECONorthwest for the Oregon LNG Project (Fruits, 2008) reached similar conclusions. Both studies evaluated the potential effect on property values of a natural gas pipeline that was constructed in 2003-2004 in northwestern Oregon, including along the western edge of the Portland metro area. The PGP study found that:

- there was no measurable long-term impact on property values resulting from high-pressure natural gas pipelines for the particular pipeline project studied;
- interviews with buyers and brokers indicated no measurable impact on value or price; and
- there was no trend in the data to suggest an extension of marketing periods (i.e., time while the property is on sale) for properties with gas pipeline easements.

The ECONorthwest study concluded that the pipeline had no statistically significant or economically significant impact on residential properties. The study also concluded that there was no relationship between proximity to the pipeline and sale price (Fruits, 2008).

Yet another study (Hansen et al., 2006) analyzed property sales near a pipeline accident location in Washington State, using methodologies that considered proximity and persistence over time. This study noted a decline in property values following the incident; however, the effect was very localized and declined as the distance from the affected pipeline increased. The effect also diminished over time in the years following the incident.

In another EIS analysis we conducted and published in 2014 (with a project area in Pennsylvania and New York), several appraisers were contacted about the potential impacts on property values due to the presence of a natural gas pipeline easement (FERC, 2014). One appraiser who teaches seminars for appraisers and realtors, including discussions of mineral rights and pipeline easements, provided information on the subject. According to the appraiser, "the empirical evidence indicates no difference in value attributable to the existence of the pipeline easement." The appraiser further noted that he was not aware of appraisers making adjustments in the appraiser reports for the existence of a pipeline easement. He stated that the large number of variables that impact home values make it difficult to determine the incremental effect that any one variable may have on a home's value. Regardless, it is possible that the perceived safety issues or the limitations on land use within the permanent easement could reduce the number of potential buyers for a property, which may extend the number of days a property is on the market.

Based on the research we reviewed, we find no conclusive evidence indicating that natural gas pipeline easements would have a negative impact on property values in general; however, there is always the possibility that any given property may experience some value-related impacts (e.g., price at sale lower than owner believes is warranted; longer time on the market).

On other projects, we have examined concerns that insurance premiums would increase and/or insurance companies would not insure properties due to pipeline proximity. These concerns were examined by contacting insurance offices to pose the question. We asked whether the presence of a utility crossing would change the terms of an existing or new residential insurance policy, which types of utilities may cause a change, how a policy might change, and what factors would influence a change in the policy terms, including the potential for a policy to be dropped completely. Results of this initial investigation suggested that the potential for a residential insurance policy to be affected could exist, but the extent of any action and corresponding corrective action would depend upon several factors, including the terms of the individual landowner's policy and the terms of the pipeline company's own policy. Insurance company contacts were not able to speak directly to the potential factors that could cause a change in a policy (e.g., type of utility, proximity of residence to utility), or provide quantitative information on the potential change in a policy premium (in dollars or percent). Further, we have requested in some previous projects that the pipeline company notify us of any landowner-reported instances where property insurance was either dropped, denied, or had rates affected due to the presence of a pipeline. To date, there have been no such reports. As such, there is no conclusive evidence indicating that insurance premiums would be affected by the presence of a natural gas pipeline easement.

4.9.7.1 Mountaineer XPress Project

As described in section 4.8.1.2, Columbia Gas would acquire easements for both the temporary (construction) and permanent rights-of-way, where applicable. Columbia Gas would

compensate landowners for the acquisition of new property for aboveground facilities and for easements, including compensation for construction related damages and for damages associated with residential properties, crops, pasture, and timber. The total acreage of cropland and timbered areas disturbed by the project can be found in section 4.8.1.1. If the landowner observes damage after the project is complete and the land is rehabilitated, Columbia Gas would work with the landowner to rectify the damage. Columbia Gas would implement an environmental complaint resolution procedure during construction and for a period of at least 2 years following the completion of construction. This procedure is discussed further in section 4.8.1.3. Because damaged land would be rehabilitated and/or the landowners compensated for damages, the fiscal impact of productivity loss resulting from direct or indirect effects from the project is expected to be negligible.

4.9.7.2 Gulf XPress Project

Columbia Gulf would compensate landowners for the acquisition of new property for aboveground facilities. For the work planned at the existing and approved facilities, Columbia Gulf would not increase the permanent footprint of these stations as part of the GXP. Existing station components that require upgrades or modifications at these facilities would be unlikely to have an adverse effect to property values of nearby residences, as the existing footprint would not be expanded.

4.9.8 Economy and Tax Revenues

Construction and operation of the MXP and GXP would have a beneficial impact on local tax revenues and local sales tax.

4.9.8.1 Mountaineer XPress Project

Construction and operation of the MXP would have a beneficial impact on local sales tax revenue. Table 4.9-10 provides the estimated payroll, cost of materials purchased locally, and projected sales tax revenues associated with project construction. Payroll taxes would also be collected from the workers employed on the projects. Columbia Gas anticipates that its total payroll would be approximately $644 million during the construction phase. Economic impacts due to construction of the MXP may be beneficial at the local and county level in the form of increased sales and payroll taxes. However, these impacts would be limited to the duration of the construction period.

Table 4.9-10
Estimated Local Sales and Payroll Taxes Generated by Construction and Operation of the MXP

	Construction (in millions)		Operation (in millions)
County	Construction Payroll	Cost of Materials Purchased	Tax Revenue Paid by Columbia Gas a/
Marshall	$43.6	$24.6	$1.7
Wetzel	$71.2	$14.9	$2.4
Tyler	$13.4	$2.8	$0.4
Doddridge	$122.7	$73.4	$5.6
Ritchie	$66.5	$14.0	$2.3

Table 4.9-10
Estimated Local Sales and Payroll Taxes Generated by Construction and Operation of the MXP

County	Construction (in millions)		Operation (in millions)
	Construction Payroll	Cost of Materials Purchased	Tax Revenue Paid by Columbia Gas a/
Wirt	$48.9	$10.3	$1.7
Calhoun	$31.3	$41.8	$1.3
Roane	$33.9	$7.1	$0.9
Jackson	$87.4	$63.1	$4.0
Mason	$1.6	$0.3	<$0.1
Putnam	$79.2	$16.6	$3.1
Kanawha	$2.2	$9.7	$0.1
Cabell	$30.9	$9.5	$1.3
Wayne	$11.5	$26.5	$1.1
Total for Project Area	**$644.4**	**$314.8**	**$26.1**

a Estimated tax revenue for 2019, the first full year of operation of the project.

Construction of the MXP would have a short-term, beneficial effect in terms of increased payroll and local material purchases. Because about 50 percent of the workers are expected to be local, and non-local workers would temporarily relocate to the project vicinity, a substantial portion of the payroll likely would be spent with local vendors and businesses. About half of non-specialized construction materials (i.e., aggregate, concrete, asphalt, clean fill, paint, coatings, etc.) are expected to be locally sourced. Construction of the MXP would also result in increased state and local sales tax revenues associated with the purchase of some construction materials, as well as the construction workforce's purchase of goods and services.

During public scoping, we received comments regarding concerns with local tax losses due to diminished property values. As discussed in section 4.9.7, we find no conclusive evidence indicating that natural gas pipeline easements would have a negative impact on property values. The long-term positive economic impacts from the MXP include an increase in annual tax revenue paid by Columbia Gas ranging from $50,000 per year in Mason County to $5.6 million in Doddridge County (see table 4.9-5). This increase in taxes paid would benefit the local governments and their budgets annually for the life of the MXP.

We do not expect the project to have any long-term negative economic impact. The pipeline would be installed underground, and any surface impacts, such as damaged roads, would be repaired. Once installed, the pipeline would not impede normal surface traffic or access to businesses, and most pre-construction property uses would be allowed.

4.9.8.2 Gulf XPress Project

Construction and operation of the GXP would have a beneficial impact on local tax revenue. Table 4.9-11 provides the estimated property tax impact for the years 2016 through 2019 for the project.

Table 4.9-11
Estimated Property Tax Revenues by County per Year for the GXP a/

State/County	2016	2017	2018	2019	Total by County
Kentucky					
Boyd b/	$0	$0	$6,255	$24,644	$30,899
Carter	$0	$0	$122,380	$80,363	$202,743
Garrard	$32,701	$107,447	$664,782	$904,009	$1,705,939
Metcalfe	$28,701	$94,305	$583,569	$793,434	$1,500,009
Rowan	$29,881	$98,181	$607,453	$826,050	$1,433,503
Kentucky Total	**$91,283**	**$299,993**	**$1,984,439**	**$2,628,500**	**$4,873,093**
Tennessee					
Davidson	$11,555	$37,967	$234,904	$2,129,577	$2,414,003
Wayne	$5,436	$17,860	$110,501	$1,001,767	$1,135,564
Tennessee Total	**$16,991**	**$55,827**	**$345,405**	**$3,131,344**	**$3,549,567**
Mississippi					
Grenada	$92,410	$303,636	$1,878,612	$2,554,644	$4,829,302
Union	$116,770	$383,678	$2,373,835	$3,228,077	$6,102,360
Mississippi Total	**$209,180**	**$687,314**	**$4,252,447**	**$5,782,721**	**$10,931,662**
Project Total	**$317,454**	**$1,043,134**	**$6,582,291**	**$11,542,565**	**$19,354,322**

a Estimates are based on current levy rates as of March 10, 2015.
b Only rights-of-way would be purchased for the properties in Boyd and Carter Counties, and property taxes would be subject to a 1-year lag. Therefore, no property taxes would be owed in Boyd or Carter Counties for the years 2016 and 2017.

In addition to expected property tax benefit that the project would provide, GXP would also result in millions of dollars of project spending in the area of influence through materials purchase and construction payroll. Total outlays expected for all seven new aboveground facilities is estimated at approximately $704 million. Table 4.9-12 provides the total estimated expenses, including construction materials, facility components, labor costs including payroll, and real estate purchases, for the GXP.

Table 4.9-12
Estimated Construction Expenses for the GXP a/

State	2016	2017	2018	2019	Total Estimated Investment
Kentucky	$24,567,255	$221,563,352	$90,304,341	$1,139,509	$337,574,457
Tennessee	$15,063,762	$125,113,717	$48,210,722	$698,706	$189,086,907
Mississippi	$14,091,387	$117,037,546	$45,098,689	$653,604	$176,881,226
Project Total	**$53,722,404**	**$463,714,615**	**$183,613,752**	**$2,491,819**	**$703,542,590**

a Estimated construction costs include: facility components for existing and new aboveground facilities, construction materials, construction labor, contract labor, right-of-way and real estate costs, and other project-related costs.

4.9.9 Environmental Justice

EO 12898, *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires federal agencies to identify and address, as appropriate, the potential for disproportionately high and adverse health or environmental effects of federal programs, policies, and activities on minority and low-income populations. Consistent with EO 12898, the CEQ called on federal agencies to actively scrutinize the following issues with respect to environmental justice (CEQ, 1997a):

- the racial and economic composition of affected communities;
- health-related issues that may amplify project effects to minority or low-income individuals; and
- public participation strategies, including community or tribal participation in the process.

The EPA's Environmental Justice Policies focus on enhancing opportunities for residents to participate in decision-making. The EPA states that Environmental Justice requires meaningful involvement so that:

- "potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health;
- the public's contributions can influence the regulatory agency's decision;
- the concerns of all participants involved will be considered in the decision-making process; and
- the decision-makers seek out and facilitate the involvement of those potentially affected" (EPA, 2011b).

Guidance from the CEQ states that "minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent, or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis" (CEQ, 1997). "Minority" is defined as individuals who are Black or African American; Asian; American Indian or Alaskan Native; Native Hawaiian or Pacific Islander; or Hispanic. The CEQ guidance also states that the low-income populations should be identified based on poverty thresholds as reported by the U.S. Census Bureau.

For both the MXP and the GXP, environmental justice communities are defined according to the following thresholds:

- communities where minorities comprise more than 50 percent of the population within a given census tract (for pipeline facilities) or census block group (for aboveground facilities);
- communities where the percentage of minorities within a given census tract (for pipeline facilities) or census block group (for aboveground facilities) exceeds the comparative county level by 10 percent or more; or

- communities where the percentage of persons below the poverty level within a given census tract (for pipeline facilities) or census block group (for aboveground facilities) exceeds the comparative county level by 10 percent or more.

As discussed in section 1.3, there have been many opportunities for the public to comment on and provide input about the projects. The Companies met with many different stakeholders, including local residents and affected landowners, during the initial development of the projects. These efforts included Columbia Gas and Columbia Gulf holding a number of open houses in the project areas for the affected communities and local authorities. The Companies also established, and are maintaining, websites for the MXP and GXP to share information about the projects with the public.

4.9.9.1 Mountaineer XPress Project

Columbia Gas used our PF review process (discussed in section 1.3.1). One of the goals of this process is to increase public awareness and encourage public input regarding the project before an application is filed. As part of this process, we participated in all of Columbia Gas' open houses to explain the FERC environmental review process and receive input from the public about the MXP. Interested parties have had, and will continue to be given, opportunities to participate in the NEPA review process. Indeed, Columbia Gas revised its planned and proposed pipeline route in numerous locations based in a large part on public input. Further, stakeholders have been afforded the opportunity to participate in our public scoping meetings within the project area to identify concerns and issues that should be covered in the EIS, to submit written comments about the project during the scoping period, and to comment on the draft EIS either electronically, in writing, or at draft EIS comment meetings to be held within the project area. All comments on the draft EIS will be responded to in the final EIS.

Table 4.9-13 shows minority and income information for the state, counties, and census tracts crossed by the MXP pipeline facilities, and table 4.9-14 shows this information for MXP aboveground facilities.

Table 4.9-13
Minority Populations and Low-Income Population Information for the Census Tracts Crossed by MXP Pipeline Facilities

State / County / Census Tract	Percent Minority (percent) a/	Percent Below Poverty Level (percent) b/	Median Household Income b/
State of West Virginia	***7.3***	***18.1***	***$41,576***
Marshall County	**3.0**	**15.1**	**$41,978**
Census Tract 208	2.2	12.7	$47,50
Census Tract 209	1.9	11.4	$46,583
Wetzel County	**2.1**	**20.0**	**$38,066**
Census Tract 304	1.1	24.6	$36,285
Census Tract 305	1.4	23.6	$32,260
Tyler County	**1.8**	**18.0**	**$39,974**
Census Tract 9620	0.7	16.8	$36,154

Table 4.9-13
Minority Populations and Low-Income Population Information for the Census Tracts Crossed by MXP Pipeline Facilities

State / County / Census Tract	Percent Minority (percent) a/	Percent Below Poverty Level (percent) b/	Median Household Income b/
Doddridge County	**3.9**	**15.3**	**$40,329**
Census Tract 9650	2.8	11.0	$40,329
Census Tract 9651	4.8	19.3	$38,607
Ritchie County	**2.0**	**18.6**	**$39,118**
Census Tract 9623	2.0	21.0	$36,741
Census Tract 9625	1.8	23.9	$37,219
Census Tract 9624	2.3	8.4	$43,724
Calhoun County	**2.6**	**22.9**	**$31,017**
Census Tract 9626	3.1	26.6	$32,314
Wirt County	**2.5**	**19.1**	**$37,117**
Census Tract 301.1	3.7	19.3	$41,684
Census Tract 301.2	0.9	18.8	$34,055
Roane County	**2.5**	**24.5**	**$30,104**
Census Tract 9628	1.7	17.6	$36,293
Jackson County	**2.5**	**18.9**	**$40,733**
Census Tract 9637	2.3	20.0	$42,030
Mason County	**2.9**	**18.0**	**$38,297**
Census Tract 9551.02	0.9	20.5	$41,953
Putnam County	**4.2**	**10.1**	**$55,939**
Census Tract 201	0.4	17.7	$40,452
Census Tract 202	3.6	12.4	$45,152
Census Tract 203	2.1	4.6	$65,980
Cabell County	**9.5**	**22.6**	**$37,716**
Census Tract 106	3.2	17.7	$46,424
Census Tract 108	1.2	10.3	$48,898

Sources:
a U.S. Census Bureau, 2014; total minority population calculated by subtracting the percentage of the population identified as "not Hispanic or Latino – white alone" from the total.
b U.S. Census Bureau, 2014.

Table 4.9-14
Minority and Low-Income Population Information for MXP Aboveground Facilities

State / County / Census Tract / Census Block Group	Percent Minority a/	Percent Below Poverty b/	Median Household Income b/
West Virginia	7.3	18.1	$41,576
Sherwood Compressor Station			
Doddridge County	3.9	15.3	$40,329
Census Tract 9651	2.8	19.3	$38,607
Census Block Group 9651004	2.8	1.5	$53,194

Table 4.9-14
Minority and Low-Income Population Information for MXP Aboveground Facilities

State / County / Census Tract / Census Block Group	Percent Minority a/	Percent Below Poverty b/	Median Household Income b/
White Oak Compressor Station			
Calhoun County	2.6	22.9	$31,017
Census Tract 9626	3.1	26.6	$32,314
Census Block Group 9626002	6.5	23.2	$32,222
Mount Olive Compressor Station			
Jackson County	2.5	18.9	$40,733
Census Tract 9637	2.3	20.0	$42,030
Census Block Group 9637002	14.2	29.5	$31,838

Sources:
a U.S. Census Bureau, 2014; total minority population calculated by subtracting the percentage of the population identified as "not Hispanic or Latino – white alone" from the total.
b U.S. Census Bureau, 2014.

None of the census tracts or census block groups that are crossed by or contain MXP facilities have minority populations that are greater than 50 percent of the population in those tracts or block groups. There are 11 census tracts crossed by MXP pipeline facilities that have a minority and/or low-income population that exceeds the county level by more than 10 percent and are, therefore, identified as environmental justice communities. Census tracts 304 and 305 in Wetzel County have low-income populations of 24.6 percent and 23.6 percent, respectively, compared to 20.0 percent for the county as a whole. Census tract 9651 in Doddridge County has a minority population of 4.8 percent and a low-income population of 19.3 percent, compared to 3.9 percent and 15.3 percent, respectively, for the county as a whole. Census tracts 9623 and 9625 in Ritchie County have low-income populations of 21.0 percent and 23.9 percent, respectively, compared to 18.6 percent for the county as a whole, and census tract 9624, also in Ritchie County, has a minority population of 2.3 percent, compared to 2.0 percent for the county. Census tract 9626 in Calhoun County has a minority population of 3.1 percent and a low-income population of 26.6 percent, compared to 2.6 percent and 22.9 percent, respectively, for the county as a whole. Census tract 301.1 in Wirt County has a minority population of 3.7 percent, compared to 2.5 percent for the county. Census tract 9551.02 in Mason County has a low-income population of 20.5 percent, compared to 18.0 percent for the county. Census tracts 201 and 202 in Putnam County have low-income populations of 17.7 percent and 12.4 percent, respectively, compared to 10.1 percent for the county as a whole.

There are two census block groups containing MXP aboveground facilities that have a minority and/or low-income population that exceeds the county level by more than 10 percent and are, therefore, also identified as environmental justice communities. Census block group 9637002 in Jackson County, which would contain the Mount Olive Compressor Station, has a minority population of 14.2 percent and a low-income population of 29.5 percent, compared to 2.5 percent and 18.9 percent, respectively, for the county as a whole. Census block group 9626002 in Calhoun County, which would contain the White Oak Compressor Station, has a minority population of 6.5 percent, compared to 2.6 percent for the county.

Construction and operation of the MXP would not cause impacts (in terms of air quality, water quality, or noise) that are expected to adversely affect the health or welfare of the population living in the project area. Nor would the project generate air emissions at levels constituting either nuisance or human health hazards off-site. The project is generally planned to be located in remote areas and avoids urban and high-density residential areas. The project has been routed substantially around or away from residential structures, and, therefore, potential negative impacts that could occur during construction, such as noise and traffic, would be located away from residents and residential areas. The yearlong duration of construction may cause temporary impacts on the project area; however, impacts would be distributed along the length of the entire project and would not disproportionately affect the identified environmental justice communities. Once the pipeline is operational, it would be buried, and thus would not constitute a visual impact on nearby residences. Maintenance of the pipeline would be infrequent and would not cause significant negative impacts.

The Mount Olive Compressor Station site (in census block group 9637002, identified as an environmental justice community) is within a low density semi-rural area. The site is vacant with mature vegetation. I-77 is adjacent to the eastern boundary of the site, and some residences are along Parkersburg Road in the site vicinity. As discussed in section 4.11.1, models of air quality impacts indicate potential air emissions would be below applicable thresholds and would not have significant impacts on local or regional air quality. Also discussed in section 4.11.1, although construction and operation of the MXP compressor stations would result in a noticeable increase in noise levels, the noise levels would remain below our noise criterion. With the incorporation of our noise recommendations and the mitigation measures proposed by Columbia Gas, construction and operation of the compressor station would not result in a significant noise impact on residents and the surrounding community. As discussed in section 4.9.7, we do not anticipate any measurable impact on property values of residential properties crossed by or adjacent to the project facilities. Residential development is located within 100 feet of the Mount Olive Compressor Station site. This site, similar to the other compressor station sties, has significant mature vegetation, which would provide visual screening between the facility and the residential development. Due to the location of I-77 on the eastern property line, the facility can be placed away from residential structures, and existing mature vegetation can be maintained to provide a substantial vegetative buffer between the facility and residences along Parkersburg Road. Given the ability to screen the facility from the adjacent residential development, it is unlikely that the station would have a significant visual impact on nearby residences.

The White Oak Compressor Station site (in census block group 9626002, identified as an environmental justice community) is in a rural area of Calhoun County on a forested parcel. The closest residential structures to the site are between 500 and 700 feet away. Mature vegetation surrounds the White Oak site, mitigating potential visual impacts on nearby residences. As discussed in section 4.11.1, air modeling indicates potential air emissions would be below applicable thresholds and would not have significant impacts on local or regional air quality. We note in section 4.11.2 that projected noise levels for White Oak would remain below our noise criterion but would nevertheless be equivalent to almost a doubling of the perceived noise in this quiet rural environment. We recommend a mitigation measure in section 4.11.2 that would reduce these impacts to acceptable levels.

In sum, the MXP is not anticipated to cause disproportionately high and adverse environmental or socioeconomic effects to any minority or low-income populations.

4.9.9.2 Gulf XPress Project

For the GXP, environmental justice communities are defined as they were for the MXP (see section 4.9.9.1). Table 4.9-15 shows minority and low-income population information for the counties, census tracts, and census block groups that contain the GXP facilities.

Table 4.9-15
Minority and Low-Income Population Information for the GXP

County/Census Tract/ Census Block Group	Percent Minority a/	Percent Below Poverty b/	Median Household Income b/
Kentucky			
Leach C Meter Station (Existing)			
Boyd County	6.4	19.7	$41,739
Census Tract 311	1.5	10.8	$57,318
Census Block Group 311-003	2.9	5.4	$57,500
Grayson Compressor Station (Existing)			
Carter County	3.1	18.7	$37,139
Census Tract 9606	5.4	14.3	$36,293
Census Block Group 9606-001	0.8	6.4	$42,800
Morehead Compressor Station			
Rowan County	5.3	26.0	$40,697
Census Tract 9501	2.0	16.1	$58,372
Census Block Group 9501-001	0	19.4	$40,370
Paint Lick Compressor Station			
Garrard County	5.7	20.7	$44,304
Census Tract 9704	4.7	13.9	$39,167
Census Block Group 9704-001	4.0	6.2	$27,750
Good Luck Road Compressor Station			
Metcalfe County	5.4	21.7	$30,453
Census Tract 9602	7.7	22.8	$32,188
Census Block Group 9602-002	14.4	27.5	$34,792
Tennessee			
Cane Ridge Compressor Station			
Davidson County	42.9	18.8	$47,434
Census Tract 191.12	61.4	21.4	$55,769
Census Block Group 019112-1 c/	61.4	21.4	$55,769
Clifton Junction Compressor Station			
Wayne County	9.1	21.3	$31,225
Census Tract 9501	23.9	17.0	$33,292
Census Block Group 9501-002	39.4	3.6	$34,500
Mississippi			
New Albany Compressor Station			
Union County	20.8	24.0	$35,389
Census Tract 9504	42.6	32.8	$35,242

Table 4.9-15
Minority and Low-Income Population Information for the GXP

County/Census Tract/ Census Block Group	Percent Minority a/	Percent Below Poverty b/	Median Household Income b/
Census Block Group 9504-001	23.2	18.9	$39,219
Holcomb Compressor Station			
Grenada County	44.2	22.7	$33,067
Census Tract 9502	27.2	14.4	$37,660
Census Block Group 9502-003	10.2	25.8	$27,469

Sources:
a U.S. Census Bureau, 2014; total minority population calculated by subtracting the percentage of the population identified as "not Hispanic or Latino – white alone" from the total.
b U.S. Census Bureau, 2014.
c Census Tract 191.12 only has one Census Block Group: 019112-1.

One census block group that contains GXP facilities has a minority population that is greater than 50 percent, and four census block groups have a minority and/or low-income population that exceeds the county level by more than 10 percent. Therefore, these five census block groups are identified as environmental justice communities. Census block group 019112-1 in Davidson County, Tennessee, which would contain the Cane Ridge Compressor Station, has a minority population of 61.4 percent. Census block group 9602-002 in Metcalfe County, Kentucky, which would contain the Good Luck Road Compressor Station, has a minority population of 14.4 percent, compared to 5.4 percent for the county as a whole, and a low-income population of 27.5 percent, compared to 21.7 percent for the county. Census block group 9501-002 in Wayne County, Tennessee, which would contain the Clifton Junction Compressor Station, has a minority population of 39.4 percent, compared to 9.1 percent for the county as a whole. Census block group 9504-001 in Union County, Mississippi, which would contain the New Albany Compressor Station, has a minority population of 23.2 percent, compared to 20.8 percent for the county as a whole. Census block group 9502-003 in Grenada County, Mississippi, which would contain the Holcomb Compressor Station, has a low-income population of 25.8 percent, compared to 22.7 percent for the county as a whole.

Construction and operation of the project would not cause impacts (in terms of air quality, water quality, or noise) that are expected to adversely affect the health or welfare of the population living in the project area. The GXP would not generate air emissions at levels constituting either nuisance or human health hazards off-site.

The proposed Cane Ridge Compressor Station site is in a suburban area on a large parcel with surrounding mature vegetation. As discussed in section 4.11.1, models of air quality impacts indicate potential air emissions would be below applicable standards and would not have significant impacts on local or regional air quality. Also, discussed in section 4.11.2, although construction and operation of the GXP compressor stations would result in a noticeable increase in noise levels, the noise levels would remain below our noise criterion. With the incorporation of our noise recommendation and the mitigation measures proposed by Columbia Gulf, construction and operation of the station would not result in a significant noise impact on residents and the surrounding community. As discussed in section 4.9.7, we do not anticipate any measurable impact on property values of residential properties adjacent to the station facilities. As

discussed in section 4.8.1.2, Columbia Gulf purchased the residential land located within the TWS for the Cane Ridge site and would convert it to open land following construction. As discussed in section 4.8.3.2, Columbia Gulf developed a visual screening plan for the Cane Ridge station. Given the ability to screen the facility from the adjacent residential development, the station would not have a significant visual impact on nearby residences.

The Goodluck Compressor Station would be located on a large parcel with very few residences located nearby. The nearest residential structure to the site has a substantial buffer of mature vegetation providing natural screening of the facility. Given the rural nature of the site, noise, air quality, visual, or property value impacts on the identified minority environmental justice community from construction and operation of the compressor station would not be anticipated.

The Clifton Junction, New Albany, and Holcomb Compressor Stations would all be located on large tracts in rural areas. Given the low population density in the area of these sites, it is unlikely that construction and operation noise, air quality, visual, or property value effects from of these facilities would adversely impact the identified environmental justice communities.

For these reasons, the GXP would be unlikely to cause disproportionately high and adverse environmental or socioeconomic effects to any minority or low-income populations.

4.9.10 Conclusion

Construction of the MXP and GXP would temporarily increase the population in the general vicinity of these projects. No significant impacts on the local housing markets would be expected from this temporary population increase. Existing public services are adequate to meet the anticipated needs of the construction and operational workforce for the MXP and GXP.

Staging and delivery of construction personnel, equipment, and materials to project sites may temporarily impact traffic on roads where construction site access is provided, but no long-term impacts in the project area would be anticipated. The Companies would implement appropriate measures and notifications to minimize these impacts on residents or businesses along these local roads.

The Companies would compensate landowners for the acquisition of new property for aboveground facilities and for easements, including compensation for construction-related damages and for damages from loss of crops, pasture, and timber.

Construction of the MXP and GXP would result in minor beneficial socioeconomic impacts due to increases in construction jobs, payroll taxes, local purchases made by the workforce, and expenses associated with the local acquisition of material, goods, and equipment. Operation of the projects would have a minor-to-moderate positive effect to the local governments' tax revenues due to the increase in real property taxes that would be collected from the Companies.

Construction and operation of the MXP and GXP would not cause impacts that are expected to adversely affect the health or welfare of the population living in the project area. Thus, the projects are not anticipated to cause disproportionately high and adverse environmental or socioeconomic effects to any minority or low-income populations.

4.10 CULTURAL RESOURCES

Section 106 of the NHPA, as amended, requires FERC to take into account the effects of its undertakings on properties listed or eligible for listing on the NRHP, and to provide the ACHP an opportunity to comment on the undertaking. Columbia Gas and Columbia Gulf are assisting FERC in meeting our obligations under section 106, by preparing the necessary information, analyses, and recommendations as authorized by 36 CFR 800.2(a)(3).

Construction and operation of the projects could affect historic properties (i.e., cultural resources listed or eligible for listing on the NRHP). These properties could include pre-contact or historic archaeological sites, districts, buildings, structures, and objects, or locations with traditional value to Native Americans or other groups. Such historic properties must generally possess integrity of location, design, setting, materials, workmanship, feeling, and association, and must meet one or more of the criteria specified in 36 CFR 60.4. Direct effects could include destruction or damage to all, or a portion of, an archaeological site, or alteration or removal of a historic property. Indirect effects could include the introduction of visual, atmospheric, or audible elements that affect the setting or character of a historic property.

4.10.1 Cultural Resources Surveys

Columbia Gas and Columbia Gulf conducted Phase I archaeological and historic architectural resource surveys of the proposed construction areas to identify cultural resources that could be affected by construction and operation of the MXP and the GXP.

4.10.1.1 Mountaineer XPress Project

The archaeological survey included a 300-foot-wide survey corridor centered on the pipeline centerline for the MXP-100, MXP-200, and SM80 Loop Line and SM80 Line replacement segments. The survey also included a 50-foot-wide survey corridor for existing access roads, a 100-foot-wide survey corridor for new access roads, the total acreage for off right-of-way use areas (staging areas and contractor yards), extra workspaces, and aboveground facility footprints. Some areas could not be surveyed due to safety concerns associated with the rugged and steep terrain of the project area. In such cases, the areas were documented as inaccessible, and archaeologists recorded visual observations of the locations. A total of 10,577 acres were surveyed. For architectural resources, the surveyed area included the 300-foot-wide corridor, the footprint of the associated pipeline facilities, and areas of potential visual effects to historic structures from changes in the setting (from construction of new facilities), clearing of vegetation, and/or modifications to the landscape. In a letter dated August 3, 2015, the West Virginia State Historic Preservation Office (SHPO) concurred with Columbia Gas' proposed survey methodology and study area.

Columbia Gas completed archaeological survey of 97.9 percent of the MXP-100 and the entirety of the SM80 Loop Line, the MXP-200, and SM80 Line replacements, and all but one of the aboveground facility sites (MXP-200 Tie-in with Line 1983). Archaeological survey is completed for 97.9 percent of the ATWS, 92.0 percent of access roads, 99.5 percent of staging areas, and 97.2 percent of pipe yards. Due to changes in the project route, some architectural resource surveys also remain. Columbia Gas provided a *Phase I Archaeological Survey Report*

(Stanyard et al., 2016a), *Phase I Historic Resource Survey Report* (Voisin-George et al., 2016), and a *draft Phase I Archaeological Survey Addendum 1 Report* (Stanyard et al., 2016b) to FERC and the West Virginia SHPO, and would provide the results of outstanding surveys in a subsequent addendum report(s).

4.10.1.1.1 Archaeological Resources

As of September 2016, Columbia Gas documented and assessed 55 archaeological resources within the surveyed area. Of these, 52 resources were newly recorded and 3 (46PU159, 46PU96, and 46PU208) were previously recorded. Site 46PU159 was previously determined eligible for the NRHP. It would be avoided by HDD. Sites 46PU96 and 46PU208 are pre-contact mound remnant sites with undetermined NRHP eligibility. Both sites 46PU96 and 46PU208 could not be relocated during Columbia Gas' cultural resource surveys. The previously and newly recorded resources include 11 historic-era cemeteries, 28 pre-contact sites, 4 isolated finds of pre-contact artifacts, 11 historic-period sites, and 1 multicomponent site.

The MXP-100 survey corridor passes through the eastern portion of the Burning Springs Civil War battlefield, approximately 1.2 miles east of the Burning Springs Complex NRHP boundary. The portion of the pipeline that crosses the Little Kanawha River is listed on the NRI due in part to its association with the Burning Springs Complex Site. Columbia Gas' cultural resource surveys in this area and at this crossing did not identify any surface features within the project area overlapping the general location of Civil War activity, nor did they recover any artifacts possibly related to the military engagement. No further cultural investigations are recommended for this area.

Project construction would avoid all 11 historic-era cemeteries recorded during the survey. Because cemetery 46MR246 is fewer than 20 meters from the project centerline, Columbia Gas would also install construction fencing and/or flagging or signage at the edge of the construction workspace to protect the cemetery from impacts associated with construction of the project.

Columbia Gas recommended that 50 of the 52 newly recorded sites were not eligible for the NRHP. Two sites (46PU368 and 46RT155) were recommended for avoidance or further work to assess their NRHP-eligibility status. Columbia Gas indicated it would avoid sites 46PU368 and 46RT155 through corridor adjustments and would install protective fencing at the edge of the construction workspace to protect the sites from impacts associated with project construction.

In a letter dated June 14, 2016, the West Virginia SHPO concurred with the eligibility recommendations for 43 of the 50 non-eligible sites; that the HDD would not adversely affect site 46PU159; and that sites 46PU368 and 46RT155 should be avoided or tested, and requested to be advised whether the two sites would be avoided. The SHPO also requested additional information for three sites and the Burnings Springs Civil War battle area be provided in a final version of the Phase I report. Columbia Gas provided a final Phase I report to the FERC and SHPO. In a letter dated August 29, 2016, the SHPO indicated the project would have no effect to sites 46PU159, 46PU368, and 46RT155, and remained in concurrence with its previous eligibility determinations. We concur with the SHPO.

Columbia Gas provided a draft Phase I Archaeological Survey Addendum 1 Report to the FERC and SHPO. The addendum report presents the results of survey efforts conducted subsequent to the initial field effort and includes areas that were previously inaccessible or are new modifications to the proposed project. This effort resulted in the identification of 7 of the 52 newly recorded sites; 6 pre-contact archaeological sites 46CB218, 46CB520, 46DO115, 46PU377, 46PU378, and 46PU379 and 1 historic-period site 46CB217. Columbia Gas recommended that all seven newly recorded sites were not eligible for the NRHP. Columbia Gas' cultural resource surveys did not identify any surface features in the location of the two previously recorded mound sites (46PU96 and 46PU208), nor did they recover any artifacts possibly related to those resources. No further cultural investigations are recommended for this area. In a letter dated December 9, 2016, the SHPO indicated the project would have no effect to sites 46PU96 and 46PU208 and concurred with Columbia's determination that sites 46CB217, 46CB218, 46CB520, 46DO115, 46PU377, 46PU378, and 46PU379 are not eligible for inclusion in the NRHP. We concur with the SHPO.

Columbia Gas has not yet provided another addendum report(s) for outstanding archaeological surveys.

The NPS provided information about a National Coal Heritage Area where the pipeline route terminates and provided the Heritage Area's Executive Director's contact information to Columbia Gas. Columbia Gas contacted the Executive Director, and no response has been received to date.

4.10.1.1.2 Architectural Resources

Columbia Gas documented and assessed 167 historic-age architectural resources within the surveyed area. Twenty-five of these were previously recorded, and 142 were newly identified. The previously and newly recorded resources within the project survey area include 149 residential properties, 5 farmstead complexes with residences, 7 churches, 2 commercial buildings, a bridge (Mud River Covered Bridge), a school, a hospital complex, and a rail line that has been converted to a recreational trail.

One of these resources, the 1930s-era Morris Memorial Children's Hospital complex, is NRHP-listed. The hospital complex occupies a hilltop approximately 0.3 mile west of the project. Columbia Gas indicated that while the pipeline corridor would be visible as a tree cut within the overall landscape on the opposite side of the valley, construction was not expected to have a significant negative impact on the viewshed due to the modern infrastructure already present, and that the visual effects would not be adverse.

In addition, the MXP crossing point at Mud River in Cabell County (MP 161.4) is within a segment listed on the NRI as having historic value (NPS, 2011) based in part on the Mud River Covered Bridge. The original location of the bridge is about 1.7 miles north-northwest of the proposed MXP-100 crossing of the Mud River. This bridge, listed as a National Historic Landmark, was subsequently moved off the river to an isolated pond within the Cabell County Fairgrounds approximately 1.5 miles north of the Mud River crossing site (WVDOT, 2016). No further cultural investigations are recommended for this area.

Columbia Gas recommended that the remaining 166 resources were not eligible for the NRHP.

In a May 31, 2016 letter, the West Virginia SHPO requested a revised report be submitted with additional information for 44 of the architectural resources. The SHPO also recommended minor modifications to any subsequent draft reports and addenda. Columbia Gas has not yet provided a revised architectural resources survey report addressing the SHPO's comments, or an addendum report covering areas still requiring architectural survey.

4.10.1.2 Gulf XPress Project

Columbia Gulf completed archaeological and historic architectural resource surveys of the existing Leach C Meter Station extra workspace and proposed Morehead, Paint Lick, and Goodluck Compressor Stations in Kentucky; Cane Ridge and Clifton Junction Compressor Stations in Tennessee; and New Albany and Holcomb Compressor Stations in Mississippi, to identify cultural resources that could be affected by the GXP.

At the time of the field investigations, the temporary and permanent workspace had not yet been identified at the compressor station sites, and field surveys were conducted for the entire parcel of land on which each station would be located. Further, compressor station site alternatives were surveyed for the Morehead, Paint Lick, Goodluck, Clifton Junction, New Albany, and Holcomb stations. Surveys were not conducted at the approved Grayson Compressor Station because most of the workspace would be sited within the station fenceline. Some TWS would be required outside the station fenceline; however, this workspace was previously surveyed as part of the authorization process for this facility. The modifications to the Leach C Meter Station also would require workspace outside of the station fenceline; therefore, survey was completed for the TWS outside the fenceline. Surveys totaled 244.3 acres in Kentucky, 110.8 acres in Tennessee, and 139.2 acres in Mississippi.

The Phase I archaeological investigation consisted of pedestrian survey augmented by shovel testing to identify sites and to define site boundaries. For archaeological resources, the Phase I surveys covered the boundaries of the station sites. For historic architectural properties, the boundaries of the proposed compressor and meter stations and the viewsheds to and from historic sites near the stations were surveyed. The linear extent of the viewsheds varied by site depending on changes in topography, vegetation cover, and the presence of structures or other obstructions in sight lines to and from historic architectural properties. Columbia Gulf provided the resulting reports to FERC and the Kentucky, Tennessee, and Mississippi SHPOs for their respective states. The Tennessee and Mississippi reports (McKee, et al., 2016a and 2016b) documented both archaeological and architectural resources, while for Kentucky, separate reports were provided for archaeological (McKee, et al., 2016c) and architectural (Peckler, et al., 2016) resources.

4.10.1.2.1 Archaeological Resources

Kentucky

Columbia Gulf's Phase I archaeological survey identified two new pre-contact archaeological sites (15GD157 and 15GD158) and an isolated find. Columbia Gulf recommended

that site 15GD157 and the isolated find were not eligible for the NRHP. Following Phase II evaluation testing, the portion of site 15GD158 in the project area was recommended as not eligible for the NRHP, and Columbia Gulf recommended no further work for site 15GD158. In a letter dated June 9, 2016, the Kentucky SHPO concurred with these recommendations. We concur also.

Tennessee

Columbia Gulf's Phase I survey for archaeological resources identified one newly recorded pre-contact archaeological site (40WY114) and one previously recorded pre-contact archaeological site (40WY108). Columbia Gulf recommended that neither of these resources was eligible for the NRHP and no further work would be required. In a May 16, 2016 letter, the Tennessee SHPO found that "the project area contains no historic properties eligible for listing in the National Register of Historic Places." We agree with the SHPO.

The NPS communicated concerns over the potential for impacts on the Trail of Tears at the Clifton Junction station site. To address the NPS's concerns, Columbia Gulf provided a detailed discussion of the trail, its location, a map, and potential project-related effects to the trail. Columbia Gulf recommended that no direct impacts on the Trail of Tears would result from the construction and operation of the station, and that limited indirect impacts on the Trail of Tears are anticipated as a result of the project. The station exhaust stack would potentially be visible to motorists from points along U.S. Highway 64; however, as the highway is used for vehicle traffic, the stack would be seen only briefly, and distinct features would be difficult to distinguish given the prevalence of forested lands and rolling topography surrounding the proposed compressor station. Overall, Columbia Gulf recommended that the level of visual impact from the project was considered negligible.

Mississippi

Columbia Gulf's Phase I survey for archaeological and historic architectural resources resulted in the identification of no archaeological sites. In a May 23, 2016 letter, the Mississippi SHPO concurred with the findings of Columbia Gulf. We concur also.

4.10.1.2.2 Architectural Resources

Kentucky

Columbia Gulf's Phase I Architectural survey identified seven previously recorded resources (a cemetery, two residences, two barns, and two farms), and eight newly recorded resources (a bridge, a farmstead, three residences, and three barns). Four of the previously recorded resources had been previously determined not eligible for the NRHP and were not revisited. The remaining 11 resources were recommended as not eligible for the NRHP. The previously recorded cemetery is approximately 500 feet outside the work area for the Morehead station and would be avoided. In a letter dated June 21, 2016, the SHPO requested the architectural survey report be revised to include additional information regarding modifications to the existing Leach C and approved Grayson stations, and NRHP eligibility assessments of both stations, as well as additional information regarding the area of potential effects. Columbia Gulf provided a revised architectural survey report in September 2016. In a letter dated September 22, 2016, the

Kentucky SHPO concurred with the revised report and indicated no historic properties would be affected by the project. We agree with the SHPO.

Tennessee

Columbia Gulf's Phase I survey for historic architectural resources identified eight newly recorded historic architectural properties (all residences), and four previously recorded historic architectural properties (three residences and a church/cemetery). Columbia Gulf recommended that none of these resources were eligible for the NRHP and no further work would be required. The previously recorded church/cemetery is approximately 1,200 feet outside the work area for the Clifton Junction station and would be avoided. In a May 16, 2016 letter, the Tennessee SHPO found that "the project area contains no historic properties eligible for listing in the National Register of Historic Places." We agree with the SHPO.

Mississippi

Columbia Gulf's Phase I survey for historic architectural resources identified nine newly recorded historic architectural properties (seven residences, a radio tower, and a church/cemetery). Columbia Gulf recommended that none of the historic architectural properties were eligible for the NRHP, and no further work would be required. In a May 23, 2016 letter, the Mississippi SHPO concurred with the findings and recommendations of Columbia Gulf. We concur also.

4.10.2 Native American Consultation

Columbia Gulf and Columbia Gas requested information from federally recognized Native American tribes regarding the locations of archaeological sites, burials, or traditional cultural properties within or near the project areas.

4.10.2.1 Mountaineer XPress Project

Columbia Gas requested information from 11 federally recognized Native American tribes:

- Absentee-Shawnee Tribe of Oklahoma
- Cherokee Nation of Oklahoma
- Delaware Nation
- Delaware Tribe of Indians
- Eastern Band of the Cherokee Indians
- Eastern Shawnee Tribe of Oklahoma
- Seneca Nation of Indians
- Seneca-Cayuga Tribe of Oklahoma
- United Keetoowah Band of Cherokee Indians of Oklahoma
- Tonawanda Band of Seneca Indians of New York
- Shawnee Tribe of Oklahoma

Columbia Gas sent introductory project letters to the 11 tribes on July 14, 2015. The letters contained a project description and location maps and invited each tribe to comment on the project. The Seneca Nation of Indians replied on July 21, 2015, requesting to be informed of any findings. On July 21, 2015, the Delaware Tribe of Indians replied with a letter detailing its fee structure for responding to consultation requests. The Delaware Nation replied on September 9, 2015, requesting a copy of the cultural resources survey report upon completion. Columbia Gas indicated it would provide the Seneca Nation and Delaware Nation with the survey report. No other responses have been received to date.

We sent our MXP Notice of Intent and follow-up letters to these same tribes. The United Keetoowah Band of Cherokee Indians of Oklahoma responded on April 8, 2016, and recommended a survey be completed. Columbia Gas will provide the tribe with the survey report. No other responses have been received to date.

4.10.2.2 Gulf XPress Project

Columbia Gulf requested information from 23 federally recognized Native American tribes:

- Absentee-Shawnee Tribe of Oklahoma
- Alabama-Coushatta Tribe of Texas
- Alabama-Quassarte Tribal Town
- Cherokee Nation of Oklahoma
- Choctaw Nation of Oklahoma
- The Chickasaw Nation
- Chitimacha Tribe of Louisiana
- Coushatta Tribe of Louisiana
- Delaware Nation
- Eastern Band of the Cherokee Indians
- Eastern Shawnee Tribe of Oklahoma
- Jena Band of Choctaw Indians
- Kialegee Tribal Town
- Miami Tribe of Oklahoma
- Mississippi Band of Choctaw Indians
- Muscogee (Creek) Nation
- Peoria Tribe of Indians of Oklahoma
- Poarch Band of Creek Indians
- Quapaw Tribe of Oklahoma

- Shawnee Tribe
- Thlopthlocco Tribal Town
- Tunic- Biloxi Indians of Louisiana
- United Keetoowah Band of Cherokee Indians

Columbia Gulf sent introductory project letters to 21 of the 23 tribes on July 17, 2015. Columbia Gulf sent introductory project letters to the Chitimacha Tribe of Louisiana and the Poarch Band of Creek Indians on June 1, 2016. All the letters contained a project description and location maps, and invited each tribe to comment on the project. Columbia Gulf also conducted follow-up phone calls with the tribes.

In a letter dated August 27, 2015, the Alabama-Coushatta Tribe of Texas indicated the Tribe has ancestral homelands in Tennessee and Mississippi and requested to be notified of inadvertent discoveries during construction in these two states. The project Unanticipated Discover Plans provides for notification of the Alabama-Coushatta Tribe of Texas in the event of such a discovery.

In a letter dated September 8, 2015, the Chickasaw Nation indicated it was unaware of any specific historic properties, including those of traditional, religious, and cultural significance in the project area.

On August 28, 2015, the Peoria Tribe of Indians in Oklahoma indicated the tribe may have an interest in the portion of the project located in Kentucky and requested a copy of the survey report for Kentucky. Columbia Gulf provided the tribe with the report.

On September 8, 2015, the Chickasaw Nation sent a letter to FERC. The letter stated that no known properties of concern to the Tribe are located within the project area.

On August 25, 2015, the Choctaw Nation indicated portions of the project were located within the Choctaw Nation's area of historic interest, and requested shapefiles of the project locations in Mississippi. Columbia Gulf provided the shapefiles to the Choctaw Nation. On September 11, 2015, the Choctaw Nation requested a copy of the Phase I cultural resources survey report for Mississippi, which Columbia Gulf provided.

On August 26 and 28, 2015, respectively, the Delaware Nation and Eastern Shawnee Tribe of Oklahoma indicated they had no concerns regarding the project.

On August 28, 2015, the Muscogee (Creek) Nation expressed possible interest in portions of the project in Mississippi and Tennessee.

On September 1, 2015, the United Keetoowah Band of Cherokee Indians indicated it had no concerns regarding the project, but requested to be notified of unanticipated discoveries during construction in Kentucky or Tennessee. The project Unanticipated Discovery Plans provide for notification of the United Keetoowah Band of Cherokee Indians in the event of such a discovery.

In a letter dated August 1, 2016, the Quapaw Tribe of Oklahoma indicated that it did not anticipate the project would adversely impact any cultural resources, but requested to be contacted in the event of unanticipated discoveries. The project Unanticipated Discovery Plans provide for notification of the interested tribes in the event of such a discovery.

We sent our GXP Notice of Intent and follow-up letters to these same tribes. The United Keetoowah Band of Cherokee Indians responded on June 22, 2016, and recommended a survey be completed. Columbia Gulf provided the tribe with the survey reports. In a June 23, 2016, letter, the Quapaw Tribe of Oklahoma expressed interest in the project and requested copies of all SHPO correspondence. Columbia Gulf provided the tribe with the requested information and the survey reports. No other responses have been received to date.

4.10.3 Unanticipated Discovery Plan

The Companies have developed project-specific plans which outline procedures to follow, in accordance with state and federal laws, if archaeological materials or human remains are discovered during construction of the projects.

4.10.3.1 Mountaineer XPress Project

Columbia Gas has prepared an Unanticipated Discovery Plan for the project, and provided the plan to FERC and the West Virginia SHPO. The plan outlines procedures to follow, in accordance with state and federal laws, if archaeological materials or human remains are discovered during construction. We requested minor revisions to the plan. Columbia Gas provided a revised plan which we find acceptable.

4.10.3.2 Gulf XPress Project

Columbia Gulf prepared an Unanticipated Discovery Plan for each of the states in which facilities would be located, and provided the plans to FERC and the SHPOs for the respective states. The plans define procedures to be implemented if previously unreported historic properties or human remains are discovered during construction. The Tennessee SHPO found the plan met state standards. The Mississippi SHPO accepted the plan. We requested minor revisions to the plans. Columbia Gulf provided revised plans, which we find acceptable.

4.10.4 Compliance with the National Historic Preservation Act

4.10.4.1 Mountaineer XPress Project

Compliance with section 106 of the NHPA has not been completed for the MXP. Cultural resources surveys of portions of the project and consultation with the West Virginia SHPO have not been completed. If FERC, in consultation with the SHPO, determines that an historic property would be adversely affected, Columbia Gas would be required to either (a) avoid the historic property, or (b) prepare a treatment plan, in consultation with the appropriate parties, to mitigate adverse effects. FERC would provide the ACHP an opportunity to comment in accordance with 36 CFR 800.6. Implementation of a treatment plan would occur only after FERC issued a Certificate authorizing the project and we issued written notification to Columbia Gas regarding plan implementation.

So that FERC's responsibilities under the NHPA and its implementing regulations are met, **we recommend:**

- **Columbia Gas should not begin implementation of any treatment plans/measures (including archaeological data recovery), construction of facilities, or use of staging, storage, or temporary work areas and new or to-be-improved access roads until:**
  - **a. Columbia Gas files a revised draft architectural resources report, all remaining architectural survey addendum reports, and the SHPO's comments on the reports;**
  - **b. Columbia Gas files all remaining archaeological resources survey and evaluation reports, any necessary treatment plans, and the SHPO's comments on the reports and plans;**
  - **c. the ACHP is provided an opportunity to comment on the undertaking if historic properties would be adversely affected; and**
  - **d. the Commission staff reviews and the Director of OEP approves all cultural resources survey reports and plans and notifies Columbia Gas in writing that treatment plans/mitigation measures may be implemented or construction may proceed.**

All material filed with the Secretary that contains 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."

4.10.4.2 Gulf XPress Project

Compliance with section 106 of the NHPA is complete for all of the GXP components in Tennessee, Mississippi, and Kentucky.

4.10.5 Conclusion

Columbia Gas completed cultural resources surveys for all the accessible project areas. To date, of the 55 archaeological sites identified, only 3 are eligible or recommended as potentially eligible for the NRHP. Columbia Gulf would avoid all three sites. Of 167 architectural resources identified, 1 is listed on the NRHP and the remaining 166 are recommended as not eligible for the NRHP. Columbia Gas has recommended that the project would have no adverse effect to the listed property. The West Virginia SHPO has requested additional information for the architectural resources, which Columbia Gas has not yet provided. Portions of the MXP still require survey; therefore, compliance with section 106 is not complete. Once cultural resources surveys and evaluations are complete, a treatment plan would be prepared if any historic properties would be adversely affected by the MXP.

Columbia Gulf has completed cultural resources surveys for the project and did not document any historic (NRHP-eligible or listed) properties. FERC and the Tennessee, Mississippi, and Kentucky SHPOs agree that no historic properties would be affected by the GXP.

4.11 AIR QUALITY AND NOISE

4.11.1 Air Quality

Ambient air quality is protected by federal and state regulations. The EPA established NAAQS to protect human health and welfare. Primary standards protect human health, including the health of defined sensitive populations, such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. NAAQS have been developed for sulfur dioxide (SO_2), particulate matter (PM) with a diameter of 10 microns or less (PM_{10}), PM with a diameter of 2.5 microns or less ($PM_{2.5}$), nitrogen dioxide (NO_2), carbon monoxide (CO), O_3, and lead, and include levels for short-term (acute) and long-term (chronic) exposures. Note O_3 is not a pollutant emitted into the air. It is formed from a chemical reaction between nitrogen oxides (NO_X) and volatile organic compounds (VOC) in the presence of sunlight. Consequently, emissions of NO_X and VOCs are regulated by the EPA as "precursors" to the formation of O_3. VOC means any compound of carbon (excluding CO, carbon dioxide [CO_2], carbonic acid, metallic carbides or carbonates, and ammonium carbonate) which participates in atmospheric photochemical reactions [40 CFR 51.100s]). The current NAAQS are listed on the EPA's website (EPA, 2016c).

The EPA now defines air pollution to include the mix of six long-lived and directly emitted GHG, finding that the presence of these GHGs in the atmosphere may endanger public health and welfare through climate change. These six GHG are: CO_2, methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. As with any fossil-fuel-fired activity, the MXP would contribute GHG emissions. The principal GHGs that would be produced are CO_2, CH_4, and N_2O. No fluorinated gases would be emitted by the MXP. GHG emissions are quantified and regulated in units of carbon dioxide equivalents (CO_2e). CO_2e considers the global warming potential (GWP) of each GHG. The GWP is a ratio relative to CO_2 of a particular GHG's ability to absorb solar radiation as well its residence time within the atmosphere. CO_2 has a GWP of 1; CH_4 has a GWP of 25; and N_2O has a GWP of 298 (EPA, 2014a).[35]

The EPA also regulates hazardous air pollutants (HAP). The CAA established a list of 189 HAPs and requires the EPA to regulate toxic air pollutants. The EPA assesses health risks from HAPs to determine whether the standards that have been set protect public health with an ample margin of safety, and protect against adverse environmental effects.

Air quality control regions (AQCR) are areas established by the EPA and local agencies for air quality planning purposes, in which SIPs describe how NAAQS would be achieved and maintained. The AQCRs are intra- and interstate regions such as large metropolitan areas where improvement of the air quality in one portion of the AQCR requires emission reductions throughout the AQCR. Each AQCR, or smaller portion within an AQCR (such as a county or multiple counties), is designated, based on compliance with NAAQS, as attainment, unclassifiable,

[35] These GWPs are based on a 100-year period. We have selected their use over other published GWPs for other timeframes because these are the GWPs that the EPA has established for reporting of GHG emissions and air permitting requirements. This allows for a consistent comparison with these regulatory requirements.

maintenance, or nonattainment, on a pollutant-by-pollutant basis. Areas in compliance or below NAAQS are designated as "attainment," while areas not in compliance or above NAAQS are designated as "nonattainment." Areas previously designated as nonattainment that have since demonstrated compliance with NAAQS are designated as "maintenance" for that pollutant. Maintenance areas may be subject to more stringent regulatory requirements for continued attainment of NAAQS. Areas that lack sufficient data to determine attainment status are designated "unclassifiable" and treated as attainment areas.

4.11.1.1 Air Quality Regulations

Projects that emit regulated air pollutants are subject to federal and state regulations.

4.11.1.1.1 Federal Regulations

Air quality in the United States is regulated by federal statutes in the CAA and its amendments.

Prevention of Significant Deterioration

New Source Review (NSR) is a pre-construction permitting program designed to protect air quality when air pollutant emissions are increased either through the modification of existing sources or through the construction of a new source of air pollution. In areas with good air quality, NSR ensures that the new emissions do not degrade the air quality; this is achieved through the implementation of the Prevention of Significant Deterioration (PSD) permitting program or state minor permit programs. In areas with poor air quality, Nonattainment NSR ensures that the new emissions do not inhibit progress toward cleaner air. In addition, NSR ensures that any large, new, or modified industrial source uses air pollution control technology. Air permitting of stationary sources has been delegated to each state.

Title V

Title V is an operating permit program run by each state. There are Title V permitting thresholds for criteria pollutants, and if potential emissions exceed these thresholds, sources must apply for a Title V operating permit through the state program.

Mandatory Greenhouse Gas Reporting Rule

The EPA established the final Mandatory GHG Reporting Rule (Federal Register dated October 30, 2009, 40 CFR Parts 86, 87, 89, et al.). This rule requires applicable sources of GHG emissions to report their actual GHG operating emissions, if they exceed 25,000 metric tons of CO_2e in 1 year. This rule is not a permit and does not limit or control emissions. Although this rule does not apply to construction emissions, we have provided GHG construction emission estimates, as CO_2e, in sections 4.11.1.2 and 4.11.1.3 for accounting and disclosure purposes.

National Emissions Standards for Hazardous Air Pollutants

The CAA Amendments established a list of 189 HAPs, resulting in the promulgation of National Emission Standards for Hazardous Air Pollutants (NESHAP), codified in 40 CFR 61 and

63. Part 63 regulates HAPs from major sources of HAPs and specific source categories emitting HAPs. Some NESHAP may apply to non-major sources (area sources) of HAPs. Major source thresholds for NESHAP are 10 tons per year (tpy) of any single HAP or 25 tpy of total HAPs. NESHAP regulates HAP emissions from stationary sources by setting emission limits, monitoring, testing, record keeping, and notification requirements.

New Source Performance Standards

The EPA promulgates New Source Performance Standards (NSPS) to establish emission limits and fuel, monitoring, notification, reporting, and recordkeeping requirements for stationary source types or categories that cause or contribute significantly to air pollution.

General Conformity

The General Conformity Rule was developed to ensure that federal actions in nonattainment and maintenance areas do not impede states' attainment of NAAQS. The lead federal agency must conduct a conformity determination if a federal action's construction and operational activities is likely to result in generating direct and indirect emissions that would exceed the General Conformity Applicability threshold levels of the pollutant(s) for which an air basin is designated nonattainment or maintenance. Conforming activities or actions should not, through additional air pollutant emissions, do any of the following:

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

The General Conformity Rule entails both an applicability analysis and a subsequent conformity determination, if applicable. According to the General Conformity regulations, emissions from sources that are subject to any NSR permitting and/or licensing (major or minor) are exempt and are deemed to have conformed. A General Conformity Determination must be completed when the total direct and indirect emissions of a project would equal or exceed the specified pollutant thresholds on a calendar year basis for each nonattainment or maintenance area.

4.11.1.1.2 State Regulations

Applicable State regulations are detailed separately for each project in the following sections.

4.11.1.2 Mountaineer XPress Project

Air quality would be affected by construction and operation of the MXP. Construction activities would temporarily generate air emissions over the area of pipeline construction and at the site of aboveground facilities.

4.11.1.2.1 Existing Air Quality

The regional climate of western West Virginia, including all of the project area, is generally warm during summer and cold during winter, and precipitation is generally well-distributed throughout the year. The MXP areas are designated as attainment or unclassifiable for all pollutants, except as shown in table 4.11-1.

Table 4.11-1
Nonattainment and Maintenance Areas within the MXP Area(s), by Project Component

Project Component	Designation(s)	County, State	Nonattainment / Maintenance Area
Lone Oak Compressor Station, MXP-100 Tie-in with LEX, MXP-1 Valve Site, MXP-100 (MPs 0.0-11.1)	SO_2 Nonattainment	Marshall, WV	Marshall, WV
	O_3 Maintenance	Marshall, WV	Wheeling, WV-OH
	$PM_{2.5}$ Maintenance	Marshall, WV	Wheeling, WV-OH
MXP-9 Valve Site, MXP-10 Valve Site, MXP-100 (MPs 130.9-154.7)	$PM_{2.5}$ Maintenance	Putnam, WV	Charleston, WV
	O_3 Maintenance	Putnam, WV	Charleston, WV
Saunders Creek Regulator Station, MXP-100 (MPs 155.5-163.9), SM80 Replacement (MP 0.0-0.2), SM80 Loop Replacement (MP 0.0-0.2)	$PM_{2.5}$ Maintenance	Cabell, WV	Huntington-Ashland, WV-KY
	O_3 Maintenance	Cabell, WV	Huntington-Ashland, WV-KY
Ceredo Compressor Station	$PM_{2.5}$ Maintenance	Wayne, WV	Huntington-Ashland, WV-KY-OH
	O_3 Maintenance	Wayne, WV	Huntington-Ashland, WV-KY
Elk River Compressor Station	$PM_{2.5}$ Maintenance	Kanawha, WV	Charleston, WV
	O_3 Maintenance	Kanawha, WV	Charleston, WV

Most of the operational emissions from the MXP would result from the compressor stations. The EPA, along with state and local agencies, collects data on ambient air quality at monitoring stations across the United States. To characterize existing ambient air quality conditions for the MXP, air quality data at the monitoring stations that were most representative of each new and modified compressor station site were collected and are presented in section 4.11.1.2.4 (reference tables 4.11-10 and 4.11-11), in combination with the overall impact for comparison with NAAQS.

4.11.1.2.2 Air Permitting and Regulatory Applicability

The provisions of the CAA that are applicable to the MXP are discussed below.

Federal Regulations

The applicability of federal regulations is summarized for the MXP. The applicability is based on the potential-to-emit (PTE) for each compressor station and comparison to applicable permitting thresholds in tons per year. (The PTE are shown in tables 4.11-4 through 4.11-9, presented in sections 4.11.1.2.3 and 4.11.1.2.4.)

Prevention of Significant Deterioration Applicability

The PTE of each new MXP compressor station (Sherwood, White Oak, and Mount Olive) is below the PSD new major source threshold; therefore, PSD is not applicable at the new compressor stations. The permitting of the approved Lone Oak Compressor Station was completed in 2015 for the entire facility and was not subject to PSD. The air permit for the pending Elk River Compressor Station would be for the entire facility and is not subject to PSD. The Ceredo Compressor Station is an existing PSD major source; therefore, the project emissions are compared to the PSD significant emission rate (SER) level for a respective pollutant. The Ceredo Compressor Station project emissions are less than the SER levels for all pollutants.

Title V Applicability

The new compressor stations (Sherwood, White Oak, and Mount Olive) have a PTE greater than Title V thresholds and would be subject to Title V permitting. Therefore, Columbia Gas would need to apply for a Title V permit for each of these sources within 12 months of commencing operation. Columbia Gas was issued a Permit to Construct for the Lone Oak Compressor Station on December 7, 2015, as part of Columbia's LXP, and would apply for a Title V permit within 12 months after the start of operations. Columbia Gas submitted a construction permit application for the Elk River Compressor Station on January 15, 2016, as a Title V major source associated with the WBX. The additional turbine associated with the MXP was included in the construction permit application. As such, the changes at Elk River would not require any additional permit modifications. Columbia Gas' Ceredo Compressor Station is a Title V major source and changes made to the facility as part of the MXP must be incorporated into the current Title V permit.

Mandatory Greenhouse Gas Reporting Rule

Operational GHG emission estimates for the MXP are presented, as CO_2e, in tables 4.11-4 through 4.11-9. Based on the emission estimates presented, actual GHG emissions from operation of each MXP compressor station have the potential to exceed the 25,000-metric-tpy reporting threshold. Therefore, if the actual emissions during operations from any of the compressor stations are equal to or greater than 25,000 metric tpy, Columbia Gas would need to report GHG emissions for that facility. A more detailed discussion on impacts from Project GHG emissions and climate change is included in section 4.13.

National Emissions Standards for Hazardous Air Pollutants

The new compressor stations would be considered area sources of HAPs. The Ceredo Compressor Station is an existing major source of HAPs and would remain major after the modification. Subpart YYYY (*National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines*) applies to new turbines at major sources of HAPs. Except for the initial notification, the requirements of Subpart YYYY have been stayed for lean premix natural-gas-fired stationary combustion turbines; therefore, the only requirement for the new combustion turbine at the Ceredo Compressor Station is the initial notification.

Subpart ZZZZ (*National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*) applies to new emergency generators at both major and area sources of HAPs. The new emergency generators at the White Oak, Mount Olive, and Sherwood Compressor Stations would be area sources of HAPs. As such, the engines would be

required to comply with the requirements of Subpart ZZZZ by meeting the requirements of the NSPS Subpart JJJJ. The new emergency generator at the Ceredo Compressor Station would be classified as a new emergency generator and a major source of HAPs and must comply with all applicable Subpart ZZZZ requirements.

New Source Performance Standards

NSPS Subpart JJJJ (*Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*) sets emission standards for NO_X, CO, and VOC. Subpart JJJJ would apply to the new emergency generators being installed at the new Sherwood, White Oak, and Mount Olive Compressor Stations and the existing Ceredo Compressor Station. NSPS Subpart KKKK (*Standards of Performance for Stationary Combustion Turbines*) sets emission standards for NO_X and SO_2 and would apply to the new turbines at the Sherwood, Lone Oak, White Oak, Mount Olive, Elk River, and Ceredo Compressor Stations. The stations would be subject to NSPS Subpart OOOOa and must comply with all applicable requirements of the rule.

General Conformity

Because some of the MXP facilities would operate in nonattainment and/or maintenance areas, a general conformity applicability analysis is required to determine if a conformity determination is necessary. Emissions reviewed for the conformity applicability analysis include construction and operational emissions not included in an air permit (i.e., fugitive emissions from equipment leaks and pigging operations). Operational emissions not included in air permits consist of fugitive emissions which are quantified in the air permit applications for all compressor stations that are part of the project. All projected fugitive emissions fall below the *de minimis* thresholds. Emissions associated with commuter vehicles and delivery trucks during operation of each facility were considered trivial and were not quantified. All MXP compressor stations would obtain a major or minor NSR Permit. Therefore, these emissions are exempt from applicability.

Table 4.11-2 shows the nonattainment and maintenance areas for the MXP and compares the associated direct and indirect emissions to the applicability thresholds. Emissions reviewed for the conformity applicability analysis include construction and operational emissions not included in an air permit. Construction emissions from the MXP in the nonattainment and maintenance areas, including all phases of construction and worker commuting, were assumed to span from October 2017, to November 2018. Emissions from construction were calculated for years 2017 and 2018.

Table 4.11-2
Summary of MXP Construction Emissions Subject to General Conformity Review

Designated Pollutant	County/Designated Area	Pollutant or Precursor	Applicability Threshold (tpy)	2017 Emissions (tons)	2018 Emissions (tons)
SO_2	Marshall, WV/Marshall, WV	SO_2	100	0.10	0.74
O_3	Marshall, WV/Wheeling, WV-OH	VOC	100	0.43	5.38
		NO_X	100	4.17	34.44
	Putnam, WV/Charleston, WV	VOC	100	0.42	3.83
		NO_X	100	3.96	32.87
	Cabell, WV/Huntington-Ashland, WV-KY	VOC	100	0.43	3.86
		NO_X	100	4.02	31.89
	Wayne, WV/ Huntington-Ashland, WV-KY	VOC	100	0.14	2.69
		NO_X	100	0.76	6.78
	Kanawha, WV/Charleston, WV	VOC	100	0.04	2.79
		NO_X	100	0.21	7.53
$PM_{2.5}$	Marshall, WV/Wheeling, WV-OH	$PM_{2.5}$	100	1.97	9.12
		NO_X	100	4.17	34.44
		SO_2	100	0.10	0.74
	Putnam, WV/Charleston, WV	$PM_{2.5}$	100	4.77	21.77
		NO_X	100	3.96	32.87
		SO_2	100	0.09	0.71
	Cabell, WV/Huntington-Ashland, WV-KY	$PM_{2.5}$	100	1.96	9.78
		NO_X	100	4.02	31.89
		SO_2	100	0.09	0.68
	Wayne, WV/Huntington-Ashland, WV-KY-OH	$PM_{2.5}$	100	0.12	0.52
		NO_X	100	0.76	6.78
		SO_2	100	0.01	0.06
	Kanawha, WV/Charleston, WV	$PM_{2.5}$	100	0.03	0.45
		NO_X	100	0.21	7.53
		SO_2	100	0.00	0.07

Sources: EPA, 2016a; 2016b

As shown in table 4.11-2, emissions during construction of the MXP would not exceed General Conformity thresholds for any nonattainment or maintenance area. Therefore, a general conformity determination is not required.

West Virginia Regulations

The MXP compressor stations and pipeline would be subject to West Virginia state regulations including, but not limited to, the following:

- 45 Code of State Regulations (CSR) 2 (To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers) establishes smoke and PM

limits on fuel-burning equipment. This rule applies to the combustion turbines and generators;

- 45 CSR 4 *(Discharge of Air Pollutants that Cause Objectionable Odors)* for prevention and control of air emissions that cause objectionable odors. This rule applies to both the pipeline construction, compressor station construction, and compressor station operation;
- 45 CSR 7 (To Prevent and Control Particulate Matter Air Pollution for Manufacturing Process and Associated Operations) controls PM emissions from manufacturing processes. This rule applies to the operation of compressor stations;
- 45 CSR 10 (To Prevent and Control Air Pollution from the Emission of Sulfur Oxides) prevents sulfur oxide pollution. This rule applies to the operation of compressor stations;
- 45 CSR 13 (Permits for Construction, Modification, Relocation and Operation of Stationary Sources, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, Permission to Commence Construction, and Procedure for Evaluation) establishes permitting requirements for non-major stationary sources. This rule applies to the operation of compressor stations;
- 45 CSR 16 (*Standards of Performance for New Stationary Sources*) adopts federal procedures and criteria for new stationary sources. This rule applies to the operation of compressor stations;
- 40 CSR 17 (To Prevent and Control PM Air Pollution from Materials Handling, Preparation, Storage, and Other Sources of Fugitive PM) establishes requirements for prevention and control of PM from fugitive sources. This would apply to fugitive emissions from construction of the pipeline and compressor stations;
- 40 CSR 20 (*Good Engineering Practices as Applicable to Stack Heights*) ensures that stack heights exceeding good engineering practice are not used for the control of air pollution. This rule applies to the operation of compressor stations;
- 45 CSR 22 (*Air Quality Management Fee Program*) establishes fees for operating and construction permits. This rule applies to the operation of compressor stations;
- 45 CSR 30 (*Requirements for Operating Permits*) specifies requirements for Title V operating permits. This rule applies to the operation of compressor stations; and
- 45 CSR 34 (*Emissions Standards for Hazardous Air Pollutants*) adopts federal procedures and criteria for HAPs. This rule applies to the operation of compressor stations.

4.11.1.2.3 Construction Air Emission Impacts and Mitigation

Construction of the MXP would result in temporary and localized increases of tailpipe emissions from mobile diesel- and gas-fueled equipment. In addition, temporary increases in fugitive dust emissions would result from construction-related surface disturbances and construction vehicle travel on unpaved roads. Open burning is not currently planned for this project.

A summary of the estimated construction emissions is presented in table 4.11-3 for years 2017 and 2018 (duration of the MXP construction). Construction emissions were based on an operating schedule of 12 hours per day, 6 days per week, from the commencement of clearing through restoration. The emissions identified include construction emissions from the Sherwood, Lone Oak, White Oak, Mount Olive, Ceredo, and Elk River Compressor Stations; MXP-100 Tie-in with LEX and MXP-200 Tie-in and Line 1983 sites; the Ripley and Saunders Creek Regulator Stations; MLV sites; and pipeline-associated appurtenances. Table 4.11-3 shows emissions estimates for the following categories of emissions: diesel non-road equipment, diesel and gas on-road equipment, and construction-related and roadway fugitive dust.

Table 4.11-3
Estimated Construction Emissions for the MXP

Construction Activity	Estimated Emissions (tons)							
	NO_X	VOC	CO	PM_{10}	$PM_{2.5}$	SO_2	CO_2e	HAPs
2017 Emissions								
Diesel non-road equipment	19.69	13.62	1.60	2.23	2.23	0.78	3,645	0.21
Diesel and gas on-road equipment	5.38	2.97	0.61	0.25	0.25	0.01	2,005	0.09
Construction activity fugitive dust	--	--	--	46.55	6.98	--	--	--
Roadway fugitive dust	--	--	--	62.46	6.25	--	--	--
Total 2017 Construction Emissions	**25.07**	**16.59**	**2.21**	**111.49**	**15.71**	**0.79**	**5,650**	**0.30**
2018 Emissions								
Diesel non-road equipment	131.53	87.17	11.70	14.32	14.32	5.23	24,340	1.54
Diesel and gas on-road equipment	45.05	32.70	5.30	2.03	2.03	0.13	17,102	0.84
Construction activity fugitive dust	--	--	--	288.56	40.58	--	--	--
Roadway fugitive dust	--	--	--	543.20	54.32	--	--	--
Total 2018 Construction Emissions	**176.58**	**119.87**	**17.00**	**848.11**	**111.25**	**5.36**	**41,442**	**2.38**

Tailpipe emissions of NO_X, CO, PM_{10}, $PM_{2.5}$, SO_2, VOC, and GHGs from mobile construction equipment, worker commuter vehicles, construction, and delivery/removal vehicles were calculated based on the EPA MOVES2014 Model emission factors and vehicle assumptions.

The volume of fugitive dust generated by surface disturbance and vehicle travel on unpaved roads would be dependent upon the area disturbed and the type of construction activity, along with the soil's silt and moisture content, wind speed, and the nature of vehicular/equipment traffic. Fugitive PM_{10} and $PM_{2.5}$ emissions from excavation and backfilling were calculated using EPA's *Compilation of Air Pollutant Emission Factors (AP-42),* Section 11.9 (EPA, 1998a), to calculate total PM. The following assumptions were used for the excavation and backfilling fugitive emissions calculations:

- PM_{10} is equal to total suspended particulate;
- $PM_{2.5}$ is 10 percent of PM_{10} for construction and demolition; and
- $PM_{2.5}$ is 15 percent of PM_{10} for industrial wind erosion.

These assumptions were based on the EPA's AP-42, Chapter 13.2.2, *Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors* (EPA, 2006a). Windblown dust emissions were calculated using the EPA's AP-42, Chapter 11.9, *Western Surface Coal Mining*, Table 11.9-3 (EPA, 1998a), assuming dust control efficiency of 50 percent (achieved primarily by using water trucks to apply water to the right-of-way), based on EPA's *Control of Open Fugitive Dust Sources* (EPA, 1988). Fugitive PM_{10} and $PM_{2.5}$ from construction equipment on unpaved roads were calculated using the EPA's *Compilation of Air Pollutant Emission Factors (AP-42)*, Section 13.2.2 (EPA, 2006b).

Fugitive dust would result from land clearing, grading, excavation, concrete work, and vehicle traffic on paved and unpaved roads. The amount of dust generated would be a function of construction activity, soil type, soil moisture content, wind speed, precipitation, vehicle traffic, vehicle types, and roadway characteristics. Emissions would be greater during dry periods and in areas of fine-textured soils subject to surface activity. Columbia Gas has prepared a Fugitive Dust Control Plan[36] that describes the mitigation measures that would be implemented to control fugitive dust during project construction. We have reviewed the Fugitive Dust Control Plan and find it acceptable.

4.11.1.2.4 Operational Air Emission Impacts and Mitigation

Operational Air Emissions

Tables 4.11-4 through 4.11-9 show operational emission estimates from the compressor stations. Emissions of NO_X, CO, and VOC from operation of the combustion turbines were calculated using vendor data. Maximum hourly emission rates were based on normal operation at 32 °F. Columbia Gas has proposed to equip the new turbines with advanced dry-low-NO_X combustion controls, known by the manufacturer as SoLoNO$_X$, to mitigate air quality impacts by reducing NO_X emissions. Potential emissions were estimated from each combustion turbine accounting for normal operation for 8,760 hours per year (i.e., continuous operation) plus additional emissions to account for non-SoLoNO$_X$ operation during planned startups and shutdowns. Emission estimates of PM_{10} and $PM_{2.5}$ from operation of the combustion turbines were based on EPA's AP-24 factors (EPA, 2000 [Table 3.1-2a]).

Potential emissions from the new emergency generators are based on operation of up to 500 hours per year. Emissions of NO_X, CO, and VOC are based on NSPS Subpart JJJJ limitations. Formaldehyde (a HAP) emissions are based on vendor data.

The heaters proposed for each compressor station would operate up to 8,760 hours per year.

Except as indicated above, potential emissions for each combustion unit are based on the following emission factors:

[36] Columbia Gas' Fugitive Dust Control Plan was included as appendix 9D to Resource Report 9 in its April 2016 application. The Dust Control Plan can be viewed on the FERC website at http://www.ferc.gov. Using the "eLibrary" link, select "Advanced Search" from the eLibrary menu and enter 20160429-5286 in the "Numbers: Accession Number" field.

- Potential CO_2e emissions are based on emission factors and GWPs specified in 40 CFR 98.
- Annual SO_2 emissions are based on 0.25 grains of sulfur per 100 standard cubic feet of natural gas, and maximum hourly emissions are based on 20 grains of sulfur per 100 standard cubic feet.
- Emissions of formaldehyde and total HAPs are based on the EPA's AP-42 emission factors (except for emergency generators).
- All heater emissions are based on AP-42 emission factors.

Table 4.11-4
Potential Emissions from Expansion of the Lone Oak Compressor Station

Emissions Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	SO_2 (tpy)	CO_2e (tpy)	Formaldehyde (Single HAP) (tpy)	Total HAPs (tpy)
Emission Sources under the LXP								
Solar Mars 100 Turbine #1	31.24	46.62	3.75	3.75	0.41	66,609	0.40	0.58
Solar Mars 100 Turbine #2	31.24	46.62	3.75	3.75	0.41	66,609	0.40	0.58
Solar Mars 100 Turbine #3	31.24	46.62	3.75	3.75	0.41	66,609	0.40	0.58
Waukesha Emergency Generator	1.30	0.84	0.03	0.02	0.00	266	0.12	0.16
Catalytic Heaters (40)	1.24	1.04	0.07	0.09	0.01	1,477	0.00	0.02
Solar Mars 100 Turbine Venting **a**/	--	--	9.31	--	--	6,025	--	--
Equipment Leaks	--	--	0.60	--	--	387	--	--
Total Emissions – LXP b/	**96.26**	**141.74**	**21.26**	**11.36**	**1.24**	**207,982**	**1.32**	**1.92**
Proposed Emission Sources under MXP								
Solar Mars 100 Turbine #4	31.24	46.62	3.75	3.75	0.41	66,609	0.40	0.58
Solar Mars 100 Turbine Venting **a**/	--	--	3.10	--	--	2,008	--	--
Equipment Leaks	--	--	0.20	--	--	129	--	--
Total Proposed Emissions – MXP b/	**31.24**	**46.62**	**7.05**	**3.75**	**0.41**	**68,746**	**0.40**	**0.58**
Total Station Emissions	**127.50**	**188.36**	**28.31**	**15.11**	**1.65**	**276,728**	**1.72**	**2.50**
Title V Threshold	**100**	**100**	**100**	**100**	**100**	**N/A**	**10**	**25**
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**N/A**	**N/A**	**N/A**

a This includes emissions from the pneumatic actuators, blowdowns from shutdowns, and compressor unit dry seals.
b The MXP involves installing one turbine (#4). Turbine engines #1 – #3 are approved for installation under the LXP (Docket No. CP16-38-000).

All the combustion units at the Lone Oak Compressor Station would be natural gas-fired. Potential emissions were calculated based on operating 8,760 hours per year. The only exception is the emergency generator (part of the LXP). Potential emissions for the emergency generator were based on 500 operating hours per year.

Table 4.11-5
Potential Emissions from the Sherwood Compressor Station

Emissions Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	SO_2 (tpy)	CO_2e (tpy)	Formaldehyde (Single HAP) (tpy)	Total HAPs (tpy)
Solar Taurus 60 Turbine #1 (T01)	16.78	38.95	2.13	1.97	0.21	35,001	0.21	0.31
Solar Taurus 60 Turbine #2 (T02)	16.78	38.95	2.13	1.97	0.21	35,001	0.21	0.31
Solar Mars 100 Turbine #3 (T03)	32.51	78.89	4.16	3.82	0.41	67,713	0.41	0.59
Solar Mars 100 Turbine #4 (T04)	32.51	78.89	4.16	3.82	0.41	67,713	0.41	0.59
Waukesha Emergency Generator (G1)	1.30	2.59	0.65	0.02	0.00	266	0.12	0.17
Line Heater (H1)	0.47	0.40	0.03	0.04	0.00	564	0.00	0.01
Line Heater (H2)	0.26	0.22	0.01	0.02	0.00	308	0.00	0.00
Catalytic Heaters (40) (SH1)	1.24	1.04	0.07	0.09	0.01	1,477	0.00	0.02
Solar Mars 100 Turbine Venting **a**/	--	--	0.40	--	--	653	--	--
Solar Taurus 60 Turbine Venting **a**/	--	--	0.52	--	--	846	--	--
Blowdowns **b**/	--	--	9.15	--	--	14,954	--	--
Equipment Leaks	--	--	0.29	--	--	481	--	--
Total Station Emissions	**101.85**	**239.93**	**23.70**	**11.75**	**1.25**	**224,976**	**1.36**	**2.00**
Title V Threshold	**100**	**100**	**100**	**100**	**100**	**N/A**	**10**	**25**
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**N/A**	**N/A**	**N/A**

a This includes emissions from the pneumatic actuators and compressor unit dry seals.
b This includes emissions from turbine shutdown blowdowns and one full station blowdown.

All combustion units at the Sherwood Compressor Station would be natural gas-fired. Potential emissions were calculated based on operating 8,760 hours per year (except for the emergency generator, which was based on 500 operating hours per year).

Table 4.11-6
Potential Emissions from the White Oak Compressor Station

Emissions Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	SO_2 (tpy)	CO_2e (tpy)	Formaldehyde (Single HAP) (tpy)	Total HAPs (tpy)
Solar Titan 130E Turbine #1 (T01)	43.10	104.84	5.52	5.08	0.55	90,042	0.55	0.79
Solar Titan 130E Turbine #2 (T02)	43.10	104.84	5.52	5.08	0.55	90,042	0.55	0.79
Waukesha Emergency Generator (G1)	1.30	2.59	0.65	0.02	0.00	266	0.12	0.17
Line Heater (H1)	0.61	0.51	0.03	0.05	0.00	723	0.00	0.01
Catalytic Heaters (40) (SH1)	1.24	1.04	0.07	0.09	0.01	1,477	0.00	0.02
Solar Titan 130E Turbine Venting **a/**	--	--	0.40	--	--	653	--	--
Blowdowns **b/**	--	--	6.12	--	--	9,992	--	--
Equipment Leaks	--	--	0.15	--	--	241	--	--
Total Station Emissions	**89.35**	**213.82**	**18.46**	**10.32**	**1.11**	**193,436**	**1.22**	**1.78**
Title V Threshold	**100**	**100**	**100**	**100**	**100**	**N/A**	**10**	**25**
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**N/A**	**N/A**	**N/A**

a This includes emissions from the pneumatic actuators and compressor unit dry seals.
b This includes emissions from turbine shutdown blowdowns and one full station blowdown.

All combustion units at the White Oak Compressor Station would be natural gas-fired. Potential emissions were calculated based on operating 8,760 hours per year (except for the emergency generator, which was based on 500 operating hours per year).

Table 4.11-7
Potential Emissions from the Mount Olive Compressor Station

Emissions Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	SO_2 (tpy)	CO_2e (tpy)	Formalde-hyde (Single HAP) (tpy)	Total HAPs (tpy)
Solar Titan 130 Turbine #1 (T01)	38.98	79.87	4.87	4.62	0.50	81,923	0.50	0.72
Solar Titan 130 Turbine #2 (T02)	38.98	79.87	4.87	4.62	0.50	81,923	0.50	0.72
Solar Titan 130 Turbine #3 (T03)	38.98	79.87	4.87	4.62	0.50	81,923	0.50	0.72
Waukesha Emergency Generator (G1)	1.30	2.59	0.65	0.02	0.00	266	0.12	0.17
Line Heater (H1)	0.61	0.51	0.03	0.05	0.00	723	0.00	0.01
Line Heater (H2)	0.30	0.25	0.02	0.02	0.00	359	0.00	0.01
Catalytic Heaters (40) (SH1)	1.24	1.04	0.07	0.09	0.01	1,477	0.00	0.02
Solar Titan 130 Turbine Venting **a**/	--	--	0.60	--	--	979	--	--
Blowdowns **b**/	--	--	8.73	--	--	14,266	--	--
Equipment Leaks	--	--	0.22	--	--	361	--	--
Total Station Emissions	**120.39**	**244.00**	**24.93**	**14.04**	**1.51**	**264,200**	**1.62**	**2.37**
Title V Threshold	**100**	**100**	**100**	**100**	**100**	**N/A**	**10**	**25**
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**N/A**	**N/A**	**N/A**

a This includes emissions from the pneumatic actuators and compressor unit dry seals.
b This includes emissions from turbine shutdown blowdowns and one full station blowdown.

All combustion units at the Mount Olive Compressor Station would be natural gas-fired. Potential emissions were calculated based on operating 8,760 hours per year (except for the emergency generator, which was based on 500 operating hours per year).

Table 4.11-8
Potential Emissions from Expansion of the Ceredo Compressor Station

Emissions Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	SO_2 (tpy)	CO_{2e} (tpy)	Formalde-hyde (Single HAP) (tpy)	Total HAPs (tpy)
Existing Emission Sources at Ceredo Compressor Station								
Cooper-Bessemer GMWH-8 Engine (E01)	491.79	35.08	12.36	4.98	0.07	12,063	5.69	8.19
Cooper-Bessemer GMWH-8 Engine (E02)	491.79	35.08	12.36	4.98	0.07	12,063	5.69	8.19
Cooper-Bessemer GMWH-8 Engine (E03)	491.79	35.08	12.36	4.98	0.07	12,063	5.69	8.19
Cooper-Bessemer GMWH-8 Engine (E04)	491.79	35.08	12.36	4.98	0.07	12,063	5.69	8.19
Cooper-Bessemer GMWH-8 Engine (E05)	491.79	35.08	12.36	4.98	0.07	12,063	5.69	8.19
Cooper-Bessemer GMWH-8 Engine (E06)	491.79	35.08	12.36	4.98	0.07	12,063	5.69	8.19
Cooper-Bessemer 8V-250 Engine (E07)	591.30	39.03	11.07	4.46	0.07	10,801	5.09	7.34
GE 3912R Turbine (E08)	265.82	19.70	0.86	2.71	0.29	48,130	0.29	0.42
GE 3112R Turbine (E09)	265.54	41.28	1.06	3.32	0.36	58,982	0.36	0.52
Waukesha Emergency Generator (G3)	0.61	1.08	0.41	0.01	0.00	173	0.08	0.11
Fuel Gas Heater (H1)	0.15	0.13	0.01	0.01	0.00	180	0.00	0.00
Heating System Boiler (BL2)	2.69	2.26	0.15	0.20	0.02	3,219	0.00	0.05
Existing Station Equipment a/	**4,076.85**	**313.96**	**87.72**	**40.59**	**1.16**	**193,863**	**39.96**	**57.58**
Proposed Changes and New Emission Sources under MXP								
Removal of GE3912R Turbine (E08) **b/**	-265.82	-19.70	-0.86	-2.71	-0.29	-48,130	-0.29	-0.42
Removal of GE3112R Turbine (E09) **c/**	-265.54	-41.28	-1.06	-3.32	-0.36	-58,982	-0.36	-0.52
Solar Titan 250 Turbine (E10)	35.67	54.65	6.03	6.44	0.70	114,203	0.69	1.00
Waukesha Emergency Generator (G4)	0.97	1.94	0.49	0.02	0.00	200	0.09	0.13
Line Heater (H2)	0.43	0.36	0.02	0.03	0.00	513	0.00	0.01
Solar Titan 250 Turbine Venting **d/**	--	--	0.20	--	--	326	--	--
Blowdowns **e/**	--	--	4.10	--	--	6,692	--	--
Equipment Leaks	--	--	0.07	--	--	120	--	--
Proposed Emission Changes under MXP	**-494.29**	**-4.03**	**9.06**	**0.46**	**0.05**	**14942**	**0.13**	**0.2**
Total Station Emissions	**3,582.56**	**309.93**	**96.64**	**41.05**	**1.21**	**208,685**	**40.09**	**57.78**
Title V Threshold	**100**	**100**	**100**	**100**	**100**	**N/A**	**10**	**25**
PSD Significance Threshold	**40**	**100**	**40**	**15 / 10**	**40**	**N/A**	**N/A**	**N/A**

a Excludes fugitive emissions (equipment leaks) because compressor stations are not one of the 28 listed source categories.
b Would be taken out of service as part of the LXP and removed as part of MXP. It is identified in this table for reference only, given that it would be removed as part of the air permit application.
c Would be taken out of service and removed as part of the MXP.
d This includes emissions from the pneumatic actuators and compressor unit dry seals.
e This includes emissions from turbine shutdown blowdowns and one full station blowdown.

As part of the MXP, Columbia Gas is proposing to retire and remove one GE 3112R compressor turbine, rated at 12,500 hp. Columbia Gas is also proposing to remove one GE 3912R compressor turbine, rated at 10,200 hp, which was previously retired.

The existing emission units at Ceredo Compressor Station that would not change with the MXP include the following:

- three Solar Turbines compressors driven by Siemens electric motors, each rated at 11,000 hp;
- six Cooper-Bessemer GMWH-8 compressor engines, each rated at 2,800 hp;
- one Cooper-Bessemer 8V-250 compressor engine, rated at 2,700 hp;
- one Waukesha emergency generator, rated at 738 hp;
- one fuel gas heater, rated at 0.35 MMBtu/hr; and
- one heating system boiler, rated at 6.28 MMBtu/hr.

Emissions from the new equipment at the Ceredo Compressor Station are based on operating 8,760 hours per year (except for the emergency generator, which was based on 500 operating hours per year).

Table 4.11-9
Potential Emissions from Expansion of the Elk River Compressor Station

Emissions Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	SO_2 (tpy)	CO_2e (tpy)	Formalde-hyde (Single HAP) (tpy)	Total HAPs (tpy)
Pending Emission Sources under WBX								
Solar Mars 100 Turbine (T01)	32.29	80.63	4.19	3.85	0.42	68,362	0.41	0.60
Solar Mars 100 Turbine (T02)	32.29	80.63	4.19	3.85	0.42	68,362	0.41	0.60
Waukesha VGF-L36GL Emergency Generator (G1)	0.19	0.39	0.10	0.00	0.00	40	0.02	0.03
Line Heaters (H1 & H2)	0.28	0.23	0.02	0.02	0.00	333	0.00	0.01
Catalytic Heaters (49) (SH1)	1.03	0.87	0.06	0.08	0.01	1,233	0.00	0.02
Solar Mars 100 Turbine Venting (T01 & T02) a/	--	--	21.57	--	--	13,964	--	--
Equipment leaks	--	--	0.40	--	--	258	--	--
Total Pending Station Emissions – WBX b/	**66.08**	**162.75**	**30.53**	**7.80**	**0.85**	**152,552**	**0.84**	**1.26**
Proposed Emission Sources under MXP								
Solar Mars 100 Turbine (T03)	32.29	80.63	4.19	3.85	0.42	68,362	0.41	0.60
Solar Mars 100 Turbine Venting (T03) a/	--	--	10.78	--	--	6,982	--	--
Equipment leaks	--	--	0.20	--	--	129	--	--

Table 4.11-9
Potential Emissions from Expansion of the Elk River Compressor Station

Emissions Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	SO_2 (tpy)	CO_2e (tpy)	Formaldehyde (Single HAP) (tpy)	Total HAPs (tpy)
Total Proposed Station Emissions – MXP b/	**32.29**	**80.63**	**15.17**	**3.85**	**0.42**	**75,473**	**0.41**	**0.60**
Total Station Emissions	**98.37**	**243.38**	**76.15**	**11.65**	**1.27**	**228,025**	**1.25**	**1.86**
Title V Threshold	**100**	**100**	**100**	**100**	**100**	**N/A**	**10**	**25**
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**N/A**	**N/A**	**N/A**

a This includes emissions from the pneumatic actuators, blowdowns from shutdowns, and compressor unit dry seals.
b The MXP involves installing one turbine (T03). Turbine engines T01 & T02 are proposed for installation under the WBX (Docket No. CP16-38-000).

All combustion units at the Elk River Compressor Station would be natural gas-fired. Potential emissions were calculated based on operating 8,760 hours per year (except for the emergency generator, which was based on 500 operating hours per year).

Emissions generated during operation of the pipeline portion of the MXP would be minimal and limited to equipment leaks and maintenance-type pigging operations. Total pipeline emissions are shown in table 4.11-10.

Table 4.11-10
Operational Pipeline Emissions for the MXP

Emission Category	Operational Pipeline Emissions (tpy)	
	CH_4	CO_2e
Equipment leaks	3.10	77.39
Pigging operations	0.08	1.98
Total Pipeline Emissions	**3.17**	**79.36**

Air Dispersion Modeling

Air dispersion modeling was completed using the EPA-preferred AERMOD dispersion model for each compressor station to show compliance with NAAQS. Appropriate pound-per-hour (lb/hr) emission rates were determined for each pollutant and averaging period. Both existing/pending and new sources at each compressor station were modeled (as part of MXP and other related proposed projects) to determine the additive impact on ambient air quality from each compressor station.

Columbia Gas provided modeling protocols for each compressor station.[37] Updated modeling for the Lone Oak, Ceredo, and Elk River Compressor Stations was provided on October 12, 2016.[38] The AERMOD model was run using default, conservative methodologies for the Sherwood, White Oak, Mount Olive, Lone Oak, and Elk River Compressor Stations. Modeling protocols were submitted to the public docket (CP16-357) in September 2016. The non-default, Plume Volume Molar Ratio Method was used in AERMOD for the 1-hour and annual NO_2 modeled impacts for the Ceredo Compressor Station. The low wind speed condition (LOWWIND3) and surface friction adjustment under low wind and stable conditions (ADJ_U*) beta options were also used in the Ceredo Compressor Station 1-hour and annual NO_2 modeling.[39]

Tables 4.11-11 and 4.11-12 summarize the modeling results and provide the current ambient monitored data, the facility impact, the combined concentration, and a comparison with NAAQS for each pollutant and averaging period (except for the 3-hour SO_2 and annual NO_2 standards where 1-hour averaging periods show compliance with the lengthier averaging times). All pollutant concentrations are in micrograms per cubic meter ($\mu g/m^3$). Table 4.11-11 shows modeled impacts from new MXP compressor stations, and table 4.11-12 shows modeled impacts from compressor stations being modified as part of the MXP.

37 Appendix 9A to Resource Report 9 can be viewed on our website at http://www.ferc.gov. Using the "eLibrary" link, select "Advanced Search" from the eLibrary menu and enter 20160429-5286 in the "Numbers: Accession Number" field.

38 Air modeling for the Lone Oak, Ceredo, and Elk River Compressor Stations can be viewed on our website at http://www.ferc.gov. Using the "eLibrary" link, select "Advanced Search" from the eLibrary menu and enter 20161012-5160 in the "Numbers: Accession Number" field.

39 The EPA has proposed to incorporate these beta options as regulatory options within AERMOD/AERMET under the Revision to the Guideline on Air Quality Models Notice of Proposed Rulemaking, dated July 29, 2015, but this has not yet been approved. These options are expected to be incorporated into AERMOD, but would still require formal approval by the EPA region as an alternative model. The EPA Memo "Clarification on the Approval Process for Regulatory Application of the AERMOD Modeling System Beta Options," published on December 10, 2015, clarifies the approval process for AERMOD beta options.

Table 4.11-11
Air-Dispersion Modeling Results for New MXP Compressor Stations

Pollutant	Averaging Period	Background (µg/m^3)	Facility Impact (µg/m^3)	Facility Impact + Background (µg/m^3)	NAAQS (µg/m^3)
Sherwood Compressor Station					
NO2	1-hour **a**/	38.9	62.4	101.2	188
PM2.5	24-hour	19.0	1.58	20.6	35
PM2.5	Annual	9.1	0.11	9.2	12
PM10	24-hour	47.0	2.30	49.3	150
CO	1-hour	1,832	102.0	1,934	40,000
CO	8-hour	801	48.2	850	10,000
SO_2	1-hour **b**/	43.6	4.47	48.1	196.5
White Oak Compressor Station					
NO_2	1-hour **a**/	38.9	5.1	44.0	188
$PM_{2.5}$	24-hour	19.7	0.26	19.9	35
$PM_{2.5}$	Annual	9.8	0.02	9.8	12
PM_{10}	24-hour	30.0	0.35	30.4	150
CO	1-hour	1,832	18.3	1,850	40,000
CO	8-hour	801	7.8	809	10,000
SO_2	1-hour **b**/	69.8	0.45	70.3	196.5
Mount Olive Compressor Station					
NO_2	1-hour **a**/	57.7	12.2	69.9	188
$PM_{2.5}$	24-hour	18.3	0.71	19.0	35
$PM_{2.5}$	Annual	9.1	0.06	9.2	12
PM_{10}	24-hour	30.0	1.25	31.2	150
CO	1-hour	2,976	45.2	3,022	40,000
CO	8-hour	1,832	19.3	1,851	10,000
SO_2	1-hour **b**/	110.8	0.98	111.8	196.5

a The annual NO_2 NAAQS is 100 µg/m^3, which is at or below all modeled 1-hour NO_2 maximum values. Therefore, annual estimates would be even less than these maximum hourly estimates.
b The 3-hour SO_2 NAAQS is 1,300 µg/m^3, which is at or below all modeled 1-hour SO_2 maximum values. Therefore, 3-hour estimates would be even less than these maximum hourly estimates.

Table 4.11-12
Air-Dispersion Modeling Results for Modified MXP Compressor Stations

Pollutant	Averaging Period	Background ($\mu g/m^3$)	Facility Impact a/ ($\mu g/m^3$)	Facility Impact + Background ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Lone Oak Compressor Station					
NO_2	1-hour	66.4	31.6	98.0	188
NO_2	Annual	6.6	1.1	7.7	100
$PM_{2.5}$	24-hour	25.3	2.83	27.7	35
$PM_{2.5}$	Annual	11.6	0.17	11.8	12
PM_{10}	24-hour	47.0	3.61	50.6	150
CO	1-hour	1,259	186.4	1,446	40,000
CO	8-hour	1,145	70.6	1,215	10,000
SO_2	1-hour	108.2	2.38	110.6	196.5
SO_2	3-hour	108.2	2.77	111.0	1,300
Ceredo Compressor Station b/					
NO_2	1-hour	--	--	186.9	188
NO_2	Annual	11.3	12.3	11.3	100
$PM_{2.5}$	24-hour	21.0	10.1	21.5	35
$PM_{2.5}$	Annual	9.1	1.4	9.1	12
PM_{10}	24-hour	74.0	18.1	74.9	150
CO	1-hour	1,725.0	1,956.8	2,131.4	40,000
CO	8-hour	1,035.0	810.3	1,227.7	10,000
SO_2	1-hour	48.0	137.0	69.1	196.5
SO_2	3-hour	57.6	96.8	75.9	1,300
Elk River Compressor Station					
NO_2	1-hour	57.7	53.9	111.6	188
NO_2	Annual	5.8	1.6	7.4	100
$PM_{2.5}$	24-hour	18.3	1.48	19.8	35
$PM_{2.5}$	Annual	9.1	0.26	9.4	12
PM_{10}	24-hour	30.0	1.79	31.8	150
CO	1-hour	2,862	178.5	3,040	40,000
CO	8-hour	1,374	98.3	1,472	10,000
SO_2	1-hour	110.8	3.75	114.6	196.5
SO_2	3-hour	110.8	3.20	114.0	1,300

a Facility impact includes existing/approved/pending sources and new sources planned as part of the MXP.
b Seasonal hour-of-day NO_2 background concentrations were summed with the modeled 1-hour NO_2 concentrations within AERMOD for the Ceredo Compressor Station.

These modeling results demonstrate that the MXP compressor stations would not exceed NAAQS, and the project area would continue to remain protective of human health and public welfare for all listed pollutants.

4.11.1.3 Gulf XPress Project

Air quality would be affected by construction and operation of the GXP. Construction activities would generate air emissions at the compressor stations both temporarily during construction and throughout the operation of the GXP.

4.11.1.3.1 Existing Air Quality

The GXP would be in Kentucky, Tennessee, and Mississippi. The regional climate of Kentucky and Tennessee is classified as humid continental, characterized by frequent changes in the weather with large ranges in temperature. The climate of Mississippi is classified as humid subtropical. Although the potential exists for drought and flood, rainfall is typically consistent throughout the year. The winters are temperate, and the summers are long and hot.

The GXP areas are all designated as attainment or unclassifiable for all pollutants.

To characterize existing ambient air quality conditions for the GXP, air quality data at the monitoring stations that were most representative of each new and modified compressor station were collected and are presented in section 4.11.1.3.4 (reference table 4.11-22) in combination with the project impact for comparison with NAAQS.

4.11.1.3.2 Air Permitting and Regulatory Applicability

The provisions of the CAA that are applicable to the GXP are discussed below.

Federal Regulations

The applicability of federal regulations is summarized for each project element. Tables 4.11-14 through 4.11-21 show the PTE for each compressor station and comparison to applicable permitting thresholds in tpy.

Prevention of Significant Deterioration Applicability

The PTE of each new compressor station (Morehead, Paint Lick, Goodluck, Cane Ridge, Clifton Junction, New Albany, and Holcomb) is below the PSD new major source threshold; therefore, PSD is not applicable. The approved Grayson Compressor Station is a minor source with respect to PSD permitting, and the additional equipment proposed as part of the GXP would not trigger any PSD requirements.

Title V Applicability

The new compressor stations would be subject to Title V permitting. Therefore, Columbia Gulf would need to apply for a Title V permit for each of these sources within 12 months of commencing operation. The Grayson Compressor Station would also need to obtain a Title V permit.

Mandatory Greenhouse Gas Reporting Rule

Operational GHG emission estimates for the GXP are presented, as CO_2e, in tables 4.11-14 through 4.11-21. Based on the emission estimates presented, actual GHG emissions from

operation of each GXP compressor station have the potential to exceed the 25,000 metric tpy reporting threshold. Therefore, if the actual emissions during operations from any of the compressor stations are equal to or greater than 25,000 metric tpy, Columbia Gulf would need to report GHG emissions for that facility. A more detailed discussion on impacts from the GXP GHG emissions and climate change is included in section 4.13.

National Emissions Standards for Hazardous Air Pollutants

The new emergency generators at the Morehead, Paint Lick, Goodluck, Cane Ridge, Clifton Junction, New Albany, and Holcomb stations would be new emergency generators and area sources of HAPs. As such, the engines would comply with the requirements of Subpart ZZZZ by meeting the requirements of NSPS Subpart JJJJ.

New Source Performance Standards

Subpart JJJJ would apply to the new emergency generators at Morehead, Paint Lick, Goodluck, Cane Ridge, Clifton Junction, New Albany, and Holcomb stations. NSPS Subpart KKKK would apply to the new turbines at Morehead, Paint Lick, Goodluck, Cane Ridge, Clifton Junction, New Albany, Holcomb, and Grayson stations. The compressor stations would be subject to NSPS Subpart OOOOa and must comply with all applicable requirements of the rule.

General Conformity

Because all the GXP facilities would operate in attainment and/or unclassified areas, a general conformity applicability analysis is not required.

Kentucky, Tennessee, and Mississippi Regulations

The GXP compressor stations would be subject to Kentucky, Mississippi, and Tennessee state regulations.

In Kentucky, the Morehead, Paint Lick, and Goodluck stations would be required to comply with all applicable state regulations, including but not limited to the following:

- 401 KAR Chapter 50 (*General Administrative Procedures*) establishes procedures for general applications, fees, modeling, good engineering stack height, testing and monitoring, etc.;
- 401 KAR Chapter 51 (*Attainment and Maintenance of NAAQS*) establishes standards and requirements for the attainment and maintenance of NAAQS;
- 401 KAR Chapter 52 (*Permits, Registrations and Prohibitory Rules*) establishes rules for the Title V operating permit program and other permitting programs;
- 401 KAR Chapter 53 (*Ambient Air Quality*) sets the ambient air quality standards;
- 401 KAR Chapter 55 (*Emergency Episodes*) establishes emergency episode provisions;
- 401 KAR Chapter 57 (*Hazardous Pollutants*) establishes requirements for hazardous pollutants;
- 401 KAR Chapter 59 (*New Source Standards*) establishes new source standards; and

- 401 KAR Chapter 60 (*New Source Standards*) adopts federal new source performance standards.

In Tennessee, the Cane Ridge and Clifton Junction stations would be required to comply with all applicable state regulations, including, but not limited to the following:

- Chapter 1200-03-03 (*Ambient Air Quality Standards*) establishes primary ambient air quality standards;
- Chapter 1200-03-08 (*Fugitive Dust*) covers fugitive dust requirements and controls;
- Chapter 1200-03-09 (*Construction and Operating Permits*) establishes requirements for construction and operating permits;
- Chapter 1200-03-11 (*Hazardous Air Contaminants*) establishes emission limits and other standards for hazardous air contaminants;
- Chapter 1200-03-14 (*Control of Sulfur Dioxide Emission*) establishes emission limits and standards for SO_2;
- Chapter 1200-03-18 (*Volatile Organic Compounds*) establishes emission limits and standards for VOCs;
- Chapter 1200-03-24 (*Good Engineering Practice Stack Height Regulations*) establishes good engineering stack height standards; and
- Chapter 1200-03-27 (*Nitrogen Oxides*) establishes good engineering stack height standards.

In Mississippi, the New Albany and Holcomb stations would be required to comply with all applicable state regulations, including, but not limited to the following:

- 11 Mississippi Administrative Code (MAC) Part 2, Chapter 1 (*Air Emission Regulations for the Prevention, Abatement, and Control of Air Contaminants*) covers criteria for PM (smoke, opacity, and nuisances) and HAP provisions;
- 11 MAC Part 2, Chapter 4 (*Ambient Air Quality Standards*) establishes ambient air quality standards;
- 11 MAC Part 2, Chapter 6 (*Air Emissions Operating Permit Regulations for Purposes of Title V of the Federal Clean Air Act*) establishes requirements for the Title V program; and
- 11 MAC Part 2, Chapter 6 (*Air Toxics Regulations)* establishes regulations for air toxics.

4.11.1.3.3 Construction Air Emission Impacts and Mitigation

Construction of the GXP would result in temporary, localized increases of tailpipe emissions from mobile diesel- and gas-fueled equipment. In addition, temporary increases in fugitive dust emissions would occur due to construction-related surface disturbances and

construction vehicle travel on unpaved roads. Open burning is not currently planned for this project.

A summary of the estimated project construction emissions is presented in table 4.11-13 for years 2017 and 2018 (duration of project construction). Construction emissions were based on an operating schedule of 12 hours per day, 6 days per week, from the commencement of clearing through restoration. The emissions identified include construction emissions from the Morehead, Paint Lick, Goodluck, Cane Ridge, Clifton Junction, New Albany, Holcomb stations, and modifications at the approved Grayson Compressor Station. Table 4.11-13 shows emissions estimates for the following categories of emissions: diesel non-road equipment, diesel and gas on-road equipment, and construction activity and roadway fugitive dust.

Table 4.11-13
Estimated Construction Emissions for the GXP

Construction Activity	Estimated Emissions (tons)							
	NO_X	VOC	CO	PM_{10}	$PM_{2.5}$	SO_2	CO_2e	HAPs
2017 Emissions								
Diesel non-road equipment	1.32	0.14	1.07	0.16	0.16	0.05	212	0.02
Diesel and gas on-road equipment	6.37	1.08	18.42	0.24	0.24	0.03	2,947	0.29
Construction activity fugitive dust	--	--	--	1.91	0.29	--	--	--
Roadway fugitive dust	--	--	--	3.18	0.25	--	--	--
Total 2017 Construction Emissions	**7.69**	**1.22**	**19.49**	**5.49**	**0.94**	**0.08**	**3,186**	**0.31**
2018 Emissions								
Diesel non-road equipment	5.89	0.61	4.83	0.74	0.74	0.21	975	0.08
Diesel and gas on-road equipment	30.20	5.21	90.78	1.14	1.14	0.16	14,248	1.43
Construction activity fugitive dust	--	--	--	9.47	1.42	--	--	--
Roadway fugitive dust	--	--	--	12.41	1.24	--	--	--
Total 2017 Construction Emissions	**36.09**	**5.82**	**95.61**	**23.76**	**4.54**	**0.37**	**15,223**	**1.51**

Tailpipe emissions of NO_X, CO, PM_{10}, $PM_{2.5}$, SO_2, VOC, and GHGs from mobile construction equipment, worker commuter vehicles, construction, and delivery/removal vehicles were calculated based on the EPA MOVES2014 Model emission factors and vehicle assumptions.

The volume of fugitive dust generated by surface disturbance and vehicle travel on unpaved roads would be dependent upon the area disturbed and the type of construction activity, along with the soil's silt and moisture content, wind speed, and the nature of vehicular/equipment traffic. Fugitive PM_{10} and $PM_{2.5}$ emissions from excavation and backfilling were calculated using EPA's *Compilation of Air Pollutant Emission Factors (AP-42)* Section 11.9 (EPA, 1998a) to calculate total PM. The following assumptions were used for the excavation and backfilling fugitive emissions calculations:

- PM_{10} is equal to total suspended particulate;
- $PM_{2.5}$ is 10 percent of PM_{10} for construction and demolition; and
- $PM_{2.5}$ is 15 percent of PM_{10} for industrial wind erosion.

These assumptions were based on the EPA's AP-42, Chapter 13.2.2, *Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors* (EPA, 2006a). Windblown dust emissions were calculated using the EPA's AP-42, Chapter 11.9, *Western Surface Coal Mining*, Table 11.9-4 (EPA, 1998a), assuming dust control efficiency of 50 percent (achieved primarily by using water trucks to apply water to the right-of-way), based on EPA's *Control of Open Fugitive Dust Sources* (EPA, 1988). Fugitive PM_{10} and $PM_{2.5}$ from construction equipment on unpaved roads were calculated using the EPA's *Compilation of Air Pollutant Emission Factors (AP-42)*, Section 13.2.2 (EPA, 2006b).

Fugitive dust would result from land clearing, grading, excavation, concrete work, and vehicle traffic on paved and unpaved roads. The amount of dust generated would be a function of construction activity, soil type, soil moisture content, wind speed, precipitation, vehicle traffic, vehicle types, and roadway characteristics. Emissions would be greater during dry periods and in areas of fine-textured soils subject to surface activity. Columbia Gulf has prepared a Fugitive Dust Control Plan[40] that describes the mitigation measures that would be implemented to control fugitive dust during project construction. We have reviewed the Fugitive Dust Control Plan and find it acceptable.

These construction emissions would occur over the duration of construction activity and would be emitted at different times and at discrete locations across three states. With the mitigation measures proposed by the Columbia Gulf, air quality impacts from construction equipment would be temporary and would not result in a significant impact on regional air quality.

4.11.1.3.4 Operational Air Emission Impacts and Mitigation

Operational Air Emissions

Tables 4.11-14 through 4.11-21 show operational emission estimates from the compressor stations. Emissions of NO_X, CO, and VOC from operation of the combustion turbines were calculated using vendor data. Maximum hourly emission rates were based on normal operation at 32 °F. Columbia Gulf has proposed to equip the new turbines with $SoLoNO_X$ to mitigate air quality impacts by reducing NOx emissions. Potential emissions were estimated from each combustion turbine accounting for normal operation for 8,760 hours per year (i.e., continuous operation) plus additional emissions to account for non-$SoLoNO_X$ operation during planned startups and shutdowns. Emission estimates of PM_{10} and $PM_{2.5}$ from operation of the combustion turbines were based on EPA's AP-24 factors (EPA, 2000 [Table 3.1-2a]).

Potential emissions from the new emergency generators are based on operation of up to 100 hours per year. Emissions of NO_X, CO, and VOC are based on NSPS Subpart JJJJ limitations. Formaldehyde emissions are based on vendor data.

[40] Columbia Gulf's Fugitive Dust Control Plan was included as appendix 1D to Resource Report 1 in its April 2016 application. The Dust Control Plan can be viewed on the FERC website at http://www.ferc.gov. Using the "eLibrary" link, select "Advanced Search" from the eLibrary menu and enter 20160429-5339 in the "Numbers: Accession Number" field.

The heaters proposed for each compressor station would operate up to 8,760 hours per year.

Except as indicated above, potential emissions for each combustion unit are based on the following emission factors:

- Potential CO_2e emissions are based on emission factors and GWPs specified in 40 CFR 98.
- Annual SO_2 emissions are based on 0.25 grains of sulfur per 100 standard cubic feet of natural gas, and maximum hourly emissions are based on 20 grains of sulfur per 100 standard cubic feet.
- Emissions of formaldehyde and total HAPs are based on the EPA's AP-42 emission factors (except for emergency generators).
- All heater emissions are based on AP-42 emission factors.

A 2,000-gallon condensate storage tank would be installed at each compressor station. Emissions estimates were determined using the EPA's TANKS emissions model.

Table 4.11-14
Potential Emissions from the Proposed Morehead Compressor Station

Emissions Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	SO_2 (tpy)	CO_2e (tpy)	Formaldehyde (Single HAP) (tpy)	Total HAPs (tpy)
Solar Titan 130E Turbine	43.2	104.5	5.6	5.1	0.6	91,294	0.6	0.8
Solar Titan 130E Turbine	43.2	104.5	5.6	5.1	0.6	91,294	0.6	0.8
Waukesha Emergency Generator	0.3	0.5	0.1	0.0	0.0	53	0.0	0.0
Process Heater	0.6	0.5	0.0	0.0	0.0	723	0.0	0.0
(40) Catalytic Heaters	1.2	1.0	0.1	0.1	0.0	1,477	0.0	0.0
Condensate Tank	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Equipment Leaks	N/A	N/A	0.1	N/A	N/A	241	N/A	N/A
Venting **a**/	N/A	N/A	0.4	N/A	N/A	653	N/A	N/A
Blowdowns **b**/	N/A	N/A	5.3	N/A	N/A	8,709	N/A	N/A
Total Station Emissions	**88.5**	**211.0**	**17.2**	**10.3**	**1.2**	**194,444**	**1.2**	**1.6**
Title V Threshold	**100**	**100**	**100**	**100**	**100**	**N/A**	**10**	**25**
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**N/A**	**N/A**	**N/A**

a This includes emissions from the pneumatic actuators and compressor unit dry seals.
b This includes emissions from turbine shutdown blowdowns and one full station blowdown.

All the combustion units at the Morehead station would be natural gas-fired. Potential emissions were calculated based on operating 8,760 hours per year (except for the emergency generator, which was based on 100 operating hours per year).

Table 4.11-15
Potential Emissions from the Proposed Paint Lick Compressor Station

Emissions Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	SO_2 (tpy)	CO_2e (tpy)	Formaldehyde (Single HAP) (tpy)	Total HAPs (tpy)
Solar Titan 130 Turbine	38.6	99.9	5.0	4.6	0.5	81,570	0.5	0.7
Solar Titan 130 Turbine	38.6	99.9	5.0	4.6	0.5	81,570	0.5	0.7
Waukesha Emergency Generator	0.3	0.5	0.1	0.0	0.0	53	0.0	0.0
Process Heater	0.6	0.5	0.0	0.0	0.0	723	0.0	0.0
40 Catalytic Heaters	1.2	1.0	0.1	0.1	0.0	1,477	0.0	0.0
Condensate Tank	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Equipment Leaks	N/A	N/A	0.2	N/A	N/A	244	N/A	N/A
Venting **a**/	N/A	N/A	0.5	N/A	N/A	661	N/A	N/A
Blowdowns **b**/	N/A	N/A	5.0	N/A	N/A	6,448	N/A	N/A
Total Station Emissions	**38.6**	**201.8**	**15.9**	**9.3**	**1.0**	**172,746**	**1.0**	**1.4**
Title V Threshold	**100**	**100**	**100**	**100**	**100**	**N/A**	**10**	**25**
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**N/A**	**N/A**	**N/A**

a This includes emissions from the pneumatic actuators and compressor unit dry seals.
b This includes emissions from turbine shutdown blowdowns and one full station blowdown.

All the combustion units at the Paint Lick Compressor Station would be natural gas-fired. Potential emissions were calculated based on operating 8,760 hours per year (except for the emergency generator, which was based on 100 operating hours per year).

Table 4.11-16
Potential Emissions from the Proposed Goodluck Compressor Station

Emissions Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	SO_2 (tpy)	CO_2e (tpy)	Formaldehyde (Single HAP) (tpy)	Total HAPs (tpy)
Solar Mars 100 Turbine	31.8	77.8	4.1	3.8	0.4	67,155	0.4	0.6
Solar Mars 100 Turbine	31.8	77.8	4.1	3.8	0.4	67,155	0.4	0.6
Waukesha Emergency Generator	0.3	0.5	0.1	0.0	0.0	53	0.0	0.0
Process Heater	0.5	0.4	0.0	0.0	0.0	564	0.0	0.0
40 Catalytic Heaters	1.2	1.0	0.1	0.1	0.0	1,477	0.0	0.0
Condensate Tank	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Equipment Leaks	N/A	N/A	0.2	N/A	N/A	244	N/A	N/A
Venting **a**/	N/A	N/A	0.5	N/A	N/A	662	N/A	N/A
Blowdowns **b**/	N/A	N/A	5.8	N/A	N/A	7,487	N/A	N/A
Total Station Emissions	**65.6**	**157.5**	**14.9**	**7.7**	**0.8**	**144,597**	**0.8**	**1.2**

Table 4.11-16
Potential Emissions from the Proposed Goodluck Compressor Station

Emissions Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	SO_2 (tpy)	CO_2e (tpy)	Formaldehyde (Single HAP) (tpy)	Total HAPs (tpy)
Title V Threshold	**100**	**100**	**100**	**100**	**100**	**N/A**	**10**	**25**
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**N/A**	**N/A**	**N/A**

a This includes emissions from the pneumatic actuators and compressor unit dry seals.
b This includes emissions from turbine shutdown blowdowns and one full station blowdown.

All the combustion units at the Goodluck Compressor Station would be natural gas-fired. Potential emissions were calculated based on operating 8,760 hours per year (except for the emergency generator, which was based on 100 operating hours per year).

Table 4.11-17
Potential Emissions from the Proposed Expansion of the Grayson Compressor Station

Emissions Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	SO_2 (tpy)	CO_2e (tpy)	Formaldehyde (Single HAP) (tpy)	Total HAPs (tpy)
Pending Emission Sources under RXP								
Solar Mars 100 Turbine #1 (T01)	33.5	57.9	4.0	3.9	0.4	68,340	0.4	0.6
Solar Titan 130 Turbine (T02)	40.7	72.9	4.9	4.7	0.5	82,806	0.5	0.7
Emergency Generator	1.0	0.6	0.0	0.0	0.0	200	0.1	0.1
Indirect-fired Heat Exchanger	0.5	0.4	0.0	0.0	0.0	564	0.0	0.0
Catalytic Space Heaters	1.2	1.0	0.1	0.1	0.0	1,477	0.0	0.0
Equipment Leaks	N/A	N/A	0.7	N/A	N/A	433	N/A	N/A
Venting **a/**	N/A	N/A	7.4	N/A	N/A	4,792	N/A	N/A
Total Emissions – RXP b/	**76.9**	**132.8**	**17.1**	**8.7**	**0.9**	**158,612**	**1.0**	**1.4**
Proposed Emission Sources under GXP								
Solar Mars 100 Turbine #2 (T03) **a/**	33.5	57.9	4.0	3.9	0.4	68,340	0.4	0.6
Equipment Leaks	N/A	N/A	0.1	N/A	N/A	67	N/A	N/A
Venting **a/**	N/A	N/A	3.7	N/A	N/A	2,396	N/A	N/A
Total Proposed Emissions – GXP b/	**33.5**	**57.9**	**7.8**	**3.9**	**0.4**	**70,803**	**0.4**	**0.6**
Total Station Emissions	**110.4**	**190.7**	**24.9**	**12.6**	**1.3**	**229,415**	**1.4**	**2.0**
Title V Threshold	**100**	**100**	**100**	**100**	**100**	**N/A**	**10**	**25**
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**N/A**	**N/A**	**N/A**

a This includes emissions from the pneumatic actuators, blowdowns from shutdowns, and compressor unit dry seals.
b The GXP involves installing one turbine (T03). The station is proposed to be built with turbine engines T01 and T02 under the RXP Certificated Capacity Increase Project (Docket No. CP15-539-000).

All the combustion units at the Grayson Compressor Station would be natural gas-fired. Potential emissions were calculated based on operating 8,760 hours per year (except for the emergency generator, which was based on 100 operating hours per year).

Table 4.11-18
Potential Emissions from the Proposed Cane Ridge Compressor Station

Emissions Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	SO_2 (tpy)	CO_2e (tpy)	Formaldehyde (Single HAP) (tpy)	Total HAPs (tpy)
Solar Titan 130 Turbine	39.1	100.4	5.1	4.7	0.5	82,567	0.5	0.7
Solar Titan 130 Turbine	39.1	100.4	5.1	4.7	0.5	82,567	0.5	0.7
Waukesha Emergency Generator	0.3	0.5	0.1	0.0	0.0	53	0.0	0.0
Process Heater	0.6	0.5	0.0	0.0	0.0	723	0.0	0.0
40 Catalytic Heaters	1.2	1.0	0.1	0.1	0.0	1,477	0.0	0.0
Condensate Tank	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Equipment Leaks	N/A	N/A	0.2	N/A	N/A	244	N/A	N/A
Venting **a**/	N/A	N/A	0.5	N/A	N/A	662	N/A	N/A
Blowdowns **b**/	N/A	N/A	6.2	N/A	N/A	8,001	N/A	N/A
Total Station Emissions	**80.3**	**202.8**	**17.3**	**9.5**	**1.0**	**176,294**	**1.0**	**1.4**
Title V Threshold	**100**	**100**	**100**	**100**	**100**	**N/A**	**10**	**25**
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**N/A**	**N/A**	**N/A**

a This includes emissions from the pneumatic actuators and compressor unit dry seals.
b This includes emissions from turbine shutdown blowdowns and one full station blowdown.

All the combustion units at the Cane Ridge Compressor Station would be natural gas-fired. Potential emissions were calculated based on operating 8,760 hours per year (except for the emergency generator, which was based on 100 operating hours per year).

Table 4.11-19
Potential Emissions from the Clifton Junction Compressor Station

Emissions Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	SO_2 (tpy)	CO_2e (tpy)	Formaldehyde (Single HAP) (tpy)	Total HAPs (tpy)
Solar Mars 100 Turbine	32.3	78.3	4.2	3.9	0.4	68,442	0.4	0.6
Solar Mars 100 Turbine	32.3	78.3	4.2	3.9	0.4	68,442	0.4	0.6
Waukesha Emergency Generator	0.3	0.5	0.1	0.0	0.0	53	0.0	0.0
Process Heater	0.5	0.4	0.0	0.0	0.0	564	0.0	0.0
40 Catalytic Heaters	1.2	1.0	0.1	0.1	0.0	1,477	0.0	0.0
Condensate Tank	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Equipment Leaks	N/A	N/A	0.2	N/A	N/A	244	N/A	N/A
Venting **a**/	N/A	N/A	0.5	N/A	N/A	662	N/A	N/A
Blowdowns **b**/	N/A	N/A	5.6	N/A	N/A	7,130	N/A	N/A
Total Station Emissions	**66.6**	**158.5**	**14.9**	**7.9**	**0.8**	**147,014**	**0.8**	**1.2**

Table 4.11-19
Potential Emissions from the Clifton Junction Compressor Station

Emissions Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	SO_2 (tpy)	CO_2e (tpy)	Formaldehyde (Single HAP) (tpy)	Total HAPs (tpy)
Title V Threshold	**100**	**100**	**100**	**100**	**100**	**N/A**	**10**	**25**
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**N/A**	**N/A**	**N/A**

a This includes emissions from the pneumatic actuators and compressor unit dry seals.
b This includes emissions from turbine shutdown blowdowns and one full station blowdown.

All the combustion units at the Clifton Junction Compressor Station would be natural gas-fired. Potential emissions were calculated based on operating 8,760 hours per year (except for the emergency generator, which was based on 100 operating hours per year).

Table 4.11-20
Potential Emissions from the Proposed New Albany Compressor Station

Emissions Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	SO_2 (tpy)	CO_2e (tpy)	Formaldehyde (Single HAP) (tpy)	Total HAPs (tpy)
Solar Mars 100 Turbine	32.5	78.6	4.2	3.9	0.4	68,869	0.4	0.6
Solar Mars 100 Turbine	32.5	78.6	4.2	3.9	0.4	68,869	0.4	0.6
Waukesha Emergency Generator	0.3	0.5	0.1	0.0	0.0	53	0.0	0.0
Process Heater	0.5	0.4	0.0	0.0	0.0	564	0.0	0.0
40 Catalytic Heaters	1.2	1.0	0.1	0.1	0.0	1,477	0.0	0.0
Condensate Tank	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Equipment Leaks	N/A	N/A	0.2	N/A	N/A	244	N/A	N/A
Venting **a**/	N/A	N/A	0.5	N/A	N/A	662	N/A	N/A
Blowdowns **b**/	N/A	N/A	5.8	N/A	N/A	7,495	N/A	N/A
Total Station Emissions	**67.0**	**159.1**	**15.1**	**7.9**	**0.8**	**148,233**	**0.8**	**1.2**
Title V Threshold	**100**	**100**	**100**	**100**	**100**	**N/A**	**10**	**25**
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**N/A**	**N/A**	**N/A**

a This includes emissions from the pneumatic actuators and compressor unit dry seals.
b This includes emissions from turbine shutdown blowdowns and one full station blowdown.

All the combustion units at the New Albany Compressor Station would be natural gas-fired. Potential emissions were calculated based on operating 8,760 hours per year (except for the emergency generator, which was based on 100 operating hours per year).

Table 4.11-21
Potential Emissions from the Proposed Holcomb Compressor Station

Emissions Source	NO_X (tpy)	CO (tpy)	VOC (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	SO_2 (tpy)	CO_2e (tpy)	Formaldehyde (Single HAP) (tpy)	Total HAPs (tpy)
Solar Mars 100 Turbine	32.8	78.8	4.2	3.9	0.4	69,484	0.4	0.6
Solar Mars 100 Turbine	32.8	78.8	4.2	3.9	0.4	69,484	0.4	0.6
Waukesha Emergency Generator	0.3	0.5	0.1	0.0	0.0	53	0.0	0.0
Process Heater	0.5	0.4	0.0	0.0	0.0	564	0.0	0.0
40 Catalytic Heaters	1.2	1.0	0.1	0.1	0.0	1,477	0.0	0.0
Condensate Tank	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Equipment Leaks	N/A	N/A	0.2	N/A	N/A	244	N/A	N/A
Venting **a**/	N/A	N/A	0.5	N/A	N/A	662	N/A	N/A
Blowdowns **b**/	N/A	N/A	5.5	N/A	N/A	7,038	N/A	N/A
Total Station Emissions	**67.6**	**159.5**	**14.8**	**7.9**	**0.8**	**149,006**	**0.8**	**1.2**
Title V Threshold	**100**	**100**	**100**	**100**	**100**	**N/A**	**10**	**25**
PSD Major Source Threshold	**250**	**250**	**250**	**250**	**250**	**N/A**	**N/A**	**N/A**

a This includes emissions from the pneumatic actuators and compressor unit dry seals.
b This includes emissions from turbine shutdown blowdowns and one full station blowdown.

All the combustion units at Holcomb Compressor Station would be natural gas-fired. Potential emissions were calculated based on operating 8,760 hours per year (except for the emergency generator, which was based on 100 operating hours per year).

Air Dispersion Modeling

Air dispersion modeling was completed using the EPA-preferred AERMOD dispersion model for each compressor station to show compliance with NAAQS. Appropriate pound-per-hour emission rates were determined for each pollutant and averaging period. Existing and new sources at each station were modeled to determine the cumulative impact on ambient air quality. The AERMOD model was run using standard parameters for all GXP compressor stations. Columbia Gulf provided detailed modeling protocols for each compressor station.[41] Table 4.11-22 summarizes the modeling results and provides the current ambient monitored data, the project impact, existing sources impact, the combined concentration, and a comparison with NAAQS for each pollutant and averaging period (except for the 3-hour SO_2 NAAQS and annual NO_2 where 1-hour averaging periods show compliance with the lengthier averaging times).

41 Appendix 9C to Resource Report 9 can be viewed on the FERC website at http://www.ferc.gov. Using the "eLibrary" link, select "Advanced Search" from the eLibrary menu and enter 20160429-5339 in the "Numbers: Accession Number" field.

Table 4.11-22
Air-Dispersion Modeling Results for GXP Compressor Stations Compared to NAAQS

Pollutant	Averaging Period	Background (µg/m³)	Facility Impact (µg/m³)	Facility Impact + Background (µg/m³)	NAAQS (µg/m³)
Morehead Compressor Station					
NO_2	1-hour **a**/	57.7	40.1	97.8	188
$PM_{2.5}$	24-hour	17.3	0.81	18.1	35
$PM_{2.5}$	Annual	7.9	0.06	8.0	12
PM_{10}	24-hour	23.0	1.36	24.4	150
CO	1-hour	1,717	78.2	1,795	40,000
CO	8-hour	1,145	30.1	1,175	10,000
SO_2	1-hour **b**/	36.7	3.09	39.7	196.5
Paint Lick Compressor Station					
NO_2	1-hour a/	80.2	5.9	86.1	188
$PM_{2.5}$	24-hour	17.3	0.40	17.7	35
$PM_{2.5}$	Annual	8.5	0.02	8.5	12
PM_{10}	24-hour	30.0	0.75	30.7	150
CO	1-hour	3,320	24.5	3,344	40,000
CO	8-hour	1,946	14.5	1,961	10,000
SO_2	1-hour **b**/	40.1	0.64	40.8	196.5
Goodluck Compressor Station					
NO_2	1-hour **a**/	77.7	6.9	84.6	188
$PM_{2.5}$	24-hour	19.7	0.6	20.2	35
$PM_{2.5}$	Annual	9.9	0.0	9.9	12
PM_{10}	24-hour	30.0	0.6	30.6	150
CO	1-hour	229.0	18.3	247.3	40,000
CO	8-hour	343.4	9.7	353.2	10,000
SO_2	1-hour **b**/	27.1	0.5	27.6	196.5
Grayson Compressor Station c/					
NO_2	1-hour **a**/	57.7	38.0	95.6	188
$PM_{2.5}$	24-hour	20.7	2.5	23.2	35
$PM_{2.5}$	Annual	10.2	0.2	10.3	12
PM_{10}	24-hour	23.0	3.2	26.2	150
CO	1-hour	1,717	175.0	1,892	40,000
CO	8-hour	1,145	117.2	1,262	10,000
SO_2	1-hour **b**/	13.1	1.4	14.5	196.5
Cane Ridge Compressor Station					
NO_2	1-hour **a**/	77.7	7.7	85.4	188
$PM_{2.5}$	24-hour	21.7	0.4	22.0	35
$PM_{2.5}$	Annual	9.9	0.0	10.0	12
PM_{10}	24-hour	30.0	0.4	30.4	150
CO	1-hour	229	23.3	252	40,000
CO	8-hour	343	9.5	353	10,000
SO_2	1-hour **b**/	29.7	0.7	30.4	196.5

Table 4.11-22
Air-Dispersion Modeling Results for GXP Compressor Stations Compared to NAAQS

Pollutant	Averaging Period	Background (µg/m^3)	Facility Impact (µg/m^3)	Facility Impact + Background (µg/m^3)	NAAQS (µg/m^3)
Clifton Junction Compressor Station					
NO_2	1-hour **a**/	77.7	21.0	98.7	188
$PM_{2.5}$	24-hour	18.7	0.7	19.4	35
$PM_{2.5}$	Annual	8.9	0.1	9.0	12
PM_{10}	24-hour	35.0	0.9	35.9	150
CO	1-hour	1,374	33.4	1,407	40,000
CO	8-hour	916	16.2	932	10,000
SO_2	1-hour **b**/	53.2	1.6	54.8	196.5
New Albany Compressor Station					
NO_2	1-hour **a**/	77.1	4.0	81.1	188
$PM_{2.5}$	24-hour	20.3	0.2	20.6	35
$PM_{2.5}$	Annual	9.6	0.0	9.6	12
PM_{10}	24-hour	49.0	0.3	49.3	150
CO	1-hour	1,374	10.1	1,384	40,000
CO	8-hour	916	5.9	922	10,000
SO_2	1-hour **b**/	24.4	0.3	24.7	196.5
Holcomb Compressor Station					
NO_2	1-hour **a**/	77.1	7.1	84.2	188
$PM_{2.5}$	24-hour	20.0	0.4	20.4	35
$PM_{2.5}$	Annual	9.0	0.0	9.1	12
PM_{10}	24-hour	49.0	0.7	49.7	150
CO	1-hour	2,519	18.8	2,537	40,000
CO	8-hour	1,717	14.0	1,731	10,000
SO_2	1-hour **b**/	24.4	0.6	25.0	196.5

a The annual NO_2 NAAQS is 100 µg/m^3 which is below all modeled 1-hour NO_2 maximum values. Therefore any annual estimates would be even less than these maximum hourly estimates.

b The 3-hour SO_2 NAAQS is 1,300 µg/m^3 which is at or below all modeled 1-hour SO_2 maximum values. Therefore 3-hour estimates would be even less than these maximum hourly estimates.

c Pending and new sources at Grayson Compressor Station were modeled for this analysis and results demonstrate cumulative facility impact.

These modeling results demonstrate that the GXP compressor stations would not exceed NAAQS and the project areas would continue to remain protective of human health and public welfare for all listed pollutants.

4.11.1.3.5 Responses to Comments Regarding Air Quality and Health

Commenters expressed concern about exposure to chemicals from the construction and operation of gas compressor stations and the impacts on human health. We address concerns about radon, fugitive gas, and HAPs below.

During public scoping, we received several comments concerning the risk of radon exposure associated with the burning of natural gas sourced from Pennsylvania Marcellus Shale. We have recently evaluated general background information, studies, and literature on radon in natural gas in several past environmental assessments and EISs. These studies include samples taken at well sites, pre-processing, post-processing, and transmission pipelines; and the recent Pennsylvania Department of Environmental Protection (PADEP) Technologically Enhanced Naturally Occurring Radioactive Materials Study Report issued in January 2015 (PADEP, 2015). This PADEP report is consistent with past studies, which identify indoor radon concentrations from naturally occurring sources ranging from 0.0042 picocuries per liter (pCi/L) to 0.13 pCi/L.

In the United States, the EPA has set the indoor action level for radon at 4 pCi/L. If concentrations of radon are high enough to exceed these activity levels, the EPA recommends remedial actions, such as improved ventilation, be implemented to reduce levels below this threshold. Further, the Indoor Radon Abatement Act established the long-term goal that indoor air radon levels be equal to or better than outdoor air radon levels. The average home in the United States has a radon activity level of 1.3 pCi/L, while outdoor levels average approximately 0.4 pCi/L. Indoor radon typically originates from naturally occurring sources rather than from natural gas combustion. Past studies demonstrate that indoor radon concentrations from Pennsylvania Marcellus Shale-sourced gas would remain below the EPA action level and the Indoor Radon Abatement Act long-term goal. Therefore, we conclude that the risk of exposure to radon from natural gas would not be significant.

Other pollutants of concern (from public scoping) include CH_4, formaldehyde, methylene chloride, BTEX (benzene, toluene, ethylbenzene, and xylene) compounds, and chromium. While the term "VOC" can under specific circumstances refer to highly toxic compounds (such as BTEX), VOCs in transmission quality natural gas are limited to butane, propane, pentane, and hexane.

Fugitive gas emissions can occur because of leaks from gas pipeline equipment such as tie-ins, valves, and regulator stations. Fugitive gas can also be emitted from blowdowns at compressor stations. These emissions have been estimated for each GXP compressor station as shown in tables 4.11-14 through 4.11-21. Fugitive emissions from equipment leaks are estimated to be less than 1 tpy for each compressor station. Blowdown emissions are estimated to be in the range of 5 to 7 tpy at each compressor station. These fugitive gas emissions would be pipeline quality gas that is primarily comprised of CH_4, ethane, and propane (hydrocarbons) and not highly toxic compounds. The GXP gas composition is shown below in table 4.11-23. Hexane is the only gas component that is a listed HAP and is present in only trace amounts.

Table 4.11-23 GXP Gas Composition	
Component	**Mole Percent**
Methane	87.9993
Ethane	10.3101
Carbon dioxide	0.5650
Nitrogen	0.5635
Propane	0.4334
n-Butane	0.0515
Isobutane	0.0318
Hexane	0.0217
Isopentane	0.0130
Neopentane	0.0107

Emissions of VOCs and HAPs would also occur as a result of natural gas combustion. Combustion emissions were estimated for each compressor station and are shown in tables 4.11-14 through 4.11-21. The HAP emissions from each compressor station were estimated using emission factors from AP-42 *Chapter 1.4 Natural Gas Combustion* (EPA, 1998b). Some of the pollutant concerns expressed during public scoping, such as chromium and methylene chloride, are not listed in the AP-42 table of speciated organic compounds from natural gas combustion (AP-42 Table 1.4-3). All GXP compressor station emissions are below the major source HAP thresholds (10 tpy for each individual HAP and 25 tpy for combined HAPs). The compressor stations would be considered area sources of HAPs and would be required to meet all applicable NESHAP regulations.

Finally, one commenter raised a concern regarding unpleasant odors being emitted from the Cane Ridge Compressor Station. CH_4, the primary component of natural gas, is colorless, odorless, and tasteless. Columbia Gulf has indicated that odorization would not occur at the Cane Ridge Compressor Station.

4.11.2 Noise

4.11.2.1 Noise Environment

The magnitude and frequency of environmental noise may vary considerably over the course of the day, throughout the week, and across seasons, in part due to changing weather conditions and the effects of seasonal vegetation cover. Two measures that relate the time-varying quality of environmental noise to its known effect to people are the 24-hour equivalent sound level (L_{eq}) and day-night sound level (L_{dn}). The L_{eq} is the level of steady sound with the same total (equivalent) energy as the time-varying sound of interest, averaged over a 24-hour period. The L_{dn} is the L_{eq} plus 10 dBA added to account for people's greater sensitivity to nighttime sound levels (typically considered between the hours of 10:00 p.m. and 7:00 a.m.). The A-weighted scale is used to assess noise impacts because human hearing is less sensitive to low and high frequencies than mid-range frequencies. The human ear's threshold of perception for noise change is

considered 3 A-weighted decibels (dBA); 6 dBA is clearly noticeable to the human ear, and 10 dBA is perceived as a doubling of noise (or halving, if the noise is decreasing).

In 1974, the EPA published *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin on Safety*, which evaluated the effects of environmental noise on public health and welfare (EPA, 1974). In this document, the EPA indicated that an L_{dn} of 55 dBA is the noise threshold that would prevent outdoor activity interference or annoyance from continuous noise. We have adopted this criterion and use it to evaluate potential noise impacts from FERC projects at NSAs such as residences, schools, or hospitals. An L_{dn} of 55 dBA is equivalent to a continuous sound level of 48.6 dBA for facilities that generate constant sound levels.

A list of typical sound levels for common sound sources is presented in table 4.11-24.

Table 4.11-24
Typical Sound Pressure Levels Associated with Common Sound Sources

Sound Pressure Level (dBA)	Subjective Evaluation	Environment	
		Outdoor	Indoor
140	Deafening	Jet aircraft at 75 feet	--
130	Threshold of pain	Jet aircraft during takeoff at a distance of 300 feet	--
120	Threshold of feeling	Elevated train	Hard rock band
110	--	Jet flyover at 1,000 feet	Inside propeller plane
100	Very loud	Power mower, motorcycle at 25 feet, auto horn at 10 feet, crowd sound at football game	--
90	--	Propeller plane flyover at 1,000 feet, noisy urban street	Full symphony or band, food blender, noisy factory
80	Moderately loud	Diesel truck (40 miles per hour) at 50 feet	Inside auto at high speed, garbage disposal, dishwasher
70	Loud	B-757 cabin during flight	Close conversation, vacuum cleaner
60	Moderate	Air-conditioner condenser at 15 feet, near highway traffic	General office
50	Quiet	--	Private office
40	--	Farm field with light breeze, birdcalls	Soft stereo music in residence
30	Very quiet	Quiet residential neighborhood	Inside average residence (without TV and stereo)
20	--	Rustling leaves	Quiet theater, whisper
10	Just audible	--	Human breathing
0	Threshold of hearing	--	--

Sources: Egan, 1988; Ramsey and Sleeper, 1994

4.11.2.2 Mountaineer XPress Project

Construction and operation of the MXP may affect overall noise levels in project activity areas. There are no applicable statewide noise regulations in West Virginia; further, no applicable county or local construction or operation noise ordinances were identified. Therefore, the only applicable threshold for evaluating noise is the 55 dBA L_{dn} adopted by the Commission, as described above.

4.11.2.2.1 Construction Noise Impacts and Mitigation

Noise would be generated during construction of the pipeline and aboveground facilities. In general, the majority of construction noise is minor, temporary, of short duration, and varies considerably from day-to-day as activities progresses along the pipeline corridor. At aboveground facility locations, construction activities could last from several weeks to several months. Generally, nighttime noise is not expected to increase during construction because most construction activities would be limited to daytime hours. An exception to this would be certain HDD activities, which are expected to continue into the nighttime hours and can continue in one area for weeks to months depending on the length of the drill and the hardness of the substrate being drilled. Because of the potential for nighttime construction and for extended time periods with stationary equipment, HDD/Direct Pipe activities have a greater potential for a prolonged noise impact. Columbia Gas proposes to use trenchless methods (i.e., HDD and Direct Pipe) at two locations (the Kanawha River and U.S. Highway 50 crossings, respectively). Columbia Gas performed ambient noise surveys and acoustical assessments of NSAs within 0.5 mile of these two sites to determine background noise levels and the predicted project-generated noise levels at the nearby NSAs.

The results of the Columbia Gas's noise assessments, including the distance and direction of the nearest NSAs from the two sites, the duration of the drilling, and the predicted noise resulting from each activity (with and without implementation of noise mitigation measures) are summarized in table 4.11-25. Additional NSAs are further from each site; the noise impact at these more distant locations would be less than the results presented in table 4.11-25 due to additional noise attenuation with increased distance. The locations of all NSAs within 0.5 mile of the drill entry and exit locations are shown in appendix N-1.

Table 4.11-25
Noise Estimates for the Noise-Sensitive Areas Closest to each MXP Drilling Site

Feature Crossed	Entry or Exit Point	Distance and Direction to NSA (feet and direction)	Estimated Peak L_{dn} due to Drilling (Unmitigated)	Estimated Peak L_{dn} due to Drilling (With Proposed Noise Control Measures)	Ambient L_{dn} (dBA)	Total L_{dn} (Drilling + Ambient) (dBA)	Potential Increase Above Ambient (dB)
Highway 50 (Direct Pipe drilling potentially to take place 24 hours per day for 42 days)							
NSA #1 (Residence)	Entry	550 feet west	54.9	NA	50.7	56.3	5.6
NSA #2 (Residence)	Exit	200 feet west	65.3 **a/**	51.8	62.9	63.2	0.3

Table 4.11-25
Noise Estimates for the Noise-Sensitive Areas Closest to each MXP Drilling Site

Feature Crossed	Entry or Exit Point	Distance and Direction to NSA (feet and direction)	Estimated Peak L_{dn} due to Drilling (Unmitigated)	Estimated Peak L_{dn} due to Drilling (With Proposed Noise Control Measures)	Ambient L_{dn} (dBA)	Total L_{dn} (Drilling + Ambient) (dBA)	Potential Increase Above Ambient (dB)
Kanawha River (HDD drilling potentially to take place 24 hours per day for 56 days)							
NSA #1 (Residence)	Entry	200 feet east	77.3 **a/**	63.3 **a/**	50.1	63.5	13.2
NSA #3 (Residence)	Exit	900 feet southwest	50.9	NA	49.7	53.3	3.6

a Indicates that drill-related noise contribution is an L_{dn} of 55 dBA or greater.
NA = No noise controls required (peak Ldn estimated to be below 55 dBA). L_{dn} = day-night sound level. dBA = A-weighted decibels.

As shown in table 4.11-25, sound from Direct Pipe/HDD drilling operations, with proposed noise control measures where required, would be greater than 55 dBA at two of the NSAs and also would result in potential increase above ambient levels (dB) of at least 3.6 dB at three out of four of the NSAs listed in the table.

Noise mitigation measures that would be employed during construction include checking that the sound muffling devices, which are provided as standard equipment by the construction equipment manufacturer, are kept in good working order. In addition, for drill entry and exit points at which the predicted noise levels at a NSA are greater than 55 dBA L_{dn}, Columbia Gas would install residential-grade exhaust mufflers on engines and install acoustic barriers between the drill site and the affected NSA to mitigate noise impacts. Depending on the equipment used and site layout, Columbia Gas would provide additional noise control treatments as necessary to limit noise from drilling activities. Columbia Gas indicates that even with the additional mitigation measures, noise attributable to the drilling operations for crossing Kanawha River would still be above 55 dBA L_{dn} at the nearest NSA. Alternatively, to mitigate noise impact on the NSA, Columbia Gas indicates it may offer compensation or the option of temporary relocation during nighttime drilling activities. However, we generally prefer that companies make all reasonable efforts to reduce noise as the primary mitigation effort before offering compensation or relocation for effects that cannot be reasonably mitigated. Therefore, **we recommend:**

- **Prior to the construction of the U.S. Highway 50 and Kanawha River crossings, Columbia Gas should file with the Secretary, for the review and written approval by the Director of OEP, a drilling noise mitigation plan to reduce the projected noise level attributable to the proposed drilling operations at nearby NSAs. During drilling operations, Columbia Gas should implement the approved plan, monitor noise levels, and make all reasonable efforts to restrict the noise attributable to the drilling operations to no more than a L_{dn} of 55 dBA at the NSAs.**

Construction of compressor and regulator stations would also generate noise. Construction of these facilities would occur during daylight hours (typically from 7:00 a.m. to 7:00 p.m.). In general, construction activities would be conducted using typical construction equipment (i.e.,

backhoes, bulldozers, cranes, front-end loaders, trucks). Columbia Gas has also stated that controlled blasting could occur if shallow bedrock is encountered during construction activities. Blasting activities would be conducted in accordance with the measures outlined in Columbia Gas' Blasting Plan. In comparison with other construction noise, the sound resulting from blasting would be brief and infrequent.

Table 4.11-26 shows predicted construction noise levels at the nearest NSA for each MXP compressor and regulator station. Increased noise levels during construction would occur for the duration of the construction period, estimated to extend from 9 to 12 months. As the distance between the construction activity and the noise receptor increase, sound levels would decrease. While construction activities could produce noise levels that would be perceptible above ambient noise conditions, the noise increment would be short-term, localized, and limited to daylight hours only.

Table 4.11-26
Calculated Construction Noise Levels at the NSA with Highest Noise Impact for MXP Aboveground Facilities

Compressor Station	Estimated L_{dn} of Peak Construction Noise at NSA (dBA)	Estimated Duration of Construction (months)
Lone Oak Compressor Station	58	9 to 12
Sherwood Compressor Station	48	9 to 12
White Oak Compressor Station	45	9 to 12
Mount Olive Compressor Station	50	9 to 12
Ripley Regulator Station	58	9 to 12
Saunders Regulator Station	46	9 to 12
Ceredo Compressor Station	63	9 to 12
Elk River Compressor Station	62	9 to 12

L_{dn} = day-night sound level
dBA = A-weighted decibels

Because of the temporary nature of construction activities, and our noise recommendation, we conclude that no significant noise impacts are anticipated from construction of the proposed MXP pipelines, compressor stations, and regulator stations.

4.11.2.2.2 Operational Noise Impacts and Mitigation

The new and modified MXP compressor stations would generate noise on a continuous basis (i.e., up to 24 hours per day) when operating, although the pipeline itself is not expected to produce any noise. Noise would also be generated by the operation of the new regulator stations. The noise impact associated with these facilities would be limited to the vicinity of the facilities. The specific operational noise sources associated with these facilities and their estimated impact at the nearest NSAs are described below.

Columbia Gas provided ambient noise surveys and acoustical analyses for the MXP aboveground facilities, including modifications of one existing compressor stations, expansion of one approved and one pending compressor station, construction of three new compressor stations,

and construction of two new regulator stations. The acoustical analyses identified impacts on NSAs within 1 mile of the compressor stations and 0.5 mile of the regulator stations. The distances and directions to the nearest NSAs from the existing, approved, pending, or proposed station buildings are presented in tables 4.11-27 and 4.11-28, respectively. The locations of all NSAs within 1 mile of the compressor and regulator stations are shown in appendix N-1.

Table 4.11-27
Noise Analyses for NSAs Closest to the MXP New, Approved, and Pending Compressor Stations

NSA a/	Distance and Direction to NSA (feet)	Estimated Ambient L_{dn} Before Modification (dBA)	Estimated L_{dn} Attributable to Compressor Station Modification (dBA)	Estimated Total L_{dn} for Modified or New Station (dBA)	Potential Noise Increase (dB)
Approved Lone Oak Compressor Station b/					
NSA #1	1,000 feet W	48.2	44.4	49.7	1.5
NSA #2	1,400 feet NW	45.5	41.1	46.8	1.3
NSA #3	2,100 feet SE to SW	41.9	37.0	43.1	1.2
Sherwood Compressor and Regulator Station					
NSA #1	1,050 feet N	39.7	48.4	48.9	9.2
NSA #2	1,150 feet SSE	42.5	47.4	48.6	6.1
NSA #3	1,550 feet E	45.2	44.2	47.8	2.6
White Oak Compressor Station					
NSA #1	1,250 feet SE	34.2	45.6	45.9	11.7
NSA #2	1,700 feet ESE	34.2	42.1	42.8	8.6
Mount Olive Compressor Station					
NSA #1	950 feet WSW	49.0	50.0	52.5	3.5
NSA #2	1,000 feet W	49.0	49.4	52.2	3.2
NSA #3	1,150 feet SW	49.0	48.0	51.5	2.5
NSA #4	1,050 feet NE	57.5	49.0	58.1	0.6
NSA #5	1,250 feet N	53.6	47.2	54.5	0.9
Existing Ceredo Compressor Station c/					
NSA #1	600 feet SE	73.5	50.3	69.2	-4.3
NSA #1A	850 feet ESE	62.2	47.3	58.1	-9.1
NSA #2	1,000 feet S	62.9	43.8	59.3	-3.6
NSA #3	1,650 feet NNW	57.7	39.2	50.2	-7.5
NSA #4	1,600 feet NE	57.9	40.5	50.6	-7.3
Pending Elk River Compressor Station d/					
NSA #1	700 feet NW	52.3	47.6	53.6	1.3
NSA #2	650 feet ESE	53.6	48.4	54.7	1.1
NSA #3	875 feet NW	50.0	54.4	51.3	1.3
NSA #4	2,050 feet WNW	40.5	36.7	42.0	1.5
NSA #5	1,975 feet NNE	42.2	37.1	43.3	1.2

N, S, E, W = North, South, East, West, respectively.

a NSA #1 north of the Sherwood Compressor Station represents a residence and Doddridge County Park. All other NSAs within 1 mile of the compressor stations are residences.

b The approved Lone Oak station consists of Units 1 – 3; the proposed MXP expansion would add a Unit 4.

Table 4.11-27 Noise Analyses for NSAs Closest to the MXP New, Approved, and Pending Compressor Stations					
NSA a/	Distance and Direction to NSA (feet)	Estimated Ambient L_{dn} Before Modification (dBA)	Estimated L_{dn} Attributable to Compressor Station Modification (dBA)	Estimated Total L_{dn} for Modified or New Station (dBA)	Potential Noise Increase (dB)
c The existing Ceredo station consists of Units 1 – 7 and planned Units 10 – 12. The proposed modification for the MXP would add Units 13 and 14, and the retirement of Unit 9. Modification of this facility is estimated to decrease noise levels at nearby NSAs due to the retirement of Unit 9.					
d The pending Elk River station would consist of Units 1 and 2, and the existing adjacent Cobb Compressor Station. MXP's proposed Elk River expansion would add a Unit 3.					

Table 4.11-28 Noise Analyses for NSAs Closest to the MXP New Regulator Stations					
NSA a/	Distance and Direction to NSA (feet)	Calculated Ambient L_{dn} (dBA)	Estimated L_{dn} for Station at Full Capacity (dBA)	Estimated Total L_{dn} (Station + Ambient) (dBA)	Potential Noise Increase (dB)
Ripley Regulator Station					
NSA #1	750 feet ESE	45.3	43.2	47.4	2.1
NSA #2	1,150 feet NW	51.9	38.5	52.1	0.2
Saunders Creek Regulator Station					
NSA #1	1,600 feet N	40.5	42.6	44.7	4.2
NSA #2	2,000 feet SE	40.1	40.0	43.0	2.9
NSA #3	2,500 feet SW	36.2	37.2	39.8	3.6
N, S, E, W = North, South, East, West, respectively. a All NSAs within 0.5 mile of regulator stations are residences.					

The Lone Oak and Elk River Compressor Stations are approved and pending (respectively) as parts of separate projects, the LXP (Docket No. CP15-514-000) and WBX (Docket No. CP16-038-000), respectively. The MXP expansions of these stations would add a Unit 4 to the three-unit Lone Oak station and a Unit 3 to the two-unit Elk River station. The existing Ceredo Compressor Station would be modified as part of the LXP with the addition of Units 10, 11, and 12. The MXP expansion of the Ceredo station would add Units 13 and 14. The combined noise levels from existing, approved, and pending equipment associated with these stations were estimated in noise impact analysis reports filed for the MXP and available on the MXP public docket.[42]

As shown in tables 4.11-27 and 4.11-28, noise levels from each station (with the exception of the existing Ceredo station) are projected to be below an L_{dn} of 55 dBA. The modifications associated with the Ceredo station are predicted to decrease noise levels at nearby NSAs.

We note that noise attributable to operation of the Sherwood Compressor Station is projected to increase ambient levels at NSA #1 (adjacent to the Doddridge County Park) to 48.9

42 See filing by Columbia Gas dated April 29, 2016, in Docket No. CP16-357; eLibrary accession #20160429-5286(31429033); Resource Report 9, appendix 9G (beginning on page 9G-186).

dBA (see appendix N-1, Sherwood Compressor Station figure 2). While the projected level would meet our 55 dBA L_{dn} standard, a 9.2-dBA increase over present ambient levels would nevertheless be equivalent to almost a doubling of the perceived noise in this quiet rural environment. Comparable increases are also projected to occur at NSAs near the White Oak Compression Station. To minimize station operations noise levels to the extent practical, **we recommend that:**

- **Columbia Gas should make all reasonable efforts to ensure its predicted noise levels from the Sherwood and White Oak Compressor Stations are not exceeded at nearby NSAs, and file noise surveys showing this with the Secretary no later than 60 days after placing these stations in service. However, if the noise attributable to the operation of the Sherwood and White Oak Compressor Stations at full load exceeds an L_{dn} of 55 dBA, at any nearby NSAs, Columbia Gas should file a report on what changes are needed and shall install additional noise controls to meet the level within 1 year of the in-service date. Columbia Gas should demonstrate compliance with this requirement by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.**

Operation of the Mount Olive, Ripley, and Saunders Creek stations would result in a noticeable increase in noise levels, but total noise levels would remain below an L_{dn} of 55 dBA. However, to confirm that the actual noise levels attributable to these facilities are not significant, **we recommend that**:

- **Columbia Gas should file a noise survey with the Secretary no later than 60 days after placing the Mount Olive Compressor Station, and the Ripley and Saunders Creek Regulator Stations in service. If a full-load-condition noise survey of the entire station is not possible, Columbia Gas should instead file an interim survey at the maximum possible horsepower load and file the full-load survey within 6 months. If the noise attributable to the operation of all the equipment at any of these facilities under interim or full-horsepower-load conditions exceeds 55 dBA L_{dn} at any nearby NSAs, Columbia Gas 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. Columbia Gas should confirm compliance with the 55 dBA L_{dn} requirement by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.**

In addition to the operational noise discussed above, pipeline blowdown events would also generate noise impacts at the MLV sites, and station blowdown events would generate noise at the compressor stations. Planned pipeline blowdown events can happen during inspections or maintenance and are conducted on the segment of pipeline between MLVs, requiring a segment of pipeline to be evacuated of natural gas. The duration of a blowdown depends on factors such as the extent of the maintenance activity and the gas pressure, and would generally last between 20 minutes and 2 hours. Estimated noise impacts during these times range between 43 and 49 dBA L_{eq} at the NSA closest to each compressor station. Planned events could allow for slower gas release and be scheduled for daytime hours, thus reducing the noise impacts. Unplanned pipeline blowdowns occur only in emergency situations. Unplanned events could occur at any time, but are typically infrequent and of short duration.

Based on the analyses conducted and our recommendations, we conclude that the MXP would not result in significant noise impacts on residents or the surrounding communities.

4.11.2.3 Gulf XPress Project

Construction and operation of the GXP may affect overall noise levels in the activity areas. No state noise regulations have been identified in Kentucky, Tennessee, or Mississippi that would apply to the GXP during construction or operations. Two county or local noise regulations would apply to construction and operation of components of the GXP: Ordinance 0-07-08-31-1 in Garrard County, Kentucky, would apply to the Paint Lick and Goodluck stations, and Chapter 16.44 of the Code of the Metropolitan Government of Nashville and Davidson County, Tennessee, would apply to the Cane Ridge station. The Garrard County noise ordinance does not provide any specific numerical noise limits. The Metropolitan Government of Nashville and Davidson County code limits noise from industrial noise sources on non-agricultural or industrial land to 65 dBA during daytime (7:00 a.m. to 7:00 p.m.) and 60 dBA during nighttime hours (7:00 p.m. to 7:00 a.m.); this limit is less restrictive than the FERC L_{dn} threshold of 55 dBA.

4.11.2.3.1 Construction Noise Impacts and Mitigation

Noise would be generated during construction of the GXP suction/discharge pipelines and aboveground facilities. In general, construction noise is minor, temporary, of short duration, and varies considerably from day-to-day as activities progress. The GXP does not have any planned HDD drilling operations.

Construction activities at compressor and meter stations would also generate noise. Construction would occur in daylight hours (from 7:00 a.m. to 7:00 p.m.). In general, activities would be conducted using typical construction equipment (i.e., backhoes, bulldozers, cranes, front-end loaders, trucks). In comparison with other construction noise, the sound resulting from blasting would be brief and infrequent.

Table 4.11-29 shows predicted construction noise levels at the nearest NSA for each GXP compressor station. Increased noise levels during construction would occur for the duration of the construction period at each location (estimated to be 10 months). As the distance between the construction activity and the noise receptor increases, sound levels would decrease. While construction activities could produce noise levels that would be perceptible above the ambient noise conditions, the noise increment would be short-term, localized, and limited to daytime hours. To mitigate noise impacts during construction, Columbia Gulf would use effective engine exhaust mufflers; check that engines are properly maintained; and install temporary noise barriers, as necessary, where noise complaints are made.

Table 4.11-29
Calculated Construction Noise Levels at the NSA with Highest Noise Impact for each GXP Compressor Station

Compressor Station – NSA	Estimated L_{dn} of Peak Construction Noise (dBA)	Estimated Duration of Construction (months)
Morehead	47	10
Paint Lick	42	10

Table 4.11-29
Calculated Construction Noise Levels at the NSA with Highest Noise Impact for each GXP Compressor Station

Compressor Station – NSA	Estimated L_{dn} of Peak Construction Noise (dBA)	Estimated Duration of Construction (months)
Goodluck	49	10
Grayson	78 **a**/	10
Cane Ridge	54	10
Clifton Junction	53	10
New Albany	43	10
Holcomb	39	10

a Estimated daytime sound levels for short durations when all construction equipment is working simultaneously during earth moving phase of construction.

During public scoping, we received comments from residents living near the Cane Ridge Compressor Station site regarding impacts from construction-generated noise. Peak daytime noise levels resulting from the construction of the Cane Ridge station are predicted to be 56 dBA L_{eq}, which equates to an L_{dn} of 54 dBA and is below the Metropolitan Government of Nashville and Davidson County daytime and nighttime limits.

Because of the temporary nature of construction activities, we conclude that no significant noise impacts are anticipated from construction of the GXP.

4.11.2.3.2 Operational Noise Impacts and Mitigation

The new and modified compressor stations would generate noise on a continuous basis (i.e., up to 24 hours per day) when operating. Noise would also be generated by operation of the modified meter station. The noise impact associated with these facilities would be limited to the vicinity of the facilities. The specific operational noise sources associated with these facilities and their estimated impact at the nearest NSAs are described below.

Columbia Gulf provided ambient noise surveys and acoustical analyses for the GXP aboveground facilities, including expansion of one approved compressor station, construction of seven new compressor stations, and modification of one existing meter station. The acoustical analyses identified impacts on NSAs within 1 mile of the compressor stations and 0.5 mile of the meter station. The distances and directions to the nearest NSAs from the approved or proposed compressor and meter station buildings are presented in table 4.11-30 and table 4.11-31, respectively. The locations of all NSAs within 1 mile of the compressor stations and 0.5 mile of the regulator stations are provided in the figures provided in appendix N-2.

The Grayson Compressor Station is approved as part of a separate project (RXP, Docket No. CP15-539-000), which was granted a Certificate on January 19, 2017. The expansion associated with the GXP includes the addition of Unit 3 to the approved two-unit Grayson station.

Station noise levels attributable to the RXP are incorporated into the noise impact analysis report filled for the GXP and are available on the Commission's website.[43]

Table 4.11-30
Noise Analyses for NSAs Closest to the GXP New and Approved Compressor Stations

NSA a/	Distance and Direction to NSA (feet)	Ambient L_{dn} (dBA)	Estimated L_{dn} Attributable to Compressor Station (dBA)	Estimated Total L_{dn} (Station + Ambient) (dBA)	Potential Noise Increase over Ambient (dB)
Morehead Compressor Station					
NSA #1	1,150 feet SW	53.4	47.9	54.5	1.1
NSA #2	1,400 feet NW	51.2	46.5	52.5	1.3
Paint Lick Compressor Station					
NSA #1	1,740 feet N	38.5	43.5	44.7	6.2
NSA #2	2,080 feet NW	40.4	41.5	44.0	3.6
NSA #3	1,960 feet NE	39.1	42.2	44.0	4.9
NSA #4	2,430 feet ENE	39.1	39.8	42.5	3.4
NSA #5	2,710 feet W	36.5	38.5	40.6	4.1
Goodluck Compressor Station					
NSA #1	980 feet NE	39.8	48.2	48.8	9.0
NSA #2	1,370 feet W	38.3	44.7	45.6	7.3
NSA #3	1,520 feet S	39.9	43.6	45.2	5.3
Approved Grayson Compressor Station b/					
NSA #1	760 feet SE	60.3	53.3	61.1	0.8
NSA #2	1,450 feet SSW	58.3	33.1	58.3	0.0
NSA #3	3,220 feet SW	59.0	36.8	59.0	0.0
NSA #4	1,580 feet N	51.1	31.3	51.1	0.0
NSA #5	4,000 feet E	52.4	25.9	52.4	0.0
NSA #6	3,400 feet SE	53.0	24.2	53.0	0.0
Cane Ridge Compressor Station					
NSA #1	760 feet W	42.5	50.8	51.4	8.9
NSA #2	690 feet S	44.5	51.7	52.5	8.0
NSA #3	1,550 feet N	42.5	43.5	46.1	3.6
Clifton Junction Compressor Station					
NSA #1	1,760 feet NW	52.1	41.1	52.4	0.3
NSA #2	670 feet SE	51.3	50.9	54.1	2.8
New Albany Compressor Station					
NSA #1	1,660 feet WSW	42.9	42.4	45.7	2.8
NSA #2	1,790 feet E	42.6	41.5	45.1	2.5
Holcomb Compressor Station					
NSA #1	2,770 feet S	49.6	36.8	49.8	0.2
NSA #2	2,750 feet N	39.4	36.9	41.3	1.9

N, S, E, W = North, South, East, West, respectively.

a All NSAs within 1 mile of the compressor stations are residences.

b The Grayson Compressor Station is an approved station. The proposed GXP expansion includes the addition of a single turbine. Ambient L_{dn} includes impacts from the approved two-unit station.

43 See filing by Columbia Gulf dated April 29, 2016, in Docket No. CP16-361; eLibrary accession #20160429-5339(31429480); Resource Report 9, appendix 9D (beginning on page 9D-78).

Table 4.11-31
Noise Analyses for the NSAs Closest to the GXP Existing Meter Station

NSA a/	Distance and Direction to NSA (feet)	Ambient L_{dn} (dBA)	Estimated L_{dn} for Proposed Meter Station (dBA)	Estimated Total L_{dn} (Station + Ambient) (dBA)	Potential Noise Increase (dB)
Leach C Meter Station b/					
NSA #1	300 feet W	46.0	47.8	50.0	4.0
NSA #2	500 feet N	41.4	42.3	44.9	3.5

N, S, E, W = North, South, East, West, respectively.

a All NSAs within 0.5 mile of meter station are residences.

b Modifications to the existing Leach C Meter Station would include a new regulator run with a flow control valve and new flow control valves for the two existing runs; all regulator runs would be installed inside a new regulator building.

As shown in table 4.11-30 and table 4.11-31, noise levels from each compressor and meter station are projected to be below an L_{dn} of 55 dBA. Operation of the Paint Lick, Goodluck, Leach C, and Cane Ridge stations would result in a noticeable increase in noise levels, but total noise levels would remain below our 55 dBA L_{dn} criterion. The increase in noise level at the Cane Ridge compressor station has been an issue of public concern. The predicted noise levels attributable to operation of the Cane Ridge Station at the closest NSA is 45.3 dBA L_{eq}, which is below the Metropolitan Government of Nashville and Davidson County daytime and nighttime limits. However, to confirm that actual noise levels attributable to the GXP compressor and meter stations are not significant, **we recommend that**:

- **Columbia Gulf should file a noise survey with the Secretary no later than 60 days after placing each of the GXP compressor stations in service. If a full-load-condition noise survey of the entire station is not possible, Columbia Gulf should instead file an interim survey at the maximum possible horsepower load and file the full-load survey within 6 months. If noise attributable to operation of all the equipment at any compressor station under interim- or full-horsepower-load conditions, or any meter station, exceeds 55 dBA L_{dn} at any nearby NSAs, Columbia Gulf 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. Columbia Gulf should confirm compliance with the 55 dBA L_{dn} requirement by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.**

In addition to the operational noise discussed above, pipeline blowdown events would also generate noise impacts at the MLV sites, and station blowdown events would generate noise at the compressor stations. Planned pipeline blowdown events can happen during inspections or maintenance and are conducted on the segment of pipeline between MLVs, requiring a segment of pipeline to be evacuated of natural gas. The duration of a blowdown depends on factors such as the extent of the maintenance activity and the gas pressure, and would generally last between 20 minutes and 2 hours. Estimated noise impacts during these times range between 35 and 65 dBA L_{eq} at the NSA closest to each compressor station. Planned events could allow for slower gas release and be scheduled for daytime hours, thus reducing the noise impacts. Unplanned pipeline blowdowns occur only in emergency situations. Unplanned events could occur at any time, but are typically infrequent and of short duration.

Based on the analyses conducted and our recommendation, we conclude that the GXP would not result in significant noise impacts on residents, and the surrounding communities.

4.11.3 Conclusions

4.11.3.1 Air Quality

4.11.3.1.1 Mountaineer XPress Project

Pipeline construction activities move through an area relatively quickly, and therefore construction emissions associated with the MXP pipeline would be intermittent and short-term. Similarly, emissions from the construction of the new and modified compressor stations would be intermittent and short-term. Particulate emissions would be spread over a relatively large area, and the dust control measures described in Columbia Gas' Fugitive Dust Control Plan would help decrease these emissions. Once construction activities in an area are completed, fugitive dust and construction equipment emissions would subside, and the impact on air quality due to construction would go away completely. Further, construction emissions are not estimated to exceed the General Conformity thresholds in areas of degraded air quality. Therefore, we conclude that the project's construction-related impacts would not result in a significant impact on local or regional air quality.

Emissions generated during operation of the pipeline portion of the MXP would be minimal, limited to those from maintenance vehicles and equipment and fugitive emissions. Columbia Gas submitted applications for construction and operation of each compressor station to the WVDEP. All new compressor stations associated with the MXP would require Title V permits for operation. The existing compressor stations would be required to update their Title V permits to include any changes. The White Oak, Lone Oak, Mount Olive, Elk River, and Sherwood Compressor Stations would be minor sources with respect to NSR and would not be subject to PSD permitting. The existing Ceredo Compressor Station is currently a PSD major source, but the changes proposed at this station are below the SER thresholds. All combustion turbines would use the SoLoNO$_X$ technology to reduce NO$_X$ emissions. The emergency engines would meet all NSPS JJJJ emission limits. Minimization of other pollutant emissions would be achieved with the use of natural gas fuel. Modeled impacts at the MXP compressor stations were all below applicable NAAQS standards. As with pipeline operations, any emissions resulting from operation of MXP's compressor stations would not have significant impacts on local or regional air quality. Increases in emissions during the operating phase of the MXP would be minimal and would not have significant impacts on local or regional air quality.

4.11.3.1.2 Gulf XPress Project

Columbia Gulf submitted applications for construction and operation of each compressor station to the appropriate state agencies. All compressor stations associated with the GXP would require Title V permits for operation. All compressor stations associated with the GXP would be minor sources with respect to NSR and would not be subject to PSD permitting. All combustion turbines would use the SoLoNO$_X$ technology to reduce NO$_X$ emissions. The emergency engines will meet all NSPS JJJJ emission limits. Minimization of other pollutant emissions would be achieved with the use of natural gas fuel. Modeled impacts from the GXP compressor stations

were all below applicable standards. Emissions resulting from operation of GXP's compressor stations would not have significant impacts on local or regional air quality.

Commentors expressed concerns about impacts on public health from operation of the new compressor stations. For a station compressing processed, transmission-quality gas using gas-fired turbines, the principal emissions of concern to public health are NO_X. Potential exposures to NO_X and all other criteria air pollutants were evaluated by modeling the proposed modified station's potential to emit and comparing the modeled concentrations to the NAAQS primary standards, which are set by EPA to protect the health of the general population, including sensitive subgroups.

4.11.3.2 Noise

NSAs near the MXP and GXP construction areas may experience an increase in perceptible noise, but the effect would be temporary and local. Noise mitigation measures that would be employed during construction include the use of sound-muffling devices on engines and the installation of barriers between construction activity and NSAs. Generally, nighttime noise would not increase during construction (except for HDD/Direct Pipe activity on the MXP). Proposed mitigation would reduce noise levels from this activity to below 55 dBA L_{dn}. Based on modeled noise levels, our recommendation (for Columbia Gas to develop a noise mitigation plan for the HDD/Direct Pipe construction), and the temporary nature of construction, we conclude that neither the MXP nor the GXP would result in significant noise impacts on residents or the surrounding communities during construction.

Noise impacts would result from operation of the MXP and GXP facilities. None of the proposed facilities would exceed our criterion of 55 dBA L_{dn} (except for the existing Ceredo station). However, the modifications to the Ceredo Compressor Station are predicted to reduce noise levels at nearby NSAs. Noise from planned or unplanned blowdown events could exceed the noise criteria but would be infrequent and of relatively short duration. Based on the analyses conducted, mitigation measures proposed, and our recommendations, we conclude that operation of the MXP and GXP would not result in significant noise impacts on residents or the surrounding communities.

4.12 RELIABILITY AND SAFETY

The transportation of natural gas by pipeline involves some incremental risk to the public due to the potential for an accidental release of natural gas. The greatest hazard is a fire or explosion following a major pipeline rupture.

CH_4, 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. CH_4 has an auto-ignition temperature of 1,000 °F and is flammable at concentrations between 5 and 15 percent in air. An unconfined mixture of CH_4 and air is not explosive; however, it may ignite if there is an ignition source. A flammable concentration within an enclosed space in the presence of an ignition source can explode. It is buoyant at atmospheric temperatures and disperses rapidly in air.

During public scoping for the MXP and GXP, commenters expressed concern related to the safe operating procedures of natural gas facilities in proximity to residences, businesses, and other areas where people may gather. This section of the EIS discusses some of the regulatory requirements for operation of natural gas facilities and measures that the Companies would implement to maintain the facilities in compliance with USDOT requirements.

4.12.1 Safety Standards

The USDOT is mandated to provide pipeline safety under 49 U.S.C. 601. The USDOT's PHMSA administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. PHMSA develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards that set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety.

PHMSA ensures that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the federal, state, and local levels. The USDOT provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing, at a minimum, the federal standards. A state may also act as the USDOT's agent to inspect interstate facilities within its boundaries; however, the USDOT is responsible for enforcement actions. For the MXP and GXP, PHMSA inspectors would perform inspections on interstate natural gas pipeline facilities in West Virginia, Kentucky, Tennessee, and Mississippi.

Under a *Memorandum of Understanding on Natural Gas Transportation Facilities* dated January 15, 1993, between the USDOT and the Commission, the USDOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of the Commission's regulations require that an applicant certify that it would design, install, inspect, test, construct, operate, replace, and maintain the facility for which a Certificate is requested in accordance with federal safety standards and plans for maintenance and inspection, or certify that it has been granted a waiver of the requirements of the safety standards by the USDOT in accordance with section 3(e) of the Natural Gas Pipeline Safety Act. The Commission accepts this certification and does not impose additional safety standards other than USDOT standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum to promptly alert the USDOT. The Memorandum also provides for referring complaints and inquiries made by state and local governments and the general public involving safety matters related to pipelines under the Commission's jurisdiction.

The Commission staff also participates as a member of the USDOT's Technical Pipeline Safety Standards Committee, which determines if proposed safety regulations are reasonable, feasible, and practicable.

The USDOT pipeline standards are published in 49 CFR 190-199. Part 192 specifically addresses the minimum federal safety standards for transportation of natural gas by pipeline.

The pipeline and aboveground facilities associated with the MXP and GXP must be designed, constructed, operated, and maintained in accordance with the USDOT's *Minimum Federal Safety Standards* in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. The USDOT specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion.

The USDOT also defines four area classifications, based on population density near pipeline facilities, and specifies more rigorous safety requirements for populated areas. A 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 fewer than 46 buildings intended for human occupancy.
- **Class 3:** Location with 46 or more buildings intended for human occupancy or where the pipeline lies within 100 yards of any building, or small well-defined outside area occupied by 20 or more people on at least 5 days a week for 10 weeks in any 12-month period.
- **Class 4:** Location where buildings with four or more stories aboveground are prevalent.

Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. For example, 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 (i.e., 10.0 miles in Class 1, 7.5 miles in Class 2, 4.0 miles in Class 3, and 2.5 miles in Class 4 locations). Pipe wall thickness and pipeline design pressures; hydrostatic test pressures; MAOP; inspection and testing of welds; and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas. Class locations for the MXP and GXP have been determined based on the relationship of the pipeline centerline to other nearby structures and manmade features. If a subsequent increase in population density adjacent to the rights-of-way results in a change in class location for the pipelines, the Companies would reduce the MAOP or replace the segment with pipe of sufficient grade and wall thickness, if required to comply with the USDOT requirements for the new class location. Table 4.12-1 summarizes the class locations for the MXP pipeline facilities.

Table 4.12-1 Lengths of Area Classifications Crossed by the MXP Pipeline Facilities			
Facility Name	**Class 1 (miles)**	**Class 2 (miles)**	**Class 3 (miles)**
New Pipeline Facilities			
MXP-100	147.35	8.25	2.55
MXP-200	5.97	0.00	0.00
X59M1 Tie-in	0.00	0.06	0.00
Replacement Pipeline Facilities			
SM-80 Replacement	0.00	0.00	0.24
SM-80 Loop Replacement	0.00	0.00	0.16
The totals shown in this table may not equal the sum of the addends due to rounding.			

Table 4.12-2 summarizes the class locations for the GXP facilities.

Table 4.12-2 Area Classifications for the GXP Facilities	
Compressor Station	**Class Location**
Grayson Compressor Station	Class 1
Leach C Meter Station	Class 2
Morehead Compressor Station	Class 2
Paint Lick Compressor Station	Class 2
Goodluck Compressor Station	Class 1
Cane Ridge Compressor Station	Class 1/Class 3
Clifton Junction Compressor Station	Class 1
New Albany Compressor Station	Class 1
Holcomb Compressor Station	Class 1

The USDOT regulations require operators to develop and follow a written Integrity Management Program (IMP) that contains all the elements described in 49 CFR 192.911 and addresses the risks on each transmission pipeline segment. Specifically, the rule establishes an IMP that applies to all high-consequence areas (HCA).

The USDOT has published rules that define HCAs where a gas pipeline accident could do considerable harm to people and their property and requires an IMP to minimize the potential for an accident. This definition satisfies, in part, the Congressional mandate for the USDOT to prescribe standards that establish criteria for identifying each gas pipeline facility in a high-density population area.

The HCAs may be defined in one of two ways. In the first method, an HCA includes:

- current Class 3 and 4 locations;
- any area in Class 1 or 2 where the potential impact radius[44] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle[45]; or
- any area in Class 1 or 2 where the potential impact circle includes an identified site.

An "identified site" is an outside area or open structure that is occupied by 20 or more persons on at least 50 days in any 12-month period; a building that is occupied by 20 or more persons on at least 5 days a week for any 10 weeks in any 12-month period; or a facility that is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate.

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

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

Once a pipeline operator has determined the HCAs along its pipeline, it must apply the elements of its IMP to those sections of the pipeline within HCAs. The USDOT regulations specify the requirements for the IMP in Subpart O of Part 192, Gas Transmission Pipeline Integrity Management.

Table 4.12-3 lists the HCAs for the MXP-100. HCAs have been determined based on the relationship of the pipeline centerline to other nearby structures and identified sites.

Table 4.12-3
High Consequence Areas Crossed by the MXP Pipeline Facilities

Facility Name	Begin Milepost	End Milepost	Description
MXP-100	24.36	24.78	House Count > 20
	45.50	46.00	Church/Summer Camp
	145.71	148.02	Class 3 Potential Impact Circle
	148.02	148.12	House Count > 20
	160.30	161.87	Class 3 Potential Impact Circle
	162.90	163.01	House Count > 20

Three of the six MXP HCAs are areas with 20 or more buildings intended for human occupancy within the potential impact circle. Two of the remaining three HCAs are current Class 3 locations (included are the Class 1 and Class 2 areas adjacent to the Class 3 areas within the

[44] The potential impact radius is calculated as the product of 0.69 and the square root of the MAOP of the pipeline in pounds per square inch (gauge) multiplied by the square of the pipeline diameter in inches.

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

potential impact radius), and one is an identified site (church/summer camp). No HCAs were identified on the MXP-200 pipeline.

Of the nine compressor stations proposed to be built or modified under the GXP, only the Cane Ridge Compressor Station site includes an HCA based on the class locations presented in table 4.12-2. During public scoping for the Cane Ridge Compressor Station site, there were numerous comments expressing concern about safety from the residents living around the site. As a portion of the compressor station site contains an HCA, the site must meet higher standards for safety including:

- Line Patrol, minimum two times per year. Sites without an HCA require a minimum patrol once per year.
- Leak Survey twice per year. Sites without an HCA require annual leak surveys.
- IMP that meets or exceeds the USDOT regulations, namely, by conducting in-line inspection assessments more frequently. For sections of the compressor station facility where in-line inspection is not possible (i.e., non-piggable), Columbia Gulf would employ Direct Assessment or additional pressure testing. Direct Assessment is defined in USDOT 49 CFR 192.903 as "an integrity assessment method that utilizes a process to evaluate certain threats (i.e., external corrosion, internal corrosion and stress corrosion cracking) to a covered pipeline segment's integrity. The process includes the gathering and integration of risk factor data, indirect examination or analysis to identify areas of suspected corrosion, direct examination of the pipeline in these areas, and post assessment evaluation." In addition, Columbia Gulf would follow any new guidelines and rules that are issued pertaining to inspection of non-piggable piping as they become available.

Additional patrols, surveys, and in-line inspections, and the implementation of a robust IMP are designed to minimize the potential risk associated with the Cane Ridge Compressor Station to the surrounding community by identifying and repairing hazard factors before an incident occurs.

The pipeline and aboveground facilities, including the compressor stations and associated discharge and suction piping, would be designed, constructed, operated, and maintained in accordance with the USDOT's Minimum Federal Safety Standards in 49 CFR 192. The general construction methods that Columbia Gas and Columbia Gulf would implement to ensure the safety of the projects are described in section 2.4.1.

The USDOT prescribes the minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities. Each pipeline operator is required to establish an emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency. Key elements of the plan include procedures for:

- receiving, identifying, and classifying emergency events, gas leakage, fires, explosions, and natural disasters;
- establishing and maintaining communications with local fire, law enforcement, and public officials, and coordinating emergency response;

- emergency system shutdown and safe restoration of service;
- making personnel, equipment, tools, and materials available at the scene of an emergency; and
- protecting people first and then property, and making them safe from actual or potential hazards.

The USDOT also requires pipeline operators place pipeline markers at frequent intervals along the pipeline rights-of-way, such as where a pipeline intersects a street, highway, railway or waterway, and at other prominent points along the route. Pipeline right-of-way markers can help prevent encroachment and excavation-related damage to pipelines. Because the pipeline right-of-way is much wider than the pipeline itself, and a pipeline can be located anywhere within the right-of-way, state laws require excavators to call their state One-Call center well in advance of digging to locate underground utilities and ensure it is safe for the contractor to dig in that location.

Pipeline markers identifying the owner of the pipe and a 24-hour telephone number would be placed for "line of sight" visibility along the entire pipeline length, except in active agricultural crop locations and in waterbodies, in accordance with USDOT requirements.

In accordance with USDOT regulations, the proposed facilities would be regularly inspected for leakage as part of scheduled operations and maintenance, including:

- utilizing in-line inspection tools both inside and outside HCAs;
- physically walking and inspecting the pipeline corridor periodically;
- conducting fly-over inspections of the right-of-way as required;
- inspecting and maintaining MLVs and meter stations; and
- conducting leak surveys at least once every calendar year or as required by regulations.

During inspections, Columbia Gas employees would look for signs of unusual activity on the rights-of-way and would immediately respond to assess the nature of the activity and prescribed corrective action.

Cathodic protection[46] would be installed along the entire length of the new pipelines to prevent corrosion. Columbia Gas personnel would check the voltage and amperage at regular intervals, as well as the pipe-to-soil potentials and rectifiers. In addition, annual surveys would be completed, as described above.

Columbia Gas would install a supervisory control and data acquisition (SCADA) system that allows it to monitor pipeline flows and pressures at various points along the system. The SCADA system would permit remote closing of MLVs in the event of an incident along the pipeline system and would utilize a combination of radio and/or satellite communications to transmit data from the pipelines to Columbia Gas' current gas control center in Charleston, West

[46] Cathodic protection is a technique to reduce corrosion (rust) of the natural gas pipeline that includes the use of an induced current and/or a sacrificial anode that corrodes preferentially.

Virginia. The SCADA system would be monitored by gas control technicians on duty 24 hours a day, 365 days a year. If unexpected pressure changes were noted that indicated the possibility of a leak, the gas controller on duty would either shut in the pipeline MLVs upstream and downstream of the apparent leak and/or dispatch field technicians to investigate the pressure change.

In addition, Columbia Gas' and Columbia Gulf's facilities include many equipment features that are designed to increase the overall safety of the system and protect the public from a potential system failure due to accidents or incidents beyond the Companies' control. 49 CFR 192 specifies that compressor stations must have an emergency shutdown system that can be manually operated from at least two points. In addition to manual shutdown points, the compressor stations would be equipped with a full range of automatic emergency detection and shutdown systems, including hazardous gas and fire detection alarm systems. These safety and emergency systems would be monitored on a 24-hour basis by the Companies' SCADA system and local control systems.

The Companies have facility construction crews available to respond in the event of an emergency. The Companies employ qualified and licensed personnel who could be immediately dispatched to the scene of an emergency should the need arise. Accordingly, the Companies also operate area and sub-area offices along the pipeline routes, and personnel from these offices could provide the appropriate response to emergencies and direct safety operations as necessary.

Safety standards specified in Part 192 require that each operator establish and maintain liaison with appropriate fire, law enforcement, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency, and to coordinate mutual assistance in responding to emergencies. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. The Companies would utilize the emergency procedures contained in their respective Emergency Operating Procedures Manual, which requires communication with emergency responders on an annual basis. Local contact phone numbers, external contact information, equipment or resources available for mobilization, and any specific procedures to be followed for the projects would be incorporated into the Emergency Operating Procedures Manual prior to commencement of pipeline operations.

Both Columbia Gas and Columbia Gulf would establish and maintain liaison with appropriate fire, law enforcement, and public officials in a variety of ways. Annual communications from both companies to officials in their respective areas of operation would include the following information:

- the potential hazards associated with Columbia Gas/Gulf facilities located in their service areas and prevention measures undertaken;
- the types of emergencies that could potentially occur on or near their respective facilities;
- the purpose of pipeline markers and the information contained on them;
- pipeline location information and the availability of the National Pipeline Mapping System;

- recognition of and response to pipeline emergencies; and
- procedures to contact Columbia Gas/Gulf for more information.

Both Companies' communications with local emergency responders may involve individual meetings, group meetings, or direct mailings. In addition, each company would perform periodic emergency exercises and mock emergency drills with local government, law enforcement, and emergency response agencies, subject to agency availability and willingness to participate.

Columbia Gas and Columbia Gulf would coordinate mutual response through the use of their respective Incident Command System that would be used by all emergency responders. Both Companies would train their personnel on this system to understand their roles and responsibilities within the Incident Command System structure.

4.12.2 Pipeline Accident Data

The USDOT requires all operators of natural gas transmission pipelines to notify the National Response Center at the earliest practicable moment following the discovery of an incident and to submit a report within 30 days to PHMSA. Significant incidents are defined as any leaks that:

- cause a death or personal injury requiring hospitalization;
- involve property damage, including cost of gas lost, of more than $50,000, in 1984 dollars[47];
- release 5 barrels or more of highly volatile liquid or other liquid releases of 50 barrels or more; or
- result in an unintentional fire or explosion.

During the 20-year period from 1996 through 2015, a total of 1,314 significant incidents were reported on the more than 300,000 total miles of natural gas transmission pipelines nationwide.

Additional insight into the nature of service incidents may be found by examining the primary factors that caused the failures. Table 4.12-4 provides a distribution of the causal factors as well as the number of each incident by cause from 1996 to 2015.

Table 4.12-4
Natural Gas Transmission Pipeline Significant Incidents by Cause (1996-2015) a/

Cause	Number of Incidents	Percentage
Corrosion	311	23.7
Excavation b/	210	16.0
Pipeline material, weld, or equipment failure	359	27.3
Natural force damage	146	11.1
Outside force c/	84	6.4

47 $50,000 in 1984 dollars is approximately $115,609 in 2016 (BLS, 2016).

Table 4.12-4 Natural Gas Transmission Pipeline Significant Incidents by Cause (1996-2015) a/		
Cause	**Number of Incidents**	**Percentage**
Incorrect operation	42	3.2
All other causes **d**/	162	12.3
Total	**1,314**	**100.0**

Source: USDOT, 2016

a All data gathered from PHMSA Serious Incident files, June 29, 2016.
b Includes third-party damage.
c Fire, explosion, vehicle damage, previous damage, intentional damage.
d Miscellaneous causes or other unknown causes.

We received public comments regarding concerns with the possibility of a pipeline rupture near homes. The dominant causes of pipeline incidents from 1996 to 2015 were corrosion and pipeline material, weld, or equipment failure, constituting 51.0 percent of all significant incidents. The pipelines included in the data set in table 4.12-5 vary widely in terms of age, diameter, and level of corrosion control. Each variable influences the incident frequency that may be expected for a specific segment of pipeline.

The frequency of significant incidents is strongly dependent on pipeline age. Older pipelines have a higher frequency of corrosion incidents because corrosion is a time-dependent process. Jones et al. (1986) compared reported incidents with the presence or absence of cathodic protection and protective coatings. The results of that study, summarized in table 4.12-5, indicated that corrosion control was effective in reducing the incidence of failures caused by external corrosion. The use of both an external protective coating and a cathodic protection system, required on all pipelines installed after July 1971, significantly reduces the corrosion rate compared to unprotected or partially protected pipe. The data also indicate that cathodically protected pipe without a protective coating actually has a higher corrosion rate than unprotected pipe. This anomaly reflects the retrofitting of cathodic protection to actively corroding spots on pipes.

Table 4.12-5 Incidents Caused by External Corrosion and Level of Protection (1970 through June 1984)	
Corrosion Control	**Incidents per 1,000 Miles per Year**
None – bare pipe	0.42
Cathodic protection only	0.97
Coated only	0.40
Coated and cathodic protection	0.11

Source: Jones et al., 1986

Outside force, excavation, and natural forces were the cause in 33.5 percent of significant pipeline incidents from 1996 to 2015. These result from the encroachment of mechanical equipment such as bulldozers and backhoes; earth movements due to soil settlement, washouts, or geological hazards; weather effects such as winds, storms, and thermal strains; and willful damage. Table 4.12-6 provides a breakdown of outside force incidents by cause.

Table 4.12-6
Outside Forces Incidents by Cause (1996-2015) a/

Cause	Number of Incidents	Percent of All Incidents
Third party excavation damage	172	13.1
Operator excavation damage	25	1.9
Unspecified excavation damage	4	0.3
Previous damage	9	0.7
Heavy rain/floods	74	5.6
Earth movement	32	2.4
Lightning	8	0.6
Temperature	9	0.7
High winds	10	0.8
Unspecified/other natural force	13	1.0
Vehicle (not engaged with excavation)	49	3.7
Fire/explosion	9	0.7
Previous mechanical damage	6	0.5
Fishing or maritime activity	7	0.5
Maritime equipment or vessel adrift	2	0.2
Intentional damage	1	<0.1
Electrical arcing from other equipment/facility	1	<0.1
Unspecified/other outside force	9	0.7
Total	**440**	**33.5**

Source: USDOT, 2016
a Excavation, Outside Force, and Natural Force from table 4.12-5.

Since 1982, operators have been required to participate in "One Call" public utility programs in populated areas to minimize unauthorized excavation activities near pipelines. The One Call program is a service used by public utilities and some private sector companies (e.g., oil pipelines and cable television) to provide preconstruction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts.

4.12.3 Impact on Public Safety

The service incident data summarized in table 4.12-4 include pipeline failures of all magnitudes with widely varying consequences. Table 4.12-7 presents the incident-caused injuries and fatalities between 2006 and 2015. The data have been separated into employees and non-employees to better identify the impact on the general public.

Table 4.12-7
Injuries and Fatalities – Natural Gas Transmission Pipelines a/

Year	Injuries		Fatalities	
	Employees	Public	Employees	Public
2006	2	1	2	1
2007	6	1	1	1
2008	3	2	0	0
2009	4	7	0	0
2010 b/	3	58	0	10
2011	1	0	0	0
2012	1	6	0	0
2013	0	2	0	0
2014	1	0	1	0
2015	1	13	4	2

Source: USDOT, 2016

a All data, unless otherwise noted, gathered from PHMSA Serious Consequences files, June 29, 2016.

b The National Transportation Safety Board Pipeline Accident Report for the Pacific Gas and Electric Company Natural Gas Transmission Pipeline Rupture and Fire, San Bruno, California, September 9, 2010 states that "As a result of the pipeline rupture and fire, 8 people were killed, 10 people sustained serious injuries, and 48 people sustained minor injuries," August 30, 2011.

Most fatalities from natural gas pipeline incidents are associated with local distribution pipelines. These pipelines are not regulated by the Commission; they distribute natural gas to homes and businesses after transportation through interstate transmission pipelines. In general, these distribution lines are smaller-diameter pipes and/or plastic pipes that are more susceptible to damage. In addition, local distribution systems do not have large rights-of-way and pipeline markers common to FERC-regulated interstate natural gas transmission pipelines. The proposed MXP pipelines evaluated in this document would be FERC-regulated.

The nationwide totals of accidental fatalities from various anthropogenic and natural hazards are listed in table 4.12-8; this information provides a relative measure of the industry-wide safety of natural gas transmission pipelines. Direct comparisons between accident categories should be made cautiously, however, because individual exposures to hazards are not uniform among all categories. Furthermore, the fatality rate is much lower than the fatalities from natural hazards such as lightning, tornados, floods, earthquakes, etc.

Table 4.12-8
Nationwide Accidental Deaths in 2014 a/

Type of Accident	Annual No. of Deaths
Motor vehicle	35,398
Poisoning	42,032
Falls	31,959
Drowning	3,406
Fire, smoke inhalation, burns	2,701
Other unintentional injuries	20,557
Floods b/	40

Table 4.12-8
Nationwide Accidental Deaths in 2014 a/

Type of Accident	Annual No. of Deaths
Lightning b/	26
Tornado b/	47
Natural gas distribution lines c/	18
Natural gas transmission pipelines c/	1

a All data, unless otherwise noted, reflect preliminary 2014 statistics from: U.S. Department of Health and Human Services, CDC, National Center of Health Statistics, National Vital Statistics System, 2016.
b U.S. Department of Commerce, NOAA, National Weather Service, 2016.
c USDOT, 2016.

4.12.4 Conclusion

The available data show that natural gas transmission pipelines continue to be a safe, reliable means of energy transportation. From 2006 to 2015, the rate of total fatalities for the nationwide natural gas transmission lines in service was less than 0.01 per year per 1,000 miles of pipeline. Using this rate, constructing a 171-mile-long pipeline system might result in a fatality (either an industry employee or a member of the public) on the pipeline every 606 years. The operation of the MXP and GXP would represent only a very slight increase in risk to the nearby public.

4.13 CUMULATIVE IMPACTS

4.13.1 Projects and Activities Considered

The MXP would be in western West Virginia, largely along a new 164-mile-long pipeline corridor, and includes the construction of three new compressor stations. In addition, it includes a 6-mile-long lateral pipeline, a short (about 300 feet) section of pipe installed for a tie-in, activities at three discrete compressor stations (distinct from the MXP pipeline corridor), and a short section of pipeline replacement along Columbia Gas' existing system (also distinct from the pipeline corridor).

The GXP includes seven new compressor station sites along Columbia Gulf's existing system in Kentucky, Tennessee, and Mississippi, and modifications to two existing facilities in Kentucky. Activities at all nine locations would be discrete and localized. The Companies propose to begin construction in October 2017, with both projects in service by November 2018; although these dates are just estimates at this point.

In accordance with NEPA, we considered the cumulative impacts of the MXP and GXP and other projects or actions in the area of each. As defined by the CEQ, a cumulative effect is the impact on the environment that results from the incremental impact of the proposed action when added to other past, present, or reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions (CEQ, 1997). Although the individual impact of each separate project may be minor, the additive or synergistic effects of multiple projects could

be significant. This cumulative impacts analysis includes other actions meeting the following three criteria:

- the action impacts a resource that is also potentially affected by the MXP or GXP;
- the action causes the impacts within all or part of the same geographic scope as the MXP or GXP; and
- the action causes this impact within all or part of the temporal scope for the potential impacts from the MXP or GXP.

As described in previous sections of this EIS, construction and operation of the MXP and GXP would temporarily and permanently affect the environment, with most (but not all) impacts generally localized and minimal. The MXP would result in impacts on geological resources, soils, wetlands, water resources, vegetation, wildlife habitat, special status species, some land uses, recreational and visual resources, socioeconomics, air quality, noise, and climate change. The GXP would result in impacts on a much smaller range of resources because of its limited scope. Impacts include soils, vegetation, some land uses, visual resources, air quality, noise, and climate change. Nevertheless, throughout the individual resource discussions in this EIS, we have determined that the MXP and GXP would have only minimal, generally localized, and temporary impacts on these resources, with the exception of the MXP's long-term impacts on upland forested areas (in particular, CFAs and interior forest habitat) and habitat-related impacts on the cerulean warbler. Based on the minimization and mitigation measures described in the projects' respective ECS and SPCC Plan and other specialized plans including blasting plans, CPG's MSHCP, and adherence to our recommendations, we find that most of the impacts would be largely limited to areas of disturbance associated with the MXP rights-of-way, and both projects' construction workspaces and adjacent areas.

We recognize that oil and natural gas exploration and production activities are ubiquitous in many of the counties crossed by the MXP. Oil and natural gas exploration activities include improvement or construction of roads, preparation of a well pad, drilling and completion of wells, and construction of gathering systems and consequent rights-of-way. We have not examined the impacts associated with these activities to the same extent as the other projects identified in table 4.13-2 because the status, scale, and timing of these facilities are unknown. Construction associated with these developments would be similar to natural gas transmission facilities, although land requirements would typically be less, due to smaller diameter pipes and a more localized extent of activities. WVDEP's Office of Oil and Gas provides regulatory authority over these activities. The Office of Oil and Gas requires BMPs for the construction and operation of oil and gas production facilities as part of its permitting process. The BMPs are similar to those proposed by Columbia Gas and Columbia Gulf to minimize erosion and sedimentation, and impacts on wetlands, waterbodies, and other natural resources.

For other resources, the contribution of regional cumulative impacts is lessened by the expected recovery of ecosystem function. For example, vegetation communities would be cleared, but restoration would proceed immediately following construction. Additionally, we determined that certain air quality and noise impacts would be temporary during construction, but operational impacts on these resources would last for the life of the projects. All cultural resources identified in areas to be disturbed by either project would be avoided through routing or other mitigations

(e.g., HDD); because neither project would have an adverse impact on cultural resources, there would be no cumulative impact associated with cultural resources.

Table 4.13-1 summarizes the resource-specific geographic boundaries that were considered in this analysis and justification for each. Actions located outside these boundaries are generally not evaluated because their potential to contribute to a cumulative impact diminishes with increasing distance from the MXP and GXP.

Table 4.13-1
Resource-Specific Geographic Regions for Determining Cumulative Impacts of the MXP and GXP

Resource(s)	Cumulative Impact Geographic Scope	Justification for Geographic Scope
Geological resources and soils	For geological resources, the area of disturbance of the MXP and GXP and other projects would be overlapping or immediately abutting one another, and involve excavation. Potential soils impact would be limited to within 0.25 mile of the MXP and/or GXP workspaces.	Impacts on geological resources and soils would be highly localized and primarily limited to the respective project footprints during active construction. Cumulative impacts would only occur if other geographically overlapping or abutting projects were constructed at the same time as the MXP/GXP.
Surface water, groundwater and aquatic resources	HUC-12 sub-watershed boundary. (Note: Does not apply to GXP because of the limited scope of the disturbance associated with the new compressor stations; only ponds and ephemeral streams within the station site boundaries would be affected.)	Impacts on surface waters can result in downstream contamination or turbidity; therefore, the geographic scope used to assess cumulative impacts on water and aquatic resources includes the HUC-12 sub-watersheds crossed by the MXP.
Wetlands	HUC-12 watershed boundary for the MXP. For the GXP, it is 0.25 mile due to the limited, mostly zero, impacts on wetlands from GXP facilities.	For similar reasons as above, contributions towards cumulative impact on wetlands were assessed within the HUC-12 sub-watersheds.
Vegetation and wildlife	2 miles from the MXP; 0.5 mile from the GXP. For less-transient species, such as reptiles and amphibians, the geographic scope for both projects will be the area immediately within and abutting the project's construction areas.	Due to the transient nature of wildlife and the rural setting that exists for the majority of the MXP, we considered cumulative impacts on vegetation and wildlife within a 2-mile buffer of the pipeline routes. This allows us to consider impacts on interior forest habitat (and the wildlife therein) at a geographic scope appropriate for these resources (i.e., impacts can extend farther than just project footprint or abutting locations). Given the limited scope of the GXP, 0.5 mile was deemed appropriate.
Cultural resources	The area of potential effect of the MXP/GXP and other projects would be overlapping or immediately abutting one another and involve excavation, or within the viewshed.	Impacts on cultural resources would not occur as a result of the MXP or GXP; therefore, the projects would not contribute to a cumulative impact on cultural resources.
Land use and special interest areas	0.5 mile from the project areas.	MXP/GXP impacts on general land uses would be restricted to the construction workspaces and the immediate surrounding vicinity; therefore, the geographic scope for land use and recreation is 0.5 mile from the centerline of the MXP rights-of-way or the MXP and GXP aboveground facility sites.

Table 4.13-1
Resource-Specific Geographic Regions for Determining Cumulative Impacts of the MXP and GXP

Resource(s)	Cumulative Impact Geographic Scope	Justification for Geographic Scope
Visual resources	Viewshed varies based on topography and vegetation.	The geographic scope for assessing cumulative impacts on a viewshed includes the surrounding area from where a new facility would be visible. Therefore, the geographic scope would be limited to areas where clearing of mature trees or installation of new aboveground facilities would occur. We considered a distance of approximately 500 feet; however, that distance could be greater depending on surrounding topography.
Socioeconomics	Affected county.	Due to both projects' limited regional scope and relative short construction duration, the geographic area for assessing contributions to cumulative impact on socioeconomics, including traffic-related impacts, was evaluated on a county-wide basis.
Air quality – construction	0.25 mile from the project.	Due to the limited amount of emissions generated by construction equipment, the geographic scope used to assess potential cumulative impacts on air from construction activities was set at 0.25 mile from the MXP/GXP areas.
Air quality – operation	Air emission sources within a 31-mile (50-kilometer) radius of proposed sources of operational emissions such as gas-fired compressor stations	The geographic scope adopted the distance used by the EPA for cumulative modeling of large PSD sources during permitting and following 40 CFR 51, appendix W, section 4.1. We consider this a conservative geographic scope for the purpose of identifying other projects which could contribute to a cumulative impact on air quality.
Noise	NSAs that could be affected during construction and operation; up to 0.25 mile during construction and up to 1 mile during operation.	The geographic scope for assessing potential cumulative impacts on noise was determined to be areas within the immediate proximity of the construction activities (0.25 mile) and somewhat wider for compressor station operation (closest NSAs within about a 1-mile radius); if other projects would also affect these same NSAs.

Tables 4.13-2 and 4.13-3 identify past, present, and reasonably foreseeable future projects or actions that are being constructed or may be constructed within the geographic scope of each resource area and may cumulatively or additively impact resources that would be affected by the construction and/or operation of the MXP and GXP, respectively. These other projects and actions were identified through conversations with local planning and zoning officials, publicly available information, and aerial and satellite imagery.

The temporal scope for cumulative actions includes past, present, and reasonably foreseeable projects and actions where the duration of time for construction, operation, and/or restoration overlaps with the timeframe for construction, operation, and restoration of the MXP and GXP. Construction is expected to start, for both MXP and GXP, during the second half of 2017, although this could be delayed based on when required permits may be issued. The MXP and GXP are both tentatively scheduled to be in-service November 2018. Revegetation of the project areas would be considered complete when 80 percent of the disturbed areas have vegetation cover that is consistent with that of the undisturbed vegetative adjacent to the construction areas. For herbaceous vegetation, we estimate it may take up to 3 growing seasons to achieve successful revegetation. For other actions affecting vegetation, the temporal scope for considering

cumulative impacts on herbaceous vegetation, when combined with impacts from the MXP and GXP, would be from the start of clearing until successful revegetation. The temporal scope for cumulative impact on mature forest areas would be considerably longer; perhaps 25 years or more. Because Columbia Gas and Columbia Gulf would implement measures to confine exposed soil to the construction area through use of approved BMPs, the temporal scope for cumulative impact on soils would only extend from the moment soils are exposed during grading until stabilization has been achieved. As both noise and air emissions dissipate almost immediately, the temporal scope for air and noise impacts from construction of the projects is limited to concurrent construction. However, air and noise impacts from operation of the MXP and GXP would continue throughout the lifetime of the projects; thus no temporal scope is used to define a limit of cumulative impacts.

The other actions considered in our cumulative impact analysis may vary from the MXP and GXP in nature, magnitude, and duration. These actions are included based on the likelihood of their impacts occurring within the same geographic and temporal scope as the impacts of the MXP or GXP; i.e., the other actions have recent past, current or ongoing impacts, or are "reasonably foreseeable." The other actions that would be expected to affect similar resources during the same temporal scope as the MXP and GXP were considered further. The anticipated cumulative impacts of the MXP and GXP and these other actions are discussed below, as well as any pertinent mitigation actions.

Table 4.13-2
Past, Present, and Reasonably Foreseeable Future Actions with Potential for Cumulative Impacts when Combined with the Mountaineer XPress Project

Project	Location (County, State)	Description	Status	Location Relative to MXP	Resources with Potential Cumulative Effects
FERC Jurisdictional Projects					
OPEN (Ohio Pipeline Energy Network) Project **a**/	Monroe County, OH	FERC-regulated project consisting of 76 miles of new 30-inch-diameter pipeline, construction of a new compressor station, upgrades to additional compressor stations, and associated pipeline support facilities in Ohio. (FERC Docket No. CP14-68)	Completed; in-service as of November 17, 2015.	OPEN's Colerain Compressor Station is 22.0 miles northeast of the approved Lone Oak Compressor Station	Air (Operation)
Appalachian Gateway Project **a**/	Kanawha, Doddridge, Marshall, and Wetzel Counties, WV	FERC-regulated project consisting of 109 miles of new pipeline and compressor facilities in West Virginia and Pennsylvania. (FERC Docket No. CP10- 448)	Construction and restoration completed in January 2016.	Intersects the MXP at MP 5.0.	Groundwater, Water Resources, Vegetation, Wildlife, Land Use, Visual
Ohio Valley Connector Project **a**/	Marshall and Wetzel Counties, WV	FERC-regulated project consisting of approximately 37 miles of pipeline from Wetzel County, WV to Monroe County, OH. (FERC Docket No. CP15-41)	Construction complete. In-service date of October 1, 2016.	Intersects the MXP at MP 19.2.	Groundwater, Water Resources, Vegetation, Wildlife, Land Use, Visual
Utica Access Project **a**/	Kanawha County, WV	FERC-regulated project consisting of 4.8 miles of new 24-inch-diameter pipeline and associated facilities in Clay and Kanawha Counties, WV. (FERC Docket No. CP15-87)	In-service date of November 1, 2016.	The pipeline crosses within 0.1 mile of the proposed Elk River Compressor Station.	Vegetation, Wildlife, Land Use
Monroe to Cornwell Project **a**/	Doddridge, Kanawha, and Wetzel Counties, WV	FERC-regulated project including modifications to the L.L. Tonkin Compressor Station in Doddridge County (4.5 miles west of MXP MP 46.3); Cornwell Compressor Station in Kanawha County (2.7 miles east of Elk River Compressor Station); and Mockingbird Hill Compressor Station in Wetzel County. (FERC Docket No. CP15-7)	Project began construction in February 2016; completed and placed into service in October 2016.	Mockingbird Hill Compressor Station is 0.8 mile east of MXP MP 25.9, and 21.3 miles from the proposed Sherwood Compressor Station.	Groundwater, Water Resources, Vegetation, Wildlife, Air (operation)
SM80 MAOP Restoration Project **a**/	Wayne County, WV	FERC-regulated project consisting of the abandonment of certain sections of Line SM80 in Wayne County, WV, and upgrading a segment of the line and ancillary facilities to accommodate in-line inspection equipment. (FERC Docket No. CP15-549)	Construction began in February 2017. Anticipated to be complete during the summer of 2017.	About 0.1 mile southwest of the Ceredo Compressor Station.	Vegetation, Wildlife, Land Use

Table 4.13-2
Past, Present, and Reasonably Foreseeable Future Actions with Potential for Cumulative Impacts when Combined with the Mountaineer XPress Project

Project	Location (County, State)	Description	Status	Location Relative to MXP	Resources with Potential Cumulative Effects
Rover Pipeline Project **a**/	Doddridge, Marshall, Tyler, and Wetzel Counties, WV	FERC-regulated project consisting of 830 miles of natural gas pipeline from Pennsylvania and West Virginia to distribution points in Ohio and Michigan. Majorsville Compressor Station. (FERC Docket No. CP15-93)	FERC Order issued on February 2, 2017. Rover anticipates starting construction in February 2017.	Would cross area 10.0 miles north of MXP MP 0.0, and intersects at MP 48.0. Majorsville Compressor Station is 12.4 miles from Lone Oak Compressor Station.	Geological Resources, Soils, Groundwater, Water Resources, Vegetation, Wildlife, Land Use, Socioeconomics, Air (operation), Air & Noise (construction)
Broad Run Expansion Project **a**/	Kanawha County, WV; Madison County, KY and Davidson County, TN	FERC-regulated project includes the construction of two new compressor stations in Kanawha County, WV, one new compressor station in Madison County, KY; and one new compressor station in Davidson County, TN. (FERC Docket No. CP15-77)	Construction scheduled for March 2016 to October 2017, with a proposed in-service date of November 2017.	Rocky Fort and Tyler Mountain Compressor Stations are 20.0 miles east of MXP MP 151 and 17.5 miles south of the Mount Olive Compressor Station, respectively.	Socioeconomics, Air & Noise (operation)
Rayne XPress Expansion Project (RXP) **a**/	Carter, Menifee, and Montgomery Counties, KY	FERC-regulated project consisting of compression facilities, specifically the impacts of the Grayson Compressor Station in Carter County. (FERC Docket No. CP15-539)	FERC Certificate issued January 19, 2017. Construction expected to begin 1st quarter 2017, with an in-service date during 1st quarter of 2018.	The Grayson station is approximately 20.0 miles west of the Ceredo Compressor Station.	Air (operation)
Leach XPress Project (LXP) **a**/	Marshall County, WV	FERC-regulated project consisting of four new natural gas pipelines totaling 160 miles. (FERC Docket No. CP15-514)	FERC Certificate issued January 19, 2017. Construction expected to begin 1st quarter 2017, with an in-service date during 1st quarter of 2018.	The pipelines will intersect in Marshall County, WV, at MXP MP 0. The LXP will establish the Lone Oak Compressor Station (to be expanded by the MXP).	Groundwater, Water Resources, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (operation)

Table 4.13-2
Past, Present, and Reasonably Foreseeable Future Actions with Potential for Cumulative Impacts when Combined with the Mountaineer XPress Project

Project	Location (County, State)	Description	Status	Location Relative to MXP	Resources with Potential Cumulative Effects
WB XPress Project **a**/	Kanawha County, WV	FERC-regulated project consisting of about 30 miles of various diameter pipelines, modifications to seven existing compressor stations, construction of two new compressor stations, and uprating the MAOP on various segments of the Columbia system. (FERC Docket No. CP16-38)	Construction planned to begin in 2017 with an in-service date of late 2018 or early 2019. (The WBX NEPA document and FERC certificate are still in process.)	Project would establish the Elk River Compressor Station (to be expanded by the MXP).	Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (operation)
Gulf XPress Project **a**/	Carter, KY	FERC-regulated project consisting of seven new compressor stations, installing additional compression at the Grayson Compressor Station (Carter County, KY), as well as limited pipeline looping, system modifications, and related facilities. (FERC Docket Number CP16-361; analyzed alongside MXP in this draft EIS)	Application filed in April 2016; construction to begin second half of 2017; anticipated in-service date is November 1, 2018.	The Grayson Compressor Station is about 20.5 miles west of the Ceredo Compressor Station.	Air (operation)
Supply Header Project **a**/	Doddridge and Wetzel Counties, WV	FERC-regulated project comprising approximately 38 miles of pipeline connecting supplies in West Virginia, Ohio, and Pennsylvania to the Atlantic Coast Pipeline. The TL-635 line is almost entirely within 5 miles of the MXP, and TL- 636 is 75 miles away. The project also includes the Burch Ridge Compressor Station and the Mockingbird Hill Compressor Station (FERC Docket No. CP15-555)	Application filed in September 2015; pipeline construction anticipated for 2017-2018; in-service date scheduled for late 2018.	Five miles east and roughly parallels the MXP from MP 25.0 to 50.0. The Mockingbird Hill Compressor Station is 21.3 miles northeast of the Sherwood Compressor Station. The Burch Ridge Compressor Station is 15.0 miles south of the Lone Oak Compressor Station.	Groundwater, Water Resources, Socioeconomics, Air (operation)
Mountain Valley Pipeline Project **a**/	Doddridge and Wetzel Counties, WV	FERC-regulated project consisting of 294 miles of new 42-inch-diameter pipeline extending from northwestern West Virginia to southern Virginia and the Bradshaw Compressor Station (FERC Docket No. CP16-10)	Application filed with FERC in October 2015; targeted in-service date of late 2018.	The pipeline route is 6.5 miles east of MP 5.7 of the MXP-200 pipeline. The Bradshaw Compressor Station is 22.5 miles from the Sherwood Compressor Station.	Groundwater, Water Resources, Socioeconomics, Air (operation)

Table 4.13-2
Past, Present, and Reasonably Foreseeable Future Actions with Potential for Cumulative Impacts when Combined with the Mountaineer XPress Project

Project	Location (County, State)	Description	Status	Location Relative to MXP	Resources with Potential Cumulative Effects
Non-jurisdictional Projects (related to the MXP)					
MarkWest Pipeline	Doddridge County, WV	MarkWest Energy Partners would construct an approximately 2.4-mile-long 26- or 36-inch diameter pipeline from the existing MarkWest Gas Processing Facility to the proposed Columbia Gas Sherwood Compressor Station. Non-jurisdictional facility for the MXP.	Construction anticipated to begin while Sherwood Compressor Station is under construction.	Interconnects with Columbia Gas' proposed Sherwood Compressor Station at approximate MP 50.7.	Geology, Soils, Water Resources, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (construction)
White Oak Electric Power Line	Calhoun County, WV	For serving Columbia Gas' proposed White Oak Compressor Station, Mon Power proposes to install 1,400 feet of new power line, convert a 7.5-mile segment of single phase power line to 3-phase, convert a 2.9-mile segment of 2-phase power line to 3-phase, and potentially upgrade another 2.6 miles of existing 3-phase. Non-jurisdictional facility for MXP.	Construction anticipated to begin while the White Oak Compressor Station is under construction.	Delivers electricity to Columbia Gas' proposed White Oak Compressor Station at approximate MP 82.2.	Soils, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (construction)
Non-FERC Energy Projects					
MarkWest Sherwood Gas Processing Facility Expansion **b**/	Doddridge County, WV	MarkWest Energy Partners, cryogenic gas processing plant	Gas processing plant under construction	Approximately 2.3 miles east of MXP MP 49.0 and 2.5 miles northeast of the Sherwood Compressor Station	Groundwater, Water Resources, Vegetation, Wildlife, Socioeconomics, Air & Noise (operation)
Majorsville, WV, and Clarington, OH, Point of Receipt Facilities **c**/	Marshall County, WV	The locations of the Point of Receipt facilities have not been defined; however, the Majorsville Point of Receipt is planned near the MarkWest Plant, and the other will be located near Clarington, OH.	Estimated construction date of 2016-2017.	Near MXP MP 49.0.	Socioeconomics
Moundsville Power Plant **d**/	Marshall County, WV	Moundsville Power, LLC proposes to construct a 549-megawatt natural-gas-powered electrical generating plant in Marshall County, WV (located approximately 3 miles south of Moundsville, between the Ohio River, SR 2, and the Moundsville Golf Course).	Estimated construction schedule of 2015-2018.	Six miles northwest of MXP MP 0. Approximately 15.0 miles west of the Lone Oak Compressor Station.	Socioeconomics, Air (operation)

Table 4.13-2
Past, Present, and Reasonably Foreseeable Future Actions with Potential for Cumulative Impacts when Combined with the Mountaineer XPress Project

Project	Location (County, State)	Description	Status	Location Relative to MXP	Resources with Potential Cumulative Effects
Southeast Cabell County Area Improvements Project **e**/	Cabell County, WV	American Electric Power's subsidiary Appalachian Power is planning a new 4-mile, 138-kilovolt electric transmission line and a new substation.	Construction kicked off late 2016, with completion at the end of 2017.	Approximately 1.5 miles southeast of MXP MP 162.0	Groundwater, Water Resources, Vegetation, Wildlife, Socioeconomics
All other Projects (roads, bridges, subdivisions, etc.)					
Putnam Business Park **f**/	Putnam County, WV	Business park for light industrial businesses. Construction will occur in three phases. Located in Putnam County between Kanawha River and Route 35 in Frazier's Bottom.	Utility expansions are currently underway. Construction on Phase I began in spring 2016. Phases II and III will be added as contracts are issued. All major grading completed in 2016.	The MXP would cross the property between MPs 146.7 and 147.9.	Geological Resources, Soils, Groundwater, Water Resources, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (construction)
Tanyard Station Plaza **g**/	Cabell County, WV	Commercial real estate development in Barboursville, WV, comprised of 144,000 square feet of retail space, hotels, restaurants, banks, and a gas station. The site is a 50-acre plot at the intersection of U.S. 60 and Big Ben Bowen Highway.	Planned to be open by spring of 2017.	Approximately 2.3 miles north-northwest of the SM80 pipeline replacement.	Socioeconomics
Meighen Bridge Replacement **h**/	Marshall County, WV	Bridge replacement for County Route 7/4 over Fish Creek; associated with WVDOT District 6.	Construction planned for 2016-2017.	Approximately 1.7 miles west of MXP MP 5.9.	Vegetation, Wildlife, Socioeconomics
Antero Sandstrom Facility **i**/	Doddridge County, WV	60,000-barrel-per-day advanced wastewater treatment facility that will allow Antero to treat and reuse flowback and produced water rather than using injection wells for permanent disposal.	Planned to be in service by the end of 2017.	Approximately 9.0 miles west of MXP MP 49.4, 8.8 miles west of the Sherwood Compressor Station, and 22.5 miles northeast of the White Oak Compressor Station.	Socioeconomics, Air (operation)

Table 4.13-2
Past, Present, and Reasonably Foreseeable Future Actions with Potential for Cumulative Impacts when Combined with the Mountaineer XPress Project

Project	Location (County, State)	Description	Status	Location Relative to MXP	Resources with Potential Cumulative Effects
Alexander's Place [j]	Putnam County, WV	A major 101-lot, single-family residential subdivision on the north side of Putnam Business Park Drive, County Route 35/29, 0.48 mile southwest of Route 817, Fraziers Bottom, WV. (See Tax Map 162, parcel 95.)	Still in the planning/permitting phases. Construction is not yet scheduled.	About 4.5 miles northwest of MXP MP 146.3.	Socioeconomics

Sources:
a FERC eLibrary, 2016
b Gas Processing News, 2015
c Columbia Gas Transmission, 2016
d Clutter, Crissy, 2016
e West Virginia Transmission Company, 2016
f West Virginia Development Office, 2016
g Tanyard Station, 2016
h West Virginia Division of Highways, 2016
i Antero Resources, 2016
j Dave Hobba Builder, 2016

Table 4.13-3
Past, Present, and Reasonably Foreseeable Future Actions with Potential for Cumulative Impacts when Combined with the Gulf XPress Project

Project	Location (County, State)	Description	Status	Location Relative to GXP	Resources with Potential Cumulative Effect
FERC Jurisdictional Projects					
Broad Run Expansion Project **a/**	Davidson County, TN	FERC-regulated project consisting of compressor station construction and modifications, specifically the impact of Compressor Station 563. (FERC Docket No. CP-15-77)	Under FERC review. Original schedule had construction beginning in March 2016 with an in-service date of November 2017.	Compressor Station 563 is 24.1 miles northwest of the Cane Ridge Compressor Station site.	Socioeconomics, Air (operation)
Mountaineer XPress Project	Wayne County, WV	Part of the scope includes installing additional compression at the Ceredo Compressor Station (FERC Docket No. CP16-357; analyzed alongside GXP in this DEIS).	Application filed in April 2016; construction to begin second half of 2017; anticipated in-service date is November 1, 2018.	The Ceredo Compressor Station is about 20.5 miles east of the Grayson Compressor Station site.	Air (operation)
Rayne XPress Project **a/**	Carter, Menifee, and Montgomery Counties, KY	FERC-regulated project consisting of the construction and operation of compression facilities, specifically the impacts of the Grayson Compressor Station in Carter County. (FERC Docket No. CP15-539)	FERC Certificate issued January 19, 2017. Construction expected to begin 1st quarter 2017, with an in-service date during 1st quarter of 2018.	The project will establish the Grayson Compressor Station (to be expanded by the GXP).	Soils, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (operation)
Non-jurisdictional Projects (related to the GXP)					
Cane Ridge Electric Power Line	Davidson County, TN	Nashville Electric Service to extend new electric line in to Columbia Gulf's proposed Cane Ridge Compressor Station. Non-jurisdictional facility for the GXP.	Early planning phases. Construction of power line would likely begin once the Cane Ridge Compressor Station is under construction.	Approximately 200 feet in length to connect with the compressor station.	Soils, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (construction)
Clifton Junction Electric Power Line	Wayne County, TN	Tennessee Valley Electric Cooperative to extend electric lines for approximately 3,500 feet in to Columbia Gulf's proposed Clifton Junction Compressor Station. Non-jurisdictional facility for the GXP.	Early planning phases. Construction of power line would likely begin once the Clifton Junction Compressor Station is under construction.	Approximately 3,500 feet in length to connect with the compressor station.	Soils, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (construction)

Table 4.13-3
Past, Present, and Reasonably Foreseeable Future Actions with Potential for Cumulative Impacts when Combined with the Gulf XPress Project

Project	Location (County, State)	Description	Status	Location Relative to GXP	Resources with Potential Cumulative Effect
Goodluck Electric Power Line	Metcalfe County, KY	Tri County Electric Company to extend 380 feet of new electric line in to Columbia Gulf's proposed Goodluck Compressor Station. Non-jurisdictional facility for the GXP.	Early planning phases. Construction of power line would likely begin once the Goodluck Compressor Station is under construction.	Approximately 380 feet in length to serve compressor station.	Soils, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (construction)
All other Projects (roads, bridges, subdivisions, etc.)					
Phase 2 of the Delvin Downs Residential Development **b**/	Davidson County, TN	Additional 27 single-family housing lots to an existing residential subdivision on 9.3 acres.	Major land disturbing impacts complete. Area was graded, streets and curbs installed in 2016. All homes will likely be sold/constructed before GXP begins construction.	Adjacent to the Cane Ridge Compressor Station site.	Land Use, Socioeconomics, Noise (construction)
New County Jail **c**/	Rowan County, KY	Construction of a new 292-bed correctional facility	Currently under construction and expected to be complete in November 2017.	Three miles southeast of the Morehead Compressor Station site.	Socioeconomics
Nashville International Airport Improvements **b**/	Davidson County, TN	Approximately $30 million worth of upgrades to airport facilities.	Under construction. Improvements will continue through 2021.	Six miles north of Cane Ridge Compressor Station site.	Socioeconomics
Morehead State University Improvements **d**/	Rowan County, KY	$300 million in upgrades to existing facilities and construction of new facilities between 2016 and 2020. All upgrades to take place on campus and university-owned land.	Construction kicked-off in 2016 and will be complete in 2020.	Approximately 3.5 miles southeast of the Morehead Compressor Station site.	Socioeconomics
Kentucky State Route 32 Reconstruction **e**/	Rowan County, KY	Reconstruction of Kentucky SR 32 between Ellicottville and Kentucky SR 7.	Plan approved in 2013. No further updates.	Eleven miles east of the Morehead Compressor Station site.	Socioeconomics
Antioch Mixed Use Development **f**/	Davidson County, TN	300 acres mixed-use development including medical offices, commercial use, and general office use.	Construction has begun on this multi-phase project. Completion date is unknown.	Two miles northeast of the Cane Ridge Compressor Station site.	Socioeconomics

Sources:
a FERC eLibrary, 2016.
b The Tennessean, 2016a.
c Rowan County, 2016a.
d Rowan County, 2016b.
e Rowan County, 2016c.
f The Tennessean, 2016b.

4.13.2 Potential Cumulative Impacts of the Proposed Actions

In the following analysis, we discuss the potential cumulative impacts associated with the MXP and the GXP in conjunction with the other projects listed in tables 4.13-2 and 4.13-3.

4.13.2.1 Geological Resources

Construction of the MXP and GXP would require excavation within the project areas, resulting in minor and temporary impacts on geological resources. For the MXP or GXP to contribute to a cumulative impact on geological resources, other projects/actions would need to also involve excavation or significant grading in an area that overlaps or directly abuts the active construction footprint of MXP or GXP (geographic scope) and within the same timeframe (temporal scope).

4.13.2.1.1 Mountaineer XPress Project

The MXP facilities are expected to have a temporary, but direct, impact on near-surface geologic resources. Other projects that require significant excavation would also have temporary, direct impacts on near-surface geologic resources. Because the direct effects of the MXP would be highly localized, cumulative impacts would only be expected if other projects were constructed immediately adjacent to or within the footprint of the MXP.

The main impacts of the MXP on geological resources would result from excavations on steep slopes (areas that are highly susceptible to landslides) and in areas with existing mineral resources (mines, quarries, or oil and gas wells). However, as discussed in section 4.1.5.1, impacts from the MXP on geological conditions are anticipated to be minor and temporary, lasting only during construction.

The following projects listed in table 4.13-2 have potential to result in a cumulative impact on geological resources when combined with minor geological resource impacts resulting from construction of the MXP:

- MarkWest Pipeline where it intersects the MXP MP 50.7 at the Sherwood Compressor Station;
- Putnam Business Park construction near MXP MP 147; and
- Rover Pipeline Project where it intersects the MXP at MP 48.

Of the three projects, both the Rover Pipeline Project and MarkWest Pipeline would involve overlapping construction in an area potentially prone to geologic impact. The worst case would be for the two rights-of-way to intersect on a ridgeline with steep slopes on either side. While some level of cumulative impact is likely in this scenario, we would expect it to be limited to a relatively small area and therefore subject to close monitoring. Further, because both the Rover Pipeline Project and the MXP are regulated by the Commission, both would be required to adhere to strict construction standards and robust mitigation (e.g., see our discussion, including our recommendation, in section 4.1). The MarkWest Pipeline would be held to similar standards for construction of linear facilities on steep slopes through its stormwater permit issued by WVDEP – Division of Water and Waste Management.

Overall, the MXP would result in temporary and minor impacts on existing geological conditions and would not have a significant contribution towards cumulative impact from other past, present, and reasonably foreseeable future projects and actions on geological resources. Ground-disturbing impacts associated with the other projects listed in table 4.13-2 would be highly localized and limited to these projects' footprints. Only the MarkWest Pipeline has the likelihood of sharing a geographic and temporal footprint with the MXP. In the area where the MarkWest Pipeline would connect to the proposed Sherwood Compressor Station, the topography is relatively flat, minimizing the potential for cumulative impact on geological resources.

Although the other two projects may have abutting footprints with the MXP, in order for the MXP to contribute to a cumulative impact on geological resources, construction would need to occur within the same timeframe as these other projects. As currently scheduled, the Rover Pipeline Project's active construction would be completed prior to the start of MXP construction. However, even if the schedules were to overlap, any cumulative effect would be minimal, given the limited intersection of the Rover Project and the MXP, and the FERC-required minimization measures that would be applied to both. Earth moving and any other below-grade construction activities associated with the Putnam Business Park have occurred in a relatively level area and were completed for Phase I in 2016. There are 11 acres of developable property surrounding the MXP MLV-10, which at some point in the future, could undergo construction. These 11 acres have steeper terrain; however, similar to the Phase I areas, this location was previously graded/leveled; therefore it is unlikely that the MXP would contribute to a cumulative impact on geological resources in this area.

4.13.2.1.2 Gulf XPress Project

Impacts from the GXP on geological conditions are anticipated to be localized to the project footprint, minor, temporary, and sustained only during construction. No other past, present, or reasonably foreseeable future projects listed in table 4.13-3 share the geographic and/or temporal scope for cumulative impact on geologic resources with the GXP. Therefore, the GXP would not contribute to cumulative impact on geologic resources.

4.13.2.2 Soils

The MXP and GXP would require grading during construction, which would leave exposed soils vulnerable to erosion and sedimentation. For the MXP or GXP to contribute to cumulative impact on soils, other projects/actions would need to also result in soil exposure within an area that overlaps or directly abuts the active construction footprint (geographic scope) and occurs within the same timeframe (temporal scope) that soils would be exposed. For the MXP, we expanded the geographic scope to 0.25 mile due to steep topography and the potential for some off-right-of-way impacts (e.g., from erosion or run-off).

4.13.2.2.1 Mountaineer XPress Project

Cumulative impact on soils associated with the MXP would be limited primarily to the combined impacts of earth-disturbing projects located within the same geographic scope but also up to 0.25 mile away within the same sub-watershed. The temporal scope for cumulative impact on soils is limited to a window of construction occurring the same time as MXP or construction

recently completed (with final stabilization not yet achieved). While the MXP facilities would have direct impacts on soil resources, the impacts would be minor, localized, and temporary, limited primarily to the period of construction (see our discussion in section 4.2.12.1). The following projects listed in table 4.13-2 have potential to result in a cumulative impact on soils when combined with the minor impacts on soil resources resulting from construction of the MXP:

- MarkWest Pipeline;
- White Oak Electric Power Line;
- Putnam Business Park construction near MXP MP 147; and
- Rover Pipeline Project where it intersects MXP at MP 48.

These four projects may share the same geographic and temporal scope of the MXP. The above-listed projects also would likely require excavation and grading and thus result in temporary, direct impacts on soils. Like the MXP, the duration and effect of impacts on soils from these projects would be minimized by the implementation of erosion controls and restoration measures such as seeding and or planting of vegetation that could establish itself quickly.

Thus, construction of other projects in table 4.13-2, in conjunction with the MXP, could contribute to cumulative impacts on soil resources, but this would be avoided or minimized by Columbia Gas' implementation of its ECS and additional mitigation measures when required by state or federal jurisdictions. Our third-party monitors would be in the field, monitoring active construction on a continuous basis. Additionally, we would regularly inspect the project area, both during and following construction, to verify that erosion and sediment controls were implemented. Similar protocols would be in place for the FERC-jurisdictional Rover Project.

In areas where construction of the other projects occurs concurrently with the MXP, and within the same geographic scope, impacts on soils are anticipated to be minor and temporary during project construction and not anticipated to contribute to long-term or significant impacts (assuming adequate erosion controls and containment measures are implemented on the non-FERC-regulated projects). Impacts also would be minimized assuming mitigation measures are implemented to achieve adequate restoration of disturbed areas. We anticipate that construction and restoration activities as well as operation and maintenance activities for non-FERC-regulated projects would be monitored throughout the process to verify compliance with local and state erosion control and restoration requirements. Consequently, any contribution to a cumulative impact on soil resources from the MXP would likely be minor, temporary, and limited to construction activities only.

4.13.2.2.2 Gulf XPress Project

The GXP would likely result in negligible cumulative impact on soil resources when combined with soil impacts from construction of the following projects (listed in table 4.13-3):

- Goodluck Electric Power Line;
- Cane Ridge Electric Power Line;
- Clifton Junction Electric Power Line; and
- RXP (at the Grayson Compressor Station).

Minimal impacts on soil resources are expected from construction and operation of the GXP and its non-jurisdictional facilities. Additionally, the initial construction of the Grayson Compressor Station, proposed under RXP, would be held to the same level of erosion and sedimentation control standards as the GXP. Application of the measures included in Columbia Gulf's ECS, which would also be applied to the RXP, would minimize the duration and severity of cumulative impact on soils. Additionally, we would regularly visit the project area, both during and following construction, to verify that erosion and sediment controls were implemented. Therefore, the GXP would not have a significant contribution to cumulative soil impacts associated with other past, present, and reasonably foreseeable projects.

4.13.2.3 Water Resources

For the MXP or GXP to contribute to a cumulative impact on groundwater, surface water, wetlands, or aquatic resources, other unrelated projects/actions also must result in impacts on those water resources within the same geographic and temporal scopes. For the MXP, the water resources geographic scope is the Hydraulic Unit Code (HUC)-12 subwatershed where the pipeline facilities associated with the MXP would be installed. Operation of the MXP pipelines would not result in a permanent impact on water resources. Also, neither the MXP nor the GXP would contribute to a cumulative impact on water resources during construction or operation of aboveground facilities.

4.13.2.3.1 Mountaineer XPress Project

MXP pipeline construction activities would occur within the HUC-12 sub-watershed of the 18 waterbodies listed below.

- Grave Creek
- Lower Fish Creek
- Middle Fish Creek
- Upper Fishing Creek
- Little Fishing Creek
- Headwaters McElroy Creek
- Flint Run
- Buckeye Creek
- Meathouse Fork
- Nutter Fork – Middle Island Creek
- Indian Creek
- Hurricane Creek
- Five and Twentymile Creek
- Buffalo Creek – Kanawha River

- Charley Creek – Mud River
- Big Cabell Creek – Mud River
- Neal Run – Little Kanawha River
- Tygart Creek

The following 11 past, present, or reasonably foreseeable future actions/projects are located within the same HUC-12 subwatershed as portions of MXP and would involve ground disturbance or excavation; therefore, they could result in cumulative impacts on groundwater, surface water, wetlands, and/or other aquatic resources:

- Appalachian Gateway Project (where it intersects the MXP at MP 5.0);
- Ohio Valley Connector Project (where it intersects the MXP at MP 19.2);
- Monroe to Cornwell Project (in the area of the MXP MP 0.8);
- Rover Pipeline Project (where it intersects the MXP at MP 48.0);
- LXP (where it intersects the MXP at MP 0.0);
- Supply Header Project (where it parallels five miles east of the MXP between MP 25.0 – 50.0);
- Mountain Valley Pipeline Project (in the area MP 5.7 of the MXP-200 pipeline);
- MarkWest Pipeline;
- MarkWest Sherwood Processing Facility Expansion;
- Southeast Cabell County Area Improvements Project; and
- Putnam Business Park (near MXP MP 146.7 – 147.9).

Groundwater

Impact on groundwater associated with the MXP could occur from the clearing of vegetation, excavation of the pipeline trench and facility foundations, blasting, dewatering of the trench and bore pits, soil mixing and compaction, and hazardous material handling. These impacts would be minimized through the implementation of erosion controls, topsoil segregation, measures to avoid or reduce soil compaction, and revegetation of all disturbed areas contained in Columbia Gas' ESC, as well as through the implementation of measures outlined in Columbia Gas' SPCC Plan and Blasting Plan.

The above-listed projects would result in temporary impacts on groundwater through the processes of excavation, blasting, temporary and permanent removal of vegetation, and any deep drilling operations, and due to being within the defined geographic scope for groundwater, were considered for cumulative impact with the MXP. However, construction of the Appalachian Gateway, Ohio Valley Connector, Monroe to Cornwell, and Putnam Business Park Projects was completed in 2016; therefore, they are outside the temporal scope for cumulative impacts on groundwater when combined with the MXP. The MarkWest Gas Processing Facility Expansion Project will be completed prior to construction beginning on the MXP, so for the same reasons as

above, it is unlikely that MXP, when combined with the facility expansion, would result in a cumulative impact on groundwater.

Depending on the timing for construction of the Rover Pipeline, LXP, Supply Header, Mountain Valley, MarkWest Pipeline, and the Southeast Cabell County Area Improvements Projects, there is a likely potential for the MXP, when combined with these six other projects, to contribute to a minor cumulative impact on groundwater due to excavations, possible blasting, and the permanent removal of mature vegetation within the same HUC-12 subwatershed. Impacts on groundwater from these projects, individually and cumulatively, would not be significant because construction activities (including water withdrawals for hydrostatic testing or other uses) are expected to be conducted in accordance with all applicable state, federal, and local permit requirements. As a result, the MXP would only have a temporary and minor contribution to overall cumulative impacts combined with other past, present, and reasonably foreseeable future projects and actions on groundwater resources.

Surface Water

Construction and operation of the MXP would mainly result in only short-term impacts on surface water resources (see section 4.3). These impacts, such as increased turbidity, would return to baseline levels over a period of days or weeks following construction. Longer-term impacts could also occur until adjacent disturbed areas are stabilized through revegetation. Columbia Gas would minimize these effects by implementing specific waterbody construction and mitigation measures, including temporary and permanent erosion controls contained in its ESC, SPCC Plan, HDD Contingency Plan, and Unanticipated Discovery of Contaminants Plan, and by complying with applicable federal and state permits requirements.

As described above (groundwater), there are six projects within the geographic scope (HUC-12 subwatershed) of the MXP with the likelihood also to occur within the same temporal scope, meaning a cumulative impact on surface waters could occur from one or more of these projects. However, the MXP is most likely to contribute to a cumulative impact on surface water when combined with the Rover Pipeline Project or the LXP. If the Rover Pipeline Project is under construction around the same time as the MXP at MP 48.0, there would be minor cumulative impact on surface waters in this area, specifically to Buckeye Creek, which is less than a mile from this intersection of the two projects. Buckeye Creek (at MP 48.7) is classified as a high quality water (for trout stocking). If the LXP and MXP are constructed within the same temporal scope within the area of MP 0.0, there would be minor cumulative impact on nearby surface waters as well; although no streams in this area are known to hold a special designation.

The above-listed projects would individually result in temporary impacts on surface water mostly through the linear construction activities across streams and temporary erosion and sedimentation of exposed soils. For these reasons, we anticipate that the MXP, when combined with these other projects, would only have a minor and temporary contribution to an overall minor short-term cumulative impact on surface waters.

Wetlands

Impact on wetlands resulting from construction of the MXP would be generally localized and short-term (see discussion in section 4.4.2). Cumulative impacts would only occur in the event multiple projects are constructed immediately before, concurrently, or immediately following the MXP within the same HUC-12 subwatershed.

The 11 other projects listed above could be required by the terms and conditions of their respective CWA section 404 authorization and state permits to provide compensatory mitigation for unavoidable wetland impacts. These other projects would take steps to avoid and minimize wetland impacts through implementing a wetland construction plan, mitigation measures, and BMPs, resulting in only minor impacts on wetlands.

Because Columbia Gas would implement its ESC and SPCC Plan, restore forested and scrub-shrub wetland to pre-construction conditions, and provide compensatory mitigation for unavoidable impacts on wetlands, we conclude that the temporary impact on wetlands from the MXP would only have a minor contribution to overall minor and temporary cumulative impacts on wetlands when combined with the other 11 projects. As with surface water impacts, the greatest possibility of the MXP contributing to even a minor cumulative impact on wetlands is in combination with either the LXP or Rover Pipeline Projects. All FERC-regulated natural gas projects are held to similar robust standards for construction at wetlands and waterbodies, erosion control, and measures for avoiding, containing, and cleanup of hazardous materials. The non-FERC-regulated projects also would be expected to conform with state and local NPDES requirements, at a minimum. Therefore, any cumulative impacts on water resources are expected to be minor.

4.13.2.3.2 Gulf XPress Project

No past, present, or reasonably foreseeable future project have been identified that could contribute to an impact on water resources within the same geographic and temporal scope as the GXP.

4.13.2.4 Vegetation and Wildlife

Construction activities associated with the MXP and GXP would result in temporary and permanent impacts on vegetation and temporary impacts on wildlife. The geographic scope for analyzing a cumulative impact on vegetation and wildlife is 2 miles from the project area for MXP and 0.5 mile for GXP. For the MXP or GXP to contribute to a cumulative impact on vegetation and wildlife, other projects/actions within the appropriate geographic scope would need to also result in impacts on vegetation and wildlife. The temporal scope considered for both projects is from the start of construction activities through 1 year after operation begins when herbaceous vegetation should have become completely reestablished. Shrubs and smaller woody vegetation could take up to about 5 years to recover once stabilization has been achieved; mature forests within temporary workspaces would take much longer to approach preconstruction conditions (20 - 30 years). Also, highly transient wildlife, such as deer, are expected to return to the project areas shortly after construction is completed, in which case 1 year is a conservative estimate for analyzing the temporal scope of cumulative impacts on wildlife.

4.13.2.4.1 Mountaineer XPress Project

The following 14 past, present, and/or reasonably foreseeable future projects are within 2 miles of proposed MXP facilities and may involve construction activities that directly or indirectly affect vegetation and wildlife:

- Appalachian Gateway Project (where it intersects the MXP at MP 5.0);
- Ohio Valley Connector Project (where it intersects the MXP at MP 19.2);
- Utica Access Project (in the vicinity of the MXP Elk River Compressor Station);
- Monroe to Cornwell Project (in the area of the MXP MP 0.8);
- SM80 MAOP Restoration Project (in the vicinity of the MXP Ceredo Compressor Station);
- Rover Pipeline Project (where it intersects the MXP at MP 48.0);
- LXP (where it intersects the MXP at MP 0.0);
- WBX (Elk River Compressor Station);
- MarkWest Pipeline;
- White Oak Electric Power Line;
- Meighen Bridge Replacement;
- Sherwood Processing Facility Expansion;
- Southeast Cabell County Area Improvements Project; and
- Putnam Business Park (near MXP MP 146.7 – 147.9).

The construction activities associated with clearing, grading, removal of vegetation, and the potential for the establishment of invasive plant species occurring during the same geographic and temporal scope can result in cumulative impacts. In addition, changes in these environments can also cause alteration of wildlife habitat, displacement of wildlife, and other secondary effects such as forest fragmentation. To account for both direct and indirect effects of the MXP, the geographic scope includes a 2-mile buffer around the pipelines and related facilities. Much of the impact on vegetation from the MXP would be temporary impacts on herbaceous vegetation. However, there would be long-term impacts on almost 800 acres of forested uplands.

Vegetation

The major upland vegetation cover types affected by the MXP include agricultural lands, open lands, and forest. Throughout construction and operation of the MXP, Columbia Gas would abide by its ECS to minimize impacts on vegetation resources. Columbia Gas' ECS is based off of FERC's Plan and Procedures; and it takes into account the Commission's approved methods for revegetation of areas disturbed during construction. However, as noted in section 4.5.6.1, we concluded that impacts on upland forests, specifically large CFAs, would be significant.

While construction of most of the projects listed above would likely be complete before the construction of the MXP commences; they, along with the MXP would result in both long term

and permanent impacts on vegetation as cleared forested areas in temporary workspaces would take perhaps 20 to 30 years or more to recover and wooded areas within the facility footprints would remain cleared for the lifetime of the facility. Because the long-term recovery time for mature forests to regrow within temporary workspaces, and due to the permanent removal of mature forest areas within CFAs, all of the 14 projects listed above would be constructed within the same temporal scope for cumulative impact on vegetation as the MXP. We expect project proponents would take precautions and implement mitigation measures in accordance with state and federal permit terms and conditions to minimize permanent impacts on vegetation. Ultimately, though, when temporary and permanent forest impacts from the MXP are combined with temporary and permanent forest impacts from the Appalachian Gateway, Ohio Valley Connector, Utica Access, Monroe to Cornwell, Rover Pipeline, LXP, and the WBX Projects, cumulative impacts could be significant.

Wildlife

Similar to vegetation, cumulative effects to wildlife would occur where projects are constructed in the same general time frame and proximity, which could represent permanent or long-term loss of habitat types important to wildlife. Impacts on wildlife resources are related to vegetation, as a loss of vegetation results in the alteration of available habitat and ecosystem structure, which results in the temporary or permanent displacement of wildlife, increased population stress, predation, and mortality of some individuals (see discussion in section 4.6.1.1.1). Columbia Gas would reduce the potential for impacts on wildlife and wildlife habitat from the MXP by minimizing the amount of forested land that would be permanently maintained as rights-of-way, and facilitating successful revegetation. By allowing riparian areas to permanently revegetate across the pipeline rights-of-way at each waterbody crossing, except for a 10-foot-wide corridor centered over the pipeline that would be maintained in an herbaceous state, Columbia Gas would be reducing long-term impacts to the wildlife that rely on riparian area habitats. Further, Columbia Gas would install escape ramps about every 50 feet within the excavated trench to provide a wildlife exit.

Impacts on wildlife resources as a result of the 14 projects listed above would be similar to those associated with the MXP, including temporary displacement and stress on individuals during construction and long-term impacts as a result of the permanent alteration of the landscape, and available habitat, edge effects, and fragmentation of large core forest habitat areas. The pipeline projects that cross through the same subwatershed as the MXP are expected to have similar short-term disturbances on aquatic wildlife, and similar short- and long-term impacts on terrestrial wildlife as a result of maintaining permanent rights-of-way. Potential impacts by other projects on migratory birds would be similar to those described for the MXP. Impacts would include the temporary loss of habitat during initial clearing, prolonged loss of habitat due to the long recovery time for trees to become reestablished in disturbed areas, and the long-term loss of habitat as a result of ongoing maintenance activities. Construction of the Putnam Business Park and Sherwood Processing Facility would include temporary, construction-related impacts, and long-term or permanent displacement of wildlife as a result of the permanent structures and change in land use.

Impacts on large CFAs, particularly those within the temporary and permanent footprints of the Appalachian Gateway, Ohio Valley Connector, Utica Access, Monroe to Cornwell, Rover Pipeline, LXP, and the WBX Projects, where CFAs are large enough to provide suitable habitat

for the cerulean warbler and other forest-dependent migratory birds, that are also classified as Priority 1 species in the SWAP, could be significant on suitable habitat due to cumulative forest fragmentation. We have recommended Columbia Gas prepare a Migratory Bird Plan and consider special mitigation measures for minimizing impacts on large CFAs in the MXP area.

The other FERC-regulated projects listed in table 4.13-2 would be required to implement similar measures and restrictions as the MXP to minimize impacts on wildlife and wildlife habitat. In addition, we expect that any projects constructed in the MXP area would be required to restore some vegetation cover to disturbed areas unless they are covered by buildings or impervious surfaces. Once construction is completed and the area is restored, most wildlife displaced during construction of any of the projects would return to the newly disturbed areas and adjacent, undisturbed habitats. However, we are still evaluating the significance of the MXP on large CFAs that are considered suitable habitat for the cerulean warbler. Without implementation of a Migratory Bird Plan and without special mitigation measures within cerulean warbler habitat, impacts on these habitat areas by MXP in combination with other projects listed above, could be significant.

4.13.2.4.2 Gulf XPress Project

Construction of the GXP would result in impacts on about 191 acres of vegetated lands. This total includes about 163 acres of agricultural land, 17 acres of forested land, and 9 acres of open land. The primary impact from construction and operation would be on agricultural land. Impacts on forested and non-forested vegetation types would be minor, and mitigated through adherence to the measures described in Columbia Gulf's ECS.

There are four past, present, and/or reasonably foreseeable future projects located less than 0.5 mile from proposed GXP facilities that may involve construction activities that directly or indirectly affect vegetation and wildlife: the Grayson Compressor Station associated with the RXP, and three GXP non-jurisdictional power lines (Goodluck, Cane Ridge, and Clifton Junction Compressor Stations power lines). The GXP Grayson Compressor Station modifications would be constructed on a site that would have been previously disturbed by the RXP. The cumulative impact on vegetation and wildlife from the addition of a compressor unit on a previously disturbed area at the approved Grayson Compressor Station, as proposed under GXP, would be negligible.

The new non-jurisdictional power lines for Goodluck, Cane Ridge, and Clifton Junction Compressor Stations would be relatively short at 380 feet, 200 feet, and 3,500 feet, respectively. We anticipate the non-jurisdictional power lines to be sited so that they would require the least amount of tree-clearing as possible while still maintaining a reasonably direct route. Taking into account the short length of the three non-jurisdictional power lines, the minimal tree clearing required for the construction of the compressor stations, and the short duration for construction, cumulative impacts on vegetation and wildlife from the GXP combined with those from the non-jurisdictional power lines, would be noticeable but minor.

4.13.2.5 Threatened and Endangered Species and Other Special Status Species

The species discussed in section 4.7 could potentially be affected by construction and/or operation of other past, present, and reasonably foreseeable future projects occurring within the

same area as the MXP and the GXP. Prior to construction, Columbia Gas and Columbia Gulf, and all projects that have a federal nexus (i.e., receive federal funding or are subject to federal permitting) are required under the ESA to consult with appropriate federal, state, and local agencies to evaluate the types of species that may be found in the area of the projects, identify potential impacts from construction and operation of the projects to any species identified, and implement measures to avoid, minimize, or mitigate impacts on special status species and their habitat. Projects that do not have a federal nexus are also required to comply with the ESA; however, review of these projects is covered under section 10 of the ESA. These projects may not harm or otherwise take a federally listed species unless the project proponent has an incidental take permit issued by the USFWS. Regarding critical habitat, however, private landowners who take actions on their land that do not have a federal nexus are not required to obtain a permit.

Under the ESA, cumulative effects to federally listed species and critical habitat only take into account the effects of future state or private projects, not federal activities that are reasonably expected to occur within the project action area. Cumulative effects, under the ESA, are considered in the agency consultation and effect determinations, and in the development of appropriate mitigation. A project can only be authorized for construction if it complies with section 7 of the ESA, meaning that any impacts (direct, indirect, or cumulative) would not threaten the continued existence of any federally listed species.

4.13.2.5.1 Mountaineer XPress Project

Habitat and population assessments are still ongoing for some identified species within the MXP project area. West Virginia has no state endangered species legislation; therefore, the only species listed as threatened or endangered in the state are those listed as such by the federal government. Therefore, no contribution to cumulative impacts on state-listed species could occur. However, all native freshwater mussels are protected in West Virginia, in addition to the nine federally listed mussel species known to occur in the state.

The USFWS West Virginia Field Office has been working with Columbia Gas since 2015 to address the MXP's potential impacts on federally listed species and their habitats and to develop AMMs for these resources. In a letter to Columbia Gas dated September 8, 2016, the USFWS acknowledged Columbia Gas' ongoing efforts to avoid or mitigate project impacts on the NLEB and Indiana bat, but in the same letter expressed concerns regarding stream crossings and potential adverse effects to the federally endangered snuffbox and clubshell mussels and their habitat. Columbia Gas is working with USFWS and state agencies to develop acceptable plans that would avoid or mitigate impacts on USFWS trust resources. If the MXP is approved, Columbia Gas would implement the AMMs or other approved measures to protect federally protected species. Therefore, it is reasonable to assume the MXP would have a USFWS determination of *no effect* or *not likely to adversely affect* federally protected species before construction begins. However, if it is determined that the MXP would adversely affect a federally listed species, FERC will submit a request for formal consultation to comply with section 7 of the ESA. In response, the USFWS would issue a BO as to whether or not the federal action would likely jeopardize the continued existence of a listed species.

Cumulative impacts on federally listed and other special status species that are discussed in section 4.7 of this EIS could potentially be affected by construction and operation of other

projects occurring within the same area as the MXP. Columbia Gas, as well as the other companies who have constructed, are constructing, or are proposing the projects listed in table 4.13-2 are required to consult with the appropriate federal, state, and local agencies to evaluate plant and animal species that may be found in the area of the projects. Additionally, they are required to identify potential impacts from construction and operation of the projects to any special status species identified, and implement measures to avoid, minimize, or mitigate impacts on those species within the MXP area.

Consultation with the USFWS, pursuant to section 7 of the ESA, is ongoing. We expect all other activities (federal, state, and private) would comply with the ESA, thereby also preventing or appropriately minimizing or mitigating for impacts. Consequently, we conclude that the MXP, in combination with the other projects in the geographic scope, would not contribute significantly to cumulative impacts (under NEPA) nor cumulative effects (under the ESA) to federally listed species. Consequently, until consultations on sensitive mussel species are complete, we conclude some of the other projects, in combination with the MXP, could have a minor cumulative impact on sensitive mussel species.

4.13.2.5.2 Gulf XPress Project

Habitat and population assessments are complete for protected species within the GXP project areas. Based on implementation of the MSHCP, surveys completed to date, projected impacts of the GXP, and proposed mitigation measures, consultation with the USFWS resulted in a determination that the GXP would have either *no effect* or would be *not likely to adversely affect* federally listed species. Columbia Gulf has not completed consultations on the snuffbox mussel, which occurs in Carter County, Kentucky (Grayson Compressor Station). We expect Columbia Gulf will complete informal consultations on this mussel with a determination of *not likely to adversely affect* prior to construction. As such, the GXP would not contribute to cumulative impacts (under NEPA) nor cumulative effects (under the ESA) to federally listed species.

Similarly, with the exception of the 19 Kentucky state-protected birds listed as "consultation still ongoing" in appendix K, of which we expect Columbia Gulf to consult with KDFWR (and receive a no impact conclusion), consultations on all state-listed species that could occur within the project vicinity in Kentucky, Tennessee, and Mississippi are complete. Since the GXP is unlikely to impact state-listed species, it is also unlikely that the GXP would contribute to a cumulative impact on state-listed species.

4.13.2.6 Land Use and Special Interest Areas

Impacts on land use or special interest areas would be confined to the construction workspaces and immediate surrounding areas for both the MXP and GXP. Therefore, the geographic scope for assessing potential cumulative impact on land use was 0.5 mile from the project footprints.

4.13.2.6.1 Mountaineer XPress Project

Construction of the MXP would result in land use impacts on forested land, agricultural land, open land, developed land, open water, and wetlands (see discussion in section 4.8.1.1.1). Many of the land use impacts associated with the MXP would be temporary because most of the

impacted areas would be allowed to revert to prior uses following construction. An exception would be the conversion of forested land to herbaceous cover or developed land uses within the new permanent easements for the pipelines or at the new aboveground facility sites. Overall, the MXP would convert about 800 acres of forest to maintained pipeline easement or developed land for the life of the project. The MXP would likely contribute to minor cumulative impact on some land use types when combined with the following 10 other projects:

- Appalachian Gateway Project (where it intersects the MXP at MP 5.0);
- Ohio Valley Connector Project (where it intersects the MXP at MP 19.2);
- Utica Access Project (in the vicinity of the MXP Elk River Compressor Station);
- SM80 MAOP Restoration Project (in the vicinity of the MXP Ceredo Compressor Station);
- Rover Pipeline Project (where it intersects the MXP at MP 48.0);
- LXP (where it intersects the MXP at MP 0.0);
- WBX (Elk River Compressor Station);
- MarkWest Pipeline;
- White Oak Electric Power Line; and
- Putnam Business Park (near MXP MP 146.7 – 147.9).

The linear transmission projects listed above would be expected to have similar impacts on land use as the MXP, especially on forested lands where tree clearing would result in long-term or permanent effects (see section 4.13.2.4.1). The other projects would still impact land uses in the vicinity (within 0.5 mile) of the MXP including short-term impacts during construction.

Aboveground project components, such as buildings and aboveground facilities, would generally have greater long-term impacts on land uses than would the buried pipeline, where most land use activities would be allowed to resume following construction. Therefore, pipeline facilities typically have only temporary impacts on land use. The majority of long-term or permanent impacts on land use are associated with the prohibition of construction of new structures within the pipeline rights-of-way and the permanent change in land use at aboveground features (compressor and meter stations, MLVs).

Areas where the MXP, combined with one or more of the other projects listed above, would most noticeably contribute to a cumulative impact on land use type (other than forested), specifically to landowners and residences within proximity to MXP, include the Appalachian Gateway and LXP projects. At the MXP MP 5.0, Columbia Gas' pipeline would intersect the Appalachian Gateway Project's pipeline right-of-way, which construction was completed on in 2016. The land use in this immediate area includes approximately 15 acres of agricultural or hayfield. Although landowners were be able to maintain this area in its pre-construction use after construction and restoration was achieved on the Appalachian Gateway Project, the land would again be disturbed (less than 2 years after previous disturbances) by the MXP, which could result in a temporary reduction in crop yield or hay production during construction and possibly within the following growing season. At MP 0.0, where MXP will tie in to LXP near Nixon Ridge, a

residential area exists where there are numerous residents who will experience extended construction traffic (discussed further in section 4.13.2.8.1) and an impact on existing land use due to the conversion of agricultural or hayfield to a small fenced-in tie-in facility, which would result in restrictions on the land use inside the fenceline.

There would also be cumulative impacts on existing residential areas due almost entirely to the presence of MXP's construction vehicles making multiple daily trips for extended periods of time within areas that had recently undergone the same disturbance from other projects. These areas include;

- the intersection of the Ohio Valley Connector pipeline with MP 19.05 of the MXP;
- the neighborhood around the Elk River Compressor Station, due to the recent completion of the Utica Access Project less than 0.1-mile away;
- neighborhoods directly east and southeast of the Ceredo Compressor Station, which will also be exposed to heavy duty vehicles during construction of the SM80 MAOP Restoration Project; and
- the residents along Englands Run near MXP MP 48.0, who were also exposed to construction vehicles during construction of the Rover Pipeline Project, would again have large trucks and equipment traversing along an access road that comes within about 115 feet of their house for an extended period.

Columbia Gas would compensate landowners for any temporary loss or reduction in crop yield or hay production as a result of the MXP; and, because the other projects affecting agricultural/hayfields on these same project were FERC-regulated activities, the other companies were or would be held to the same requirement. Additionally, Columbia Gas (as well as the other FERC-regulated projects) would implement its Environmental Complaint Resolution (discussed in 4.8.1.3.1), which provides landowners with simple directions to follow to notify the appropriate company representatives when an issue has been identified. Under these circumstanced, the MXP, when combined with these other projects, would result in a minor contribution to cumulative impacts on land use.

The Putnam Business Park is the one project in this list that has/will result in a more noticeable and permanent change in land use (from open land/agricultural to light industrial business park). However, where the two projects overlap, the MXP would be a maintained pipeline right-of-way and would not result in a new change in land use because no further tree clearing would be necessary within the area. Therefore, in the area of the Putnam Business Park, the MXP's contribution to cumulative impact of land use would be negligible.

Although the MXP would cross within 0.25 mile of several state and local special interest areas, none of the eight projects within MXP's geographic scope share the same special interest areas; therefore, the MXP would not contribute to a cumulative impact on these areas.

4.13.2.6.2 Gulf XPress Project

The GXP would permanently impact existing land uses by converting about 82 acres of primarily agricultural land to developed land. These impacts on land use from the GXP, when

added to the impacts of RXP (Grayson Compressor Station) and the three non-jurisdictional power lines that would serve Goodluck, Cane Ridge, and Clifton Junction Compressor Stations, which are within the 0.5-mile geographic scope of the GXP, would also affect agricultural land. However, this would not result in significant cumulative impact due to the abundance of agricultural and open land in the surrounding areas, and that farmers are generally compensated for loss of crop production, which is typically limited in scope and duration.

4.13.2.7 Visual Resources

The geographic scope for assessing cumulative impact on visual resources includes the surrounding area (i.e., viewshed) where a new MXP or GXP aboveground facility would be constructed or the immediate area surrounding the pipeline where mature tree clearing would be performed. We considered a distance of approximately 500 feet for this reason; however, that distance could be greater depending on surrounding topography and the scope or extent of the actual viewshed.

4.13.2.7.1 Mountaineer XPress Project

The terrain in the general MXP area is highly mountainous with narrow valleys and extensive tree cover. A visual impact would occur from the pipeline mostly where new tree clearing is required for construction and operation along the right-of-way. The maintained right-of-way would be most noticeable to motorists where the pipeline crosses public roadways and from residences where a natural visual barrier is removed. Depending on the visibility of the surrounding area, the new MXP compressor stations would result in the most noticeable visual impact. When combined with the eight other projects listed below, the MXP would likely result in a minor contribution towards cumulative visual impacts.

- Appalachian Gateway Project (where it intersects the MXP at MP 5.0);
- Ohio Valley Connector Project (where it intersects the MXP at MP 19.2);
- Rover Pipeline Project (where it intersects the MXP at MP 48.0);
- LXP (where it intersects the MXP at MP 0.0);
- WBX (Elk River Compressor Station);
- MarkWest Pipeline;
- White Oak Electric Power Line; and
- Putnam Business Park (near MXP MP 146.7 – 147.9).

The degree of contribution by the MXP to cumulative visual impacts, in conjunction with these other projects, would be highly variable and dependent on the line-of-sight of the observer; the proximity of the projects to one another; the timing of their observation (i.e., winter time when deciduous trees/plants have shed their leaves); and the types of facilities, project sites, or permanent easements being observed. In the area where the Appalachian Gateway Project, Ohio Valley Connector Project, Rover Pipeline Project, LXP, and MarkWest Pipeline abuts the MXP, cumulative visual impacts would be limited to the observer's view of two pipeline easements intersecting. The non-jurisdictional power line that would serve the White Oak Compressor

Station would likely result in additional tree clearing up until the point where it reaches the White Oak fenceline. The additional compression added to the pending Elk River Compressor Station would not result in a noticeable visual change when combined with the aboveground facilities previously installed under the WBX Project. Finally, the addition of a buried pipeline easement within the same viewshed as the Putnam Business Park would also be negligible. Consequently, we conclude that the MXP, in combination with these eight other projects, would have only a very minor cumulative impact on visual resources.

4.13.2.7.2 Gulf XPress Project

The terrain in the general area of the proposed GXP compressor stations consists of rural and agricultural areas. There are two other projects and three non-jurisdictional facilities within the viewshed of GXP's proposed facilities that could result in cumulative impacts on existing viewsheds surrounding the Grayson, Goodluck, Clifton Junction, and Cane Ridge Compressor Station sites:

- RXP (Grayson Compressor Station);
- Goodluck Electric Power Line;
- Clifton Junction Electric Power Line;
- Cane Ridge Electric Power Line; and
- Delvin Downs Phase 2 Expansion (adjacent to Cane Ridge Compressor Station).

The additional compression proposed at the approved Grayson Compressor Station would not result in a noticeable visual change when combined with the aboveground facilities previously installed under the RXP. Therefore, the GXP's contribution to cumulative impact on the viewshed surrounding the Grayson Compressor Station would be negligible.

The Phase 2 expansion of the existing Delvin Downs subdivision and the extension of the power line in to the Cane Ridge Compressor Station would result in a change in the viewshed for residents living nearby. However, any addition of residential housing is consistent with the surrounding residential neighborhood. The change in the viewshed for observers near the Cane Ridge Compressor Station site could be significant if Columbia Gulf did not implement visual screening methods such as planting quick-growing vegetation around the facility boundaries and/or designing the structures to fit the existing agricultural setting. With the implementation of visual screening at the Cane Ridge station, combined with the expansion of an existing residential subdivision, the GXP's contribution to cumulative impact on the viewshed would be noticeable, but not significant.

4.13.2.8 Socioeconomics

Past, present, and reasonably foreseeable future projects and activities could cumulatively impact socioeconomic conditions in the geographic scope for both the MXP and the GXP. The socioeconomic issues considered in the area of the proposed projects were employment and workforce, housing, economy and tax revenues, public services, and transportation. For evaluating cumulative impact on socioeconomics for the MXP and GXP, the geographic scope was the county

because the metrics for assessing the resources that may be affected (population, housing, taxes, etc.) are generally collected at the regional level, and services such as healthcare, education, and public safety are usually provided on a regional basis. The exception is impacts on transportation (or traffic), which has a smaller geographic scope and is essentially confined to the project areas and surrounding roads, due to the localized and temporary nature of pipeline construction. Any given location generally experiences active construction for only a matter of a few weeks (although restoration activities would take longer, but with comparatively less construction equipment). Construction of the compressor stations would be longer at those specific locations, but the extent of construction-related traffic would be even more localized to the site. Operational traffic would not be an issue, due to the projects only requiring a few new permanent employees. Thus, on a temporal basis, the scope for employment and workforce, housing, public services, and transportation would be limited to the relatively brief construction phase of the projects because operational effects would be *de minimis*. The potential cumulative impact on economy and tax revenues extends further into the future due to the tax revenues that would be generated every year the MXP and GXP are operating.

4.13.2.8.1 Mountaineer XPress Project

The past, present, or reasonably foreseeable future actions/projects listed below are located within the same geographic (county) and temporal scopes (construction phases) as portions of the MXP. When socioeconomic impacts from the MXP are combined with socioeconomic impacts from these other projects, collectively they would likely result in cumulative impacts on employment/workforce, housing, economy and tax revenues, public services, and/or transportation.

- Rover Pipeline Project (in Doddridge, Marshall, Tyler, and Wetzel Counties);
- Broad Run Expansion Project (in Kanawha County);
- LXP (in Marshall County);
- WBX (in Kanawha County);
- Supply Header Project (in Doddridge and Wetzel Counties);
- Mountain Valley Pipeline Project (in Doddridge and Wetzel Counties);
- MarkWest Pipeline (in Doddridge County);
- White Oak Electric Power Line (in Calhoun County)
- MarkWest Sherwood Gas Processing Facility Expansion (in Doddridge County);
- Majorsville, WV and Clarington, OH POR Facilities (in Marshall County);
- Moundsville Power Plant (in Marshall County);
- Putnam Business Park (in Putnam County);
- Tanyard Station Plaza (in Cabell County);
- Meighen Bridge Replacement (in Marshall County);
- Antero Sandstrom Facility (in Doddridge County); and
- Alexander's Place (in Putnam County).

As shown in the list above, six of the other projects also occur in Doddridge County and share the same temporal scope as the MXP. Five of the other projects also occur in Marshall County while sharing the same temporal scope as the MXP. Three other projects in Wetzel County, two in Kanawha County, and two in Putnam County also share the same temporal scope as the MXP. Therefore, the MXP would most greatly contribute towards cumulative impacts on socioeconomics when combined with the other projects occurring within Doddridge, Marshall, and Wetzel Counties.

Employment/Workforce

Columbia Gas anticipates that up to half of the overall construction workforce (estimated to average about 3,600 for the pipeline and aboveground facilities; see table 4.9-2) would be local hires. This would result in a temporary decrease in the local and regional unemployment rate and a temporary increase in income and sales taxes generated in the same geographic scope. Cumulative impacts on employment and workforce would largely depend on how much of the temporary construction workforce is sourced locally and the number of permanent positions that would be needed to operate the other facilities listed above. The largest impact on employment and workforce would likely be the number of natural gas projects proposed in the same geographic area. These projects range in size and scope; some include site-specific modifications to existing facilities, and others propose the construction of new facilities (sometimes at discrete locations, sometimes including many miles of continuous pipeline).

Short-term construction laborers would be in high demand during the construction cycles of these projects, some of which may overlap. The impact on the local workforce would depend on the percentage of workers hired locally. When combined with the demand for temporary workers with the same general skill sets for the other projects in the same geographic scope, the short-term cumulative impacts would be substantially beneficial to the counties directly affected and abutting the MXP work areas. These effects would only occur during the construction cycle of these projects; once construction winds down, the small demand for workers needed to operate these facilities would be easily met by local labor resources. The number of permanent employees that would be hired to operate the MXP, estimated at 29, would have a negligible contribution to a cumulative impact on employment in the geographic scope.

Housing

The largest impacts on housing from the MXP would be from non-local workers relocating to the area during construction, requiring a large amount of temporary housing. The affected West Virginia counties and nearby cities along the MXP pipeline route contain a substantial inventory of temporary housing. However, depending on the timing of construction and temporary labor forces of the pipeline and infrastructure projects listed above, the temporary housing demand could reach or exceed capacity.

The amount of impact the temporary construction workforce would have on the counties crossed by the MXP would depend on the number of projects that actually go into construction, the amount of labor sourced locally, and the amount of overlap in construction schedules. The demand for construction worker housing may restrict the supply available to other users, such as vacationers and other visitors, and may increase the prices of short-term housing during the MXP

construction period, especially when it overlaps with other projects in the area. These impacts could be substantial, but would be restricted to the time period when the MXP would be under construction.

Economy and Tax Revenues

Columbia Gas would spend approximately $2 billion on construction and facility expenses, which include the costs of right-of-way, project development, installation and maintenance, and facility commissioning. Columbia Gas would contribute approximately $26 million in annual property taxes during operation of the MXP.

Property taxes generated from MXP components would provide local governments with revenue to fund public facilities and services. In addition to property tax revenue, the temporary and permanent workforce associated with the project would spend money locally on consumer items and living expenses, which would generate sales tax revenue to the state and municipalities. The MXP would contribute a positive tax revenue impact within its geographic scope. The workforce associated with the other projects listed above also would contribute sales and income taxes to the local economy, thereby leading to a compounding positive cumulative impact on the regional economy.

There would also be long-term cumulative impact on the economy from property, sales, and income tax collections associated with the MXP and the other projects listed above. The MXP contribution toward cumulative economic impact is anticipated to be positive through increased tax revenues generated within the project's geographic scope.

Public Services

The cumulative impact on public services from the MXP and the 16 other projects listed above would depend on the number of projects under construction at one time. The small incremental demands of several projects occurring at the same time could become difficult for police, fire, and emergency service personnel to address. With proper planning, emergency and other public services generally are able to handle additional service needs. The problem would be temporary, occurring only for the approximate 1-year duration of construction, and could be mitigated by the various project sponsors consulting with local emergency responders in the development of project-specific emergency response plans, providing their own personnel to augment the local capacity, or providing additional funds or training for local personnel. As explained in section 4.9.3.1, prior to construction Columbia Gas would require all construction contractors to develop and submit for review an individual emergency services coordination plan specific to the project area and to the local areas surrounding it. Other FERC-regulated projects, and we assume non-FERC-regulated projects, would require similar plans to be implemented by its contractors.

Further, Columbia Gas has developed a liaison program between company personnel and public safety and emergency response organizations throughout West Virginia for advising emergency response, government, and public safety officials on how to prevent damage to company facilities and how to recognize and report emergencies.

Short-term construction workers would likely not bring their families with them for the duration of the construction cycle. Thus, short-term impacts on the educational resources in the Project's geographic scope would be insignificant. The number of permanent employees planned for the MXP is also minor when compared to the total population and size of the project's geographic scope. The small increase in population resulting from new permanent employees, if they were to transfer from outside the MXP area, would not contribute to a cumulative impact on educational resources.

For these reasons, we anticipate that when combined with the other projects listed above, the MXP's contribution toward cumulative impact on public services resulting from construction and operation would not be significant.

Transportation

Construction of the MXP would result in temporary impacts on road traffic at locations where the work area is accessed and could contribute to cumulative traffic impacts if other projects take place at the same time and in the same areas. Short-term construction impacts would be mitigated by the fact that the construction workforce would access the work sites during non-peak traffic hours, as site construction activities typically extend from 7 a.m. to 7 p.m.; therefore, workers would arrive before 7 a.m. and likely leave after 7 p.m.

The geographic scope for cumulative impact on transportation is more refined than other socioeconomic factors. In our evaluation of potential cumulative impact on transportation, we looked at the areas abutting and adjacent to the construction areas for the MXP. Short-term impacts in rural areas may result in increased congestion from construction traffic during the movement of heavy equipment. Rural roads are generally not designed to handle large traffic volumes. Short-term compounding cumulative impacts may occur on the rural road networks, especially where other projects in Doddridge, Marshall, and Wetzel Counties are under construction near and at the same time as the MXP. In order to mitigate impacts on the transportation network, the MXP would work with state and local transportation authorities to address worker and materials/equipment transportation. It is expected that other projects in the area would be required to manage their construction traffic in a similar manner in order to mitigate short-term cumulative impacts on the region's transportation corridors. For these reasons, we anticipate that the contribution to cumulative transportation impacts from the MXP would be minor and temporary.

4.13.2.8.2 Gulf XPress Project

The following past, present, or reasonably foreseeable future actions/projects are located within the same geographic and temporal scopes as portions of the GXP; and, when combined with the socioeconomic impacts from the GXP, could contribute towards cumulative impacts on employment/workforce, housing, economy and tax revenues, public services, and/or transportation:

- Broad Run Expansion Project (in Davidson County, TN);
- RXP (in Carter County, KY);

- Cane Ridge Electric Power Line (Davidson County, TN);
- Clifton Junction Electric Power Line (Wayne County, TN);
- Goodluck Electric Power Line (Metcalfe County, KY);
- Delvin Downs Phase 2 Expansion (Davidson County, TN);
- New County Jail (Rowan County, KY);
- Nashville International Airport Improvements (Davidson County, TN);
- Morehead State University Improvements (Rowan County, KY);
- Kentucky State Route 32 Reconstruction (Rowan County, KY); and
- Antioch Mixed Use Development (Davidson County, TN).

As shown in the list above, five of the other projects also occur in Davidson County, Tennessee and share the same temporal scope as the GXP. Three of the other projects also occur in Rowan County, Kentucky while sharing the same temporal scope as the GXP. Therefore, the GXP would most greatly contribute towards cumulative impacts on socioeconomics when combined with the other projects occurring in Davidson and Rowan Counties.

Employment/Workforce

Columbia Gulf anticipates that, due to the specific experience needed for aboveground natural gas facility construction, few local workers would be qualified to construct the new GXP compressor stations or make modifications at the two existing facilities. At the new stations, local construction jobs would average fewer than 10 and range from 3 to 14 over the 10-month construction period. We do not expect that drawing 14 local workers from the affected counties, when combined with the other projects listed above, would contribute significantly to a cumulative impact on the area workforce. Furthermore, the impact would be temporary, limited to the 10-month station construction period. Only 14 permanent employees (total) would be hired full-time to operate the seven new compressor stations, and this would also have negligible cumulative impacts on employment within the geographic scope of the GXP.

Housing

The largest impact on housing from the GXP would be from non-local workforces during construction. Columbia Gulf estimates its non-local workforce would peak at 126 workers for a 4-month period. Most of these workers would need to locate temporary housing or other accommodations in the vicinity of the new compressor station sites. Our review concluded that this temporary influx of workers from the GXP, when combined with those needed on the other projects, would not contribute significantly to cumulative impacts on housing resources in the affected counties. The project's permanent workforce of 14 employees would result in a minor cumulative impact on employment in conjunction with the other projects that may occur in the area affected the GXP.

Economy and Tax Revenues

The GXP would generate about $19 million in property taxes from 2016 to 2019 (table 4.9-14). In addition to property tax revenue, the temporary and permanent workforce associated with the project would spend money locally on consumer items and living expenses, which would generate sales tax revenue. Workers who are permanent residents of Kentucky, Tennessee, or Mississippi also would pay income taxes on income derived from construction of the GXP. The GXP's contribution towards the cumulative tax revenues for the state and affected counties during construction would be minor, but positive.

During project operation, permanent employees would pay sales and income taxes in addition to the facility property taxes identified above. We assume the eight other projects listed above also would generate property, sales, and income tax receipts to the local economy, thereby leading to a compounding cumulative positive impact on the regional economy. For these reasons, the contribution to cumulative impact from the GXP is anticipated to be positive through increased tax revenue generated in the project's geographic scope.

Public Services

The scope of the GXP is such that demands on public and educational services in the affected counties would be extremely limited. The GXP, in conjunction with the eight projects listed above, would not have a significant contribution to a cumulative impact on public or educational services in the affected counties due to the short duration of construction and the very small number of permanent employees that would be hired for operation of the facilities. Nevertheless, Columbia Gulf, like Columbia Gas, has committed to maintaining a liaison program between company personnel and local emergency response, government, and public safety officials within the areas where Columbia Gas' facilities are located.

Transportation

In our evaluation of potential cumulative impact on transportation, we looked at the areas abutting and adjacent to the construction areas for the GXP. Construction would result in temporary impacts on road traffic in areas in proximity to the compressor station sites and could contribute to cumulative traffic impacts. This may be particularly evident where new station construction would occur near residential development (i.e., the Cane Ridge site). However, impacts would be temporary and limited to the 10-month station construction period. Our review of the projects listed above found that none of the other projects would be likely to add cumulatively to potential traffic impacts resulting from construction of the GXP due to timing of construction and location. No significant operational impacts on transportation would be expected.

4.13.2.9 Air Quality

Construction of both the MXP and GXP (as well as most of the projects and activities listed in tables 4.13-2 and 4.13-3) would involve the use of heavy equipment that would generate temporary emissions of air contaminants and fugitive dust. The majority of criteria emissions generated during construction would be PM_{10} and $PM_{2.5}$ in the form of fugitive dust that would result from clearing, grading, excavation, and vehicle traffic on unpaved roadways. Typically, PM_{10} settles quickly near the construction sites. The cumulative air impacts would be additive

emissions of pollutants due to the use of equipment powered by diesel or gasoline engines and further generation of fugitive dust from land clearing, ground excavation, and cut and fill operations. Emissions would be reduced by measures such as using properly maintained vehicles. The impacts would be localized to the vicinity of the construction areas during active construction. For the MXP or GXP to contribute to a cumulative impact from construction air emissions, other projects/actions listed in table 4.13-2 and 4.13-3 would need to also involve concurrent construction (temporal scope) in an area within 0.25 mile of the active construction footprint of the MXP or GXP (geographic scope).

Operation of the MXP and GXP would result in permanent air quality impacts associated with the new and modified compressor stations over the lifetime of the projects. Both the MXP and GXP would contribute cumulatively to air quality impacts when considering other stationary past, present, and reasonably foreseeable sources of air emissions within 31 miles (geographic scope). *Past and present sources are already accounted for by modeling existing sources and including background values in the analysis presented in section 4.11.1.* Reasonably foreseeable (i.e., future or pending) sources are discussed further below. For our analysis, operational emissions were taken from state permit applications or FERC filing documents.

4.13.2.9.1 Mountaineer XPress Project

For analyzing the potential for construction-related cumulative air impacts, the Putnam Business Park and the Rover Pipeline are expected to cross or be constructed within 0.25 mile of the MXP within the same general timeframe, and could therefore contribute to cumulative impacts should the construction schedules align. Additionally, the MXP non-jurisdictional facilities, MarkWest Pipeline and White Oak Electric Power Line, would likely go to construction within the same timeframe as the MXP. As conventional pipeline construction proceeds quickly, any cumulative air impacts from the use of conventional construction equipment would be temporally limited to days or weeks and therefore not considered significant; however, residents near these areas may experience temporarily elevated levels of fugitive dust and construction vehicle exhaust.

As listed in table 4.13-2 and summarized in table 4.13-4, seven pending or reasonably foreseeable projects with operational air emissions were identified within 30 miles of an MXP compressor station site. The other nearby sources would be required to comply with state and federal air quality regulations for the protection of air quality listed in section 4.11.1, and the specific operational air permit required is listed in table 4.13-4. This permitting process is designed to protect ambient air quality and prevent significant cumulative impacts. Prior to issuance of air quality permits, the authorities must make a determination that the cumulative effect of both projects would not cause or contribute to an exceedance of the NAAQS, that the appropriate level of control of new air emissions would be installed, and that the facilities would be in compliance with all applicable federal and state air quality regulations and permit conditions.

Table 4.13-4 Summary of Projects for Analyzing Cumulative Operational Air Impacts			
Proposed New or Modified MXP Compressor Station	**Reasonably Foreseeable Projects**	**Distance from MXP Compressor Station site (miles)**	**Operational Air Permit Required**
Mountaineer XPress Project			
Sherwood	Sherwood Gas Processing Facility Expansion	2.5	Yes, update to Title V permit required
	Antero Sandstrom Wastewater Treatment Plant	8.8	Facility under Title V permitting thresholds – not currently required
	LL Tonkin Compressor Station (Monroe to Cornwell Project)	3.7	Yes, update to Title V permit required
	Mockingbird Hill Compressor Station (Monroe to Cromwell Project and Supply Header Project)	22.3	No increase in operational air emissions – no permitting required.
Lone Oak	Majorsville Compressor Station; (Rover Pipeline)	12.5	Facility under Title V permitting thresholds – not currently required.
	Moundsville Power Plant	12.4	Yes, new Title V permit required.
	Colerain Compressor Station; (OPEN Project)	22.0	Yes, new Title V permit required.
	Burch Ridge Compressor Station (Supply Header Project)	15.0	No increase in operational air emissions – no permitting required.
White Oak	Antero Sandstrom Wastewater Treatment Plant	22.5	Facility under Title V permitting thresholds – not currently required.
	LL Tonkin Compressor Station (Monroe to Cornwell Project)	28.8	Yes, update to Title V permit required.
Mount Olive	Rocky Fork Compressor Station (Broad Run Expansion Project)	17.5	Facility under Title V permitting thresholds – not currently required.
	Tyler Mountain Compressor Station (Broad Run Expansion Project)	20.0	Facility under Title V permitting thresholds – not currently required.
Elk River	Rocky Fork Compressor Station (Broad Run Expansion Project)	20.0	Facility under Title V permitting thresholds – not currently required.
Ceredo	Grayson Compressor Station (RXP and GXP)	22.5	Yes, new Title V permit required.

Operation of natural-gas-fired compressor stations would generate emissions of criteria pollutants, VOCs, HAPs, and GHGs. The air modeling presented in section 4.11.1.2.3 for each of the MXP compressor stations demonstrates that impacts of the stations along with the existing, approved, or pending sources at the same stations would not be significant.

The combined effect of multiple actions occurring within 31 miles of the operation of emission-generating aboveground facilities associated with the project could have a long-term

impact on air quality in the project area. Existing or proposed facilities within 31 miles of the emission-generating MXP aboveground facilities are listed in table 4.13-2 and include natural gas processing facilities, natural gas compressor stations, and a wastewater treatment plant. Potentially affected air resources include long-term air pollutant concentrations in ambient air.

New permanent stationary sources of air emissions would be located at the reasonably-foreseeable LL Tonkin Compressor Station, Mockingbird Hill Compressor Station, Majorsville Compressor Station, Burch Ridge Compressor Station, Rocky Fort Compressor Station, Tyler Mountain Compressor Station, Moundsville Power Plant, and the approved Grayson Compressor Station. All of these facilities will be operated by combusting natural gas and are not expected to significantly contribute to air quality impacts in the MXP areas. All projects that trigger permitting due to the potential emissions would be required to both obtain a construction permit and operate under any required operating permits. We conclude that these proposed projects are unlikely to result in significant emission impacts on local air quality and unlikely to add cumulatively with other sources due to either the amount of emissions or distance from the other emission sources.

Antero Resources Corporation submitted an application to construct the Sandstrom Wastewater Treatment Facility in July of 2015. The facility will treat wastewater associated with shale development to an effluent water purity suitable for surface discharge or reuse with future oil and gas operations. A construction permit was issued by the WVDEP on December 7, 2015. This facility will be 8.8 miles from the Sherwood Compressor Station and 22.5 miles from the White Oak Compressor Station. The facility received a permit under West Virginia regulation 45 CSR 13 – Permits for Construction. It is not subject to any PSD regulations. The major sources of emissions from the facility are boilers and a thermal oxidizer. Due to the relatively low emissions from the facility and the distances to the Sherwood and White Oak Compressor Stations, cumulative impacts are not expected.

The existing MarkWest Sherwood Gas Processing Facility is 2.5 miles from the proposed MXP Sherwood Compressor Station and presently under construction for expansion. Gas processing facilities are known emitters of VOCs and HAPs (Moore et al., 2014). However, the stationary facilities at this station would be located within the ozone transport region and are subject to stricter NOx and VOC emission controls by the WVDEP. While residents between the expanded processing facility and proposed compressor station may experience air quality impacts from both, the WVDEP checks any new minor or major new source permits and is responsible for minimizing emissions to the extent practicable. The emissions would also be incorporated into the inventory for the region's state implementation plan to confirm that the areas would retain attainment status.

As noted previously, the air quality impacts from the MXP compressor stations would not exceed NAAQS. Considering the distance to the sources in table 4.13-2, as well as the magnitude of the potential emissions from those projects, we conclude that the cumulative impact of the projects in table 4.13-2 in combination with the MXP project would not significantly affect local or regional air quality.

In conclusion, construction and operation of the MXP facilities are not expected to have a significant impact on air quality in the project areas or in the region itself. The potential emissions associated with the operation of the majority of other projects described above are located over a

large area and have varying construction schedules. They must also adhere to federal, state, and local regulations for the protection of ambient air quality. Therefore, significant cumulative impacts on air quality are not anticipated.

4.13.2.9.2 Gulf XPress Project

In analyzing the potential for construction-related cumulative air impacts, only the Delvin Downs residential subdivision project and the three non-jurisdictional powerlines serving Goodluck, Cane Ridge, and Clifton Junction Compressor Stations were identified for potential concurrent construction. The Delvin Downs subdivision, which is adjacent to the Cane Ridge Compressor Station site, recently underwent an expansion to accommodate 27 new single-family housing lots. Tree clearing, grading, and road paving was completed in 2016. Many of the lots already have new homes on them. In the event that there are still some homes being constructed within this expanded area at the same time the Cane Ridge station is being constructed, the two projects together may result a localized increase in emissions and dust associated with construction equipment in a residential area.

Only one pending or reasonably foreseeable project with operational air emissions was identified within 31 miles of a GXP compressor station: the Compressor Station 563, which is proposed as part of the Broad Run Expansion Project, approximately 24 miles from the Cane Ridge Compressor Station site. Commenters expressed concern about potential cumulative impacts from the operation of the two stations. The air impacts from the construction and operation of Compressor Station 563 are described in FERC's environmental assessment under docket CP15-77, published in March 2016. The station requires a Title V Major Source Operating Permit and performed air modeling based on its potential to emit – all concentrations at the station boundary were modeled to be well below the NAAQS. Given the modeling results showing concentrations below the NAAQS for both the Compressor Station 563 and the Cane Ridge Compressor Station as well as the distance between the two stations, we conclude that these proposed projects are unlikely to result in significant emission impacts on local air quality.

The construction and operation of the GXP facilities are not expected to have a significant impact on air quality in the project areas itself. Only around the Cane Ridge station site were any pending or reasonably foreseeable projects identified for cumulative impact analysis. As described above, some additive impacts may be expected from any concurrent construction with the Delvin Downs subdivision but these impacts would be limited and temporary. Therefore significant cumulative impacts on air quality from the GXP are not anticipated.

4.13.2.10 Noise

Construction of the MXP and GXP would involve construction equipment and generally result in highly localized and temporary noise impacts. In order for the MXP or GXP to have a cumulative impact from construction noise, other projects/actions listed in tables 4.13-2 and 4.13-3 would need to also involve concurrent construction (temporal scope) in an area that overlaps or directly abuts the active construction footprint of the MXP or GXP (geographic scope).

As analyzed in section 4.11.2.1, operation of the MXP and GXP would result in an increase of perceptible noise at NSAs such as residences and places of worship near new and modified

compressor and meter stations. Cumulative noise impacts could occur at an NSA where noise may be experienced from both the operation of a reasonably foreseeable project and a compressor station to be modified under the MXP or GXP.

Operational noise impacts attributable to the MXP and GXP are limited by FERC regulations to a maximum allowable contribution of 55 L_{dn} dBA at existing NSAs. To maintain compliance, we have recommended a condition requiring the Companies to file a noise survey within 60 days of placing its stations in service. The condition further requires that if the noise attributable to the operation of all of the equipment at any station under interim or full horsepower load conditions exceeds 55 dBA L_{dn} at any nearby NSAs, Columbia Gas 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. Columbia Gas would then be required to file a second noise survey within 60 days after it installs the additional noise controls.

4.13.2.10.1 Mountaineer XPress Project

The following projects are expected to cross or be constructed within 0.25 mile of the MXP and within the same general timeframe, and could therefore contribute to cumulative noise impacts should the construction schedules align:

- Rover Pipeline Project (where it intersects the MXP at MP 48.0);
- MarkWest Pipeline;
- White Oak Electric Power Line;
- Sherwood Processing Facility Expansion; and
- Putnam Business Park (between MXP MPs 146.7 – 147.9).

Because conventional pipeline construction proceeds quickly, any cumulative noise impacts would be limited to the immediate area of construction where the MXP and one of the other project activities are occurring simultaneously. Noise from construction of these projects would occur during daylight hours over the course of days or weeks and therefore would not be considered significant.

There is only one proposed facility identified in table 4.13-2 that could contribute to a cumulative impact on noise during operation. The MXP Sherwood Compressor Station would operate within 2.5 miles of the Sherwood Gas Processing Facility to the east. Approximately 15 NSAs appear to be between the two facilities (east of the compressor station). While we have no independent estimates of noise expected to be generated from the processing facility, we can assume the noise would be within an order of magnitude that is within the same level of noise as the compressor station. Given this assumption, it is possible that NSAs between the two facilities may be impacted by perceptible noise from the concurrent operation of both; however, the cumulative impact is not expected to be significant given the distance between the facilities and the attenuation of noise with that distance.

The MXP expansion of the approved LXP Lone Oak Compressor Station and the pending WBX Elk River Compressor Station are expected to result in a cumulative impact from noise, but

are analyzed in sections 4.11.2.1 as part of the project's expected noise impacts and compared to the noise threshold of 55 dBA L_{dn} at any nearby NSAs. Therefore no cumulative noise impacts from operation are expected from the expansion of these expanded stations.

4.13.2.10.2 Gulf XPress Project

The GXP could contribute to a cumulative impact (temporarily) on noise from construction activities in the areas surrounding the Goodluck, Clifton Junction, and Cane Ridge Compressor Station sites when combined with the following other projects:

- Cane Ridge Electric Power Line;
- Clifton Junction Electric Power Line;
- Goodluck Electric Power Line; and
- Delvin Downs Phase 2 Expansion (adjacent to the Cane Ridge Compressor Station).

As described in the air section above, there is a possibility that the construction schedules could overlap. At the Cane Ridge Compressor Station, the construction of multiple projects together would result in a cumulative impact on noise to residents living within and directly abutting the Delvin Downs subdivision. Construction noise from the Delvin Downs expansion could include intermittent home building noise, like hammering and power tools, which would likely be limited to daytime hours. The Cane Ridge Compressor Station is expected to be constructed over a period of 10 months with noise impacts at nearby NSAs of 54 dBA L_{dn} or less. We recognize commentors concern that this may be a burdensome nuisance; however, since activities at both project sites would be expected to occur only during the daytime, any cumulative noise impact would not affect nighttime noise levels and not be considered significant. Additionally, there would be minor and temporary cumulative impact from noise at the Goodluck and Clifton Junction Compressor Station sites while the non-jurisdictional power lines are constructed.

No new permanent noise sources are proposed within 0.5 mile of any of the other GXP facilities; therefore, the GXP would not contribute toward a permanent cumulative impact on the existing noise environment.

4.13.2.11 Climate Change

Climate change is the change in climate over time, whether due to natural variability or as a result of human activity, and cannot be represented by single annual events or individual anomalies. For example, a single large flood event or particularly hot summer are not indications of climate change, while a series of floods or warm years that statistically change the average precipitation or temperature over years or decades may indicate climate change.

The leading U.S. scientific body on climate change is the U.S. Global Change Research Program (USGCRP).[48] In May 2014, the USGCRP issued a report, *Climate Change Impacts in the United States*, summarizing the impacts that climate change has already had on the United States and what projected impacts climate change may have in the future (USGCRP, 2014). The report includes a breakdown of overall impacts by resource and impacts described for various regions of the country. Although climate change is a global concern, for this analysis, we focused on the potential cumulative impacts of climate change in the MXP and GXP project areas. The USGCRP and other international bodies have recognized that climate change is currently happening. The United States and the world are warming, global sea level is rising, and some types of extreme weather events are becoming more frequent and more severe. These changes have already resulted in a wide range of impacts across every region of the country. Impacts extend beyond atmospheric changes alone and effect water resources, transportation, agriculture, ecosystems, and human health. These changes are thought to be driven primarily by the accumulation of GHG in the atmosphere from the combustion of fossil fuels.

The USGCRP's report notes the following observations of environmental impacts, with a high or very high level of confidence, may be attributed to climate change in the proposed MXP and GXP project regions:

- Heat waves, and river flooding will pose a growing challenge to the region's environmental, social, and economic systems. This will increase the vulnerability of the region's residents, especially its most disadvantaged populations;
- Increasing temperatures and the associated increase in frequency, intensity, and duration of extreme heat events will affect public health, natural and built environments, energy, agriculture, and forestry;
- Decreased water availability, exacerbated by population growth and land-use change, will continue to increase competition for water and affect the region's economy and unique ecosystems;
- Agriculture, fisheries, and ecosystems will be increasingly compromised over the next century by climate change impacts. Farmers can explore new crop options, but these adaptations are not cost- or risk-free. Moreover, adaptive capacity, which varies throughout the region, could be overwhelmed by a changing climate; and
- While a majority of states and a rapidly growing number of municipalities have begun to incorporate the risk of climate change into their planning activities, implementation of adaptation measures is still at early stages.

The rate and magnitude of expected changes will exceed those experienced in the last century. Existing adaptation and planning efforts are inadequate to respond to these projected impacts.

[48] The following departments comprise the USGCRP: EPA, DOE, U.S. Department of Commerce, U.S. Department of Defense, USDA, U.S. Department of the Interior, U.S. Department of State, PHMSA, Department of Health and Human Services, National Aeronautics and Space Administration, National Science Foundation, Smithsonian Institution, and Agency for International Development.

In addition to the GHG emissions associated with construction and operation of the MXP and GXP, the downstream end-use would result in additional GHG emissions. Columbia Gas and Columbia Gulf state that their respective projects would facilitate 1,800,000 Dth/d capacity to serve multiple Midwest, Northeast, and Mid-Atlantic markets and 900,000 Dth/d capacity to serve markets in the South and the Gulf Coast. Assuming that the projects transport the maximum 2,700,000 dekatherms per day of natural gas and that all of the gas being transported is used for additional combustion, the downstream end-use could result in about 52.3 million metric tons of carbon dioxide per year. However, given the possibility of fuel-switching from coal or other fossil fuel combustion as a result of additional gas supply and the likelihood that pipelines and compressor stations would not operate continuously at maximum capacity, this represents an upper bound of actual downstream carbon dioxide emissions.

The emissions would increase the atmospheric concentration of GHGs, in combination with past and future emissions from all other sources, and contribute incrementally to climate change that produces the impacts previously described. Because we cannot determine the projects' incremental physical impacts on the environment caused by climate change, we cannot determine whether the projects' contribution to cumulative impacts on climate change would be significant.

4.13.3 Conclusion

Recently completed, ongoing, and planned projects in the MXP and GXP areas were identified for inclusion in this cumulative impact analysis (refer to tables 4.13-2 and 4.13-3). The majority of cumulative impacts would be temporary and minor when considered in combination with past, present, and reasonably foreseeable activities. However, some long-term and potentially significant cumulative impacts would occur on forested habitat, particularly interior forest and CFA areas, and the associated habitat for the cerulean warbler. Some long-term cumulative benefits to the communities in and around the MXP and GXP areas would be realized from increased tax revenues. Short-term cumulative benefits would also be realized through jobs, wages, and purchases of goods and materials.

Due to the implementation of specialized construction techniques, the relatively short construction timeframe in any single location, and carefully developed resource protection and mitigation plans designed to avoid or minimize environmental impacts from the MXP and GXP as a whole, minimal cumulative effects are anticipated when the effects of each project are added to the past, present, and reasonably foreseeable future projects within the MXP's and GXP's geographic scopes.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS OF THE ENVIRONMENTAL ANALYSIS

The conclusions and recommendations presented in this section are those of the FERC environmental staff. Our conclusions and recommendations were developed with input from the EPA, USACE, WVDEP, and WVDNR as cooperating agencies. The federal cooperating agencies may adopt the EIS per 40 CFR 1506.3 if, after an independent review of the document, they conclude that their permitting requirements and/or regulatory responsibilities have been satisfied. However, these agencies would present their own conclusions and recommendations in their respective and applicable records of decision. Otherwise, they may elect to conduct their own supplemental environmental analysis, if they deem it necessary.

We determined that construction and operation of Columbia Gas' MXP would result in some adverse environmental impacts. These impacts would occur during both construction and operation of the MXP on soils, vegetation, aquatic resources, wetlands, wildlife, noise, and air quality as discussed in Section 4. Short-term impacts would occur on soils, vegetation, aquatic resources, wetlands, wildlife, air, and noise. Long term impacts would occur on vegetation, air, and noise. Impacts on upland forested habitat; in particular, interior forest and CFAs, are considered to be significant due to the amount of new (i.e., not co-located) right-of-way to be constructed through forested areas. Likewise, impacts on forested habitat for the cerulean warbler (a migratory bird considered sensitive in the MXP area) are also deemed to be significant.

We determined that construction and operation of Columbia Gulf's GXP also would result in some adverse environmental impacts. These impacts would occur during both construction and operation of the GXP on soils, vegetation, aquatic resources, wetlands, wildlife, noise, and air quality. Short-term impacts would occur on soils, vegetation, aquatic resources, wetlands, wildlife, air, and noise. Long term impacts would occur on vegetation, air, and noise. However, if the projects are constructed and operated in accordance with applicable laws and regulations, the mitigation measures discussed in this EIS, and our recommendations, these impacts would be reduced to acceptable levels. This determination is based on a review of the information provided by Columbia Gas and Columbia Gulf and further developed from data requests; field investigations; scoping; literature research; alternatives analyses; and contacts with federal, state, and local agencies, as well as individual members of the public.

As part of our review, we developed a number of specific mitigation measures that we determined would appropriately and reasonably reduce the environmental impacts resulting from construction and operation of the MXP and GXP. We therefore recommend that our mitigation measures be attached as conditions to any authorization issued by the Commission. A summary of the anticipated impacts, our conclusions, and our recommended mitigation measures is provided below, by resource area.

5.1.1 Geology

The overall effects of MXP and GXP construction and operation on topography and existing geologic conditions would be minor. Primary impacts would be limited to construction activities and would include temporary disturbance of slopes at facilities or within pipeline

corridors resulting from grading and trenching operations. During construction activities, some slopes within the construction workspaces would be contoured to safely accommodate construction and equipment operation for the compressor station facilities. However, after completion of construction activities, topography and associated drainageways would be returned to pre-construction contours and elevations to the extent practicable.

The removal of bedrock, by blasting or other means, may be required if bedrock is encountered within the MXP pipeline trench or at MXP or GXP aboveground facility sites. Blasting events would be designed to break up only the amount of bedrock needed for construction, and impacts on bedrock would be minor and limited to the immediate area of construction. The Companies would comply with all federal, state, and local blasting regulations and have each developed a Blasting Plan that describes measures that would be implemented to minimize potential blasting-related impacts. We have reviewed the Companies' blasting plans and find them acceptable.

Conditions necessary for the development of landslides are not present in the GXP work areas; however, the MXP is in an area of elevated landslide risk due to steep slopes. MXP pipelines would cross about 58.2 miles of slopes over 30 percent, including 55.6 miles along MXP-100, 2.4 miles along MXP-200, less than 0.1 mile along the SM80 Line, and 0.1 mile along the SM80 Loop Line. If a significant landslide hazard is identified during MXP construction, Columbia Gas would implement mitigation measures and BMPs in its ECS to maintain slope stability. We have reviewed the ECS and found it generally consistent with FERC's Plan and Procedures. Where the ECS differed from FERC's Plan and Procedures, we either found the modifications acceptable or we made recommendations for changes.

Based on a review of publicly available data from the WVDEP, four known coal mine sites are within 0.25 mile of MXP facilities. Columbia Gas would coordinate with the mining companies in advance of MXP construction so that appropriate planning for subsidence can occur. Columbia Gas would continue to coordinate with the mining companies for the duration of operation. None of the GXP work sites are within 0.25 mile of a mine or quarry.

Karst is not present in or in proximity to the MXP workspace and is not considered a risk to the MXP facilities. In the event that Columbia Gas encounters a sinkhole, notification would be made to the WVDEP - Groundwater/Underground Injection Control Department, and Columbia Gas would follow the WVDEP's approved sinkhole mitigation document in addition to Columbia Gas' Karst Mitigation Plan. Columbia Gulf conducted geotechnical studies at each of the compressor station sites and found karst terrain at the Paint Lick, Goodluck, Cane Ridge, and Clifton Junction sites; the existing GXP facilities (Leach C Meter and Grayson Compressor Stations) are not within karst terrain. Where karst topography may be a potential hazard, Columbia Gulf would construct foundations that are supported by competent bedrock to mitigate the risk of foundation disturbance due to seismic activity or sinkhole development.

With the implementation of the Companies' respective ECSs, Blasting Plans, and procedures to be followed in the event of discovery of previously undocumented karst features or abandoned underground mines, we conclude that impacts on geological resources would be adequately minimized.

5.1.2 Soils

The MXP and GXP would traverse a variety of soil types and conditions. Construction activities could adversely affect soil resources by causing erosion, compaction, and introduction of excess rock or fill material to the surface, which could hinder restoration. However, the Companies would implement the mitigation measures contained in their respective ECSs to control erosion, segregate topsoil, enhance successful revegetation, and minimize any potential adverse impacts on soil resources, including any impacts on cropland associated with the MXP.

Permanent impacts on soils would mainly occur at the aboveground facilities where the sites would be graveled and converted to industrial use. Implementation of the Companies' ECSs would adequately avoid, minimize, or mitigate construction impacts on soil resources in those areas at the aboveground facility sites that would be stabilized with vegetative cover. Based on our analysis of the Companies' proposed measures, we conclude that potential impacts on soils would be avoided or effectively minimized or mitigated.

Columbia Gas identified three facilities (a hospital, a material fabricating business, and a technical school) within 0.25 mile the MXP workspaces that are permitted to generate, transport, treat, or dispose of hazardous waste. None of the facilities have reported an uncontrolled release to the environment. Two LUST sites are also within 0.25 mile of the proposed MXP facilities; cleanup activities for these sites were completed in 1998 and 2003. None of the GXP facilities would be within 0.25 mile of any hazardous waste sites. One hazardous waste generator site owned by Columbia Gulf is 0.3 mile southeast of the existing Leach C Meter Station. While a LUST site was identified approximately 0.8 mile northeast of the proposed New Albany Compressor Station, the distance separating the two areas and the limited extent of the excavation associated with the new facility make it unlikely that contaminated soil would be encountered at the station site.

If contaminated soils are encountered during construction, the Companies would each implement measures outlined in their respective Unexpected Contamination Discovery Plans that includes proper handling, agency notification, and disposal methods. If unexpected contaminated soil is encountered, the Companies would contact state and local agencies, as appropriate, to develop and implement mitigation measures and procedures to address the contamination. Further, spill prevention measures from the Companies' respective ECSs and SPCC Plans would reduce the potential impacts on soils from spills of fuels, lubricants, coolant, and hazardous materials used during construction.

5.1.3 Water Resources

5.1.3.1 Groundwater

None of the MXP and GXP facilities would be within SSAs or state-designated aquifers. Construction of the facilities could result in increased turbidity and alteration of flow in shallow aquifers if encountered within trench depth or during grading and excavation at aboveground facilities. These impacts would be minimized by measures included in the Companies' respective ECSs and SPCC Plans, as well as our recommendations.

Four WHPAs were identified within the 3-mile-search radius of the MXP-100 pipeline, and an additional 20 WHPAs were identified within 3 miles of MXP pipe/contractor yards. No

WHPAs or Source Water Protection Areas are within 3 miles of the GXP compressor station sites in Kentucky, and no WHPAs were identified within 3 miles of the compressor station sites in Tennessee. Four PWS wells were identified within 3 miles of the New Albany station site in Mississippi; all of them are greater than 2 miles from the site. No springs crossed by the MXP have a flow of greater than or equal to 100 gpm.

Columbia Gas consulted with the WVDHHR to obtain location data for PWS wells within 150 feet of project workspaces. Additionally, Columbia Gas sought to identify private supply wells through landowner discussions, civil survey, and well records from the respective county health departments. To date, 49 private wells have been identified. We have recommended that Columbia Gas determine the status of water wells within the workspace and offer pre-construction testing of all water wells within 150 feet of the construction work areas.

Columbia Gulf consulted with the KDEP, TDEC, and MDEQ to obtain location data for PWS wells within 150 feet of GXP station workspaces. No public wells are within 150 feet of the project workspaces. Information about private wells and springs located near the station sites was obtained through discussions with landowners and field surveys. One private well was identified approximately 33 feet to the south-southwest of the existing Leach C Meter Station. No springs were identified within 150 feet of any GXP facilities.

Columbia Gas proposes use of HDD at one location – the Kanawha River. The HDD crossing of the Kanawha River would, at its deepest point, involve drilling to a depth of about 150 feet below the ground surface through the alluvial aquifer of this river valley. An inadvertent release of drilling mud could occur during drilling operations, affecting groundwater turbidity, which would diminish with time and distance from the point of release. Absent an inadvertent return event, no adverse impact on groundwater would occur as a result of HDD operations because the drilling fluid would be largely confined to the bore (cooling the drill bit and transporting cuttings to the surface) and the walls of the bore (where it creates a clay barrier to limit fluid migration away from the bore and external groundwater seeping into the bore).

We have determined that construction activities are not likely to significantly impact groundwater resources in the long-term because the majority of construction would involve shallow, temporary, and localized excavation. Trench depths are typically less than 10 feet, while the typical depth to groundwater ranges from 25 to 50 feet in the MXP area. Excavation associated with MXP and GXP aboveground facilities would be less than 6 feet deep in most instances. Columbia Gas would avoid or further minimize impacts by using construction BMPs such as temporary and permanent trench plugs and interceptor dikes.

The Companies' respective ECSs would be implemented during construction to manage any required dewatering. The greatest threat posed to groundwater resources would be a hazardous material spill or leak into groundwater supplies. We have reviewed the Companies' respective ECSs and SPCC Plans and conclude that they adequately address strategies and methods to prevent or limit such contamination should a spill occur. We do not anticipate any significant, long-term impacts on aquifers or groundwater supplies from construction or operation of the MXP and GXP given the relatively shallow depths required for construction.

Columbia Gas estimates that about 88 percent of the MXP-100 and MXP-200 pipeline routes crosses bedrock at depths of less than 60 inches where blasting may be required for pipeline installation. Additionally, Columbia Gulf anticipates encountering bedrock during construction at several compressor station sites. Blasting could affect groundwater quality by temporarily changing groundwater levels and increasing groundwater turbidity near the construction right-of-way. Impacts on nearby wells and springs from blasting would be temporary and would likely dissipate shortly after blasting or after a well has been flushed several times. The Companies have agreed to perform pre- and post-construction monitoring for well yield and water quality for private wells within 150 feet of construction workspaces (with landowner consent) for water quality and quantity parameters, including well yield, before and after construction, and provide an alternative water source or a mutually agreeable solution in the event of construction-related impacts. We conclude that with these measures along with our recommendations, and adherence to the Companies' respective blasting plans, impacts from blasting on groundwater resources would be reduced to less-than-significant levels.

5.1.3.2 Surface Water

The MXP pipeline centerlines would directly cross 417 minor waterbodies, 86 intermediate waterbodies, and 5 major waterbodies. The 417 minor waterbodies are mostly ephemeral drainages typical of the topography in the MXP area; and, most of these will be dry at the time of construction. Columbia Gas' ECS, which follows FERC's Procedures would be followed in the instances of wet or flowing water. The five major crossings are of the South Fork Hughes River (crossed twice), Little Kanawha River, Spring Creek, and Kanawha River. In addition to these 508 crossings, another 360 streams would be within the construction rights-of-way, but not crossed by the pipeline trench directly. Access roads associated with pipeline construction would require crossings of intermediate and minor waterbodies that are classified as ephemeral, intermittent, and perennial. Surveys of the pipe yards and staging areas identified one intermittent stream, seven ephemeral streams, and one pond. Columbia Gas would avoid these features where practicable. At locations where impacts are unavoidable (e.g., where bridges or culverts are required to access the site), Columbia Gas would implement procedures from its ECS and conditions from applicable permits. Following construction, all pipeyards and staging areas would be restored in accordance with the ECS, agency requirements, and landowner stipulations.

The majority of MXP stream crossings are proposed as dry-ditch crossings when water is present in the channel. Because dry-ditch crossing construction methods such as a flume or dam-and-pump allow for trenching and backfill activities to occur under relatively dry conditions, they would minimize the potential for sedimentation of the waterbody and avoid disruption to water flow. If trench dewatering is necessary, it would be conducted in a manner that would not cause erosion or result in silt-laden water entering the waterbody, as outlined in Columbia Gas' ECS. Following construction, waterbody beds and banks would be restored to pre-construction contours and revegetated.

The HDD crossing method would be used to cross the Kanawha River, while Columbia proposes to use the dam-and-pump or flume method to cross the other three major waterbodies. To minimize the potential for an inadvertent release of drilling fluid, Columbia Gas would implement measures identified in its Horizontal Directional Drilling Contingency Plan, which

describes procedures to monitor, avoid, contain, and clean up any inadvertent drilling fluid releases.

The MXP centerline would traverse 49 streams that are listed as impaired on the West Virginia 303(d) list. No 303(d) impaired waterbodies are adjacent to the proposed pipe yards, staging areas, or aboveground facilities. Twenty-five access roads would cross 303(d) impaired waterbodies.

West Virginia identifies some streams as HQW based on their ability to support certain fisheries. Construction of the MXP-100 and MXP-200 pipelines and access roads would result in crossing of multiple waterbodies classified as HQW. The pipe yards and staging areas would not cross any HQWs. Columbia Gas would observe instream work timing windows for fisheries based on requirements or approved permit conditions from the WVDNR. The WVDHHR did not identify any potable water intakes within 3 miles downstream of any MXP crossings. However, the data provided by the WVDHHR identified ZCC and ZPC that are considered surface water protection areas in corridors along waterbodies within Source Water Protection Watersheds.

A total of 17 waterbodies could potentially be affected by the GXP, including 13 ephemeral streams and 4 impoundments/stock ponds. Columbia Gulf would implement the measures included in its ECS, which incorporates FERC's Procedures, to avoid or minimize impacts on the ephemeral waterbodies and ponds present on several of the sites.

We received a comment during public scoping regarding concerns with the potential for upstream impacts due to construction within proximity of the ephemeral drainage that crosses the Holcomb Compressor Station site. The Holcomb Compressor Station site is bisected by an ephemeral drainage that would be crossed to provide access to TWS north of the feature. Columbia Gulf would mitigate impact on this drainage by installing erosion controls and a temporary bridge or culvert during construction. The temporary crossing would be removed during site restoration. One commenter expressed concern that construction activities might impede flow in this ephemeral drainage, causing it to back-up onto the commenter's property. Columbia Gas would install a bridge (or culvert) across the feature and implement its ECS, therefore, we conclude that impact on the flow capacity of this drainage would be avoided.

We received a number of comments about potential impacts from the new Cane Ridge Compressor Station on the nearby Mill Creek, which lies to the southeast of the site and is separated from the site by Barnes Road and either undeveloped forest or a residential subdivision and Columbia Gulf's existing right-of-way. Due to the proximity of the compressor station to Mill Creek, the likelihood of a spill or leak at the new compressor station having an impact on Mill Creek is remote. Once site restoration is complete, site runoff would be directed to an on site pond for infiltration into the ground.

Accidental spills and leaks of hazardous materials associated with vehicle refueling or maintenance, and the storage of fuel, oil, and other fluids can have immediate effects to aquatic resources and could contaminate a waterbody downstream of the release point. The Companies would implement procedures from their respective ECSs and SPCC Plans to avoid or minimize impacts associated with spills or leaks by restricting the location of refueling to at least 100 feet from a wetland or waterbody. During construction, fuel storage would be surrounded by a dike

with an impervious lining in accordance with the Companies' respective SPCC Plans. Machinery would be routinely inspected for leaks, and any spills would be contained, cleaned up, disposed of, and reported as per the SPCC Plan.

We have determined that no significant impacts on surface waters would result from construction and operation of MXP and GXP. Columbia Gas would bury the pipeline beneath the bed of all waterbodies, implement erosion controls, and restore the streambanks and streambed contours as close as practicable to pre-construction conditions. Columbia Gas would also implement the measures contained in its ECS during construction to minimize instream impacts. Through consultation with the USACE, Columbia Gulf would determine the jurisdictional status of water features at its compressor station sites and would avoid or mitigate impacts as required by permit conditions. Columbia Gulf would implement BMPs, as specified in its ECS, and would restore temporary work areas not encumbered by permanent facilities after construction.

5.1.3.2.1 Surface Water Uses during Construction

Columbia Gas would use about 43.1 million gallons of water from surface water sources for hydrostatic testing its pipeline segments and new aboveground facilities, which could temporarily affect the recreational and biological uses of the waterbody if the diversions constitute a substantial percentage of the source's total flow or volume. As practicable, hydrostatic test water would be transferred between test segments to minimize the total volume of test water needed. Following testing, the test water would be discharged into well-vegetated upland locations adjacent to the construction work area, in accordance with permit conditions and Columbia Gas' ECS.

Hydrostatic testing would also be required to confirm the integrity of facilities and associated suction and discharge pipelines connecting the new compressor stations with Columbia Gulf's system. Municipal water would be trucked to each facility site from a commercial source or pumped from an on site well. The amount of water used for hydrostatic testing at each facility varies, but would total about 1.4 million gallons. Columbia Gulf would attempt to re-use hydrostatic test water at multiple facilities to minimize the volume of water used and may re-use the water for fugitive dust mitigation, as needed. Test water would be discharged on site in accordance with Columbia Gulf's ECS and applicable permits. Columbia Gulf may use methanol following hydrostatic testing to scavenge any residual water from the pipe.

Both Companies would use municipal, on site (new wells), and surface water sources for dust control; although the amount would be highly variable based on the conditions at the time of construction. During extremely dry conditions, the construction work area would be sprayed with water to reduce fugitive dust in residential areas. All appropriate permits and authorization required would be obtained prior to conducting any dust control activities.

Columbia Gas would minimize the potential effects of water withdrawals from surface water and groundwater sources by adhering to the measures in its ECS, and to any additional state and federal conditions. Both Companies would also implement the measures in their respective ECSs to protect surface waters during the discharge and disposal of hydrostatic test waters. Therefore, we conclude that impacts on surface waters from withdrawal of test and dust control water would be minimized and not significant.

5.1.4 Wetlands

Based on the results of a wetland field survey, approximately 7.6 acres of wetlands are within the MXP construction footprint. Construction of the pipeline facilities would temporarily impact 6.8 acres of PEM and less than 0.3 acre of PSS wetlands within the construction right-of-way. In addition, less than 0.6 acre of PFO wetlands would be temporarily impacted by construction activities, of which less than 0.2 acre would be converted to a PEM or PSS wetland type due to pipeline operational and maintenance activities within the permanent pipeline easement. Less than 0.1 acre of PEM wetlands would be permanently altered at the White Oak Compressor Station site. Temporary impacts on wetlands within the footprint of contractor yards and access roads would be restored to pre-construction contours following construction. Operational and maintenance activities associated with access roads would not impact any wetlands.

In wetlands, the construction right-of-way would be generally limited to a width of 75 feet, except in areas where Columbia Gas has requested ATWS within a wetland. Columbia Gas has filed site-specific justifications for ATWS within 50 feet of a wetland or within the boundaries of a wetland for approval from FERC. Wetlands located in the vicinity of MXP construction activities would be avoided where possible, and Columbia Gas would implement appropriate BMPs in accordance with its ECS to protect each wetland.

The majority of MXP construction impacts are to PEM wetlands, which would recover quickly following right-of-way restoration (typically within 1 to 3 years). Long-term temporary and permanent impacts would occur within PFO wetlands, as trees would be removed from the permanent right-of-way, which would be mowed or otherwise cleared periodically to maintain it in an herbaceous state. These impacts on PFO wetlands would be minimized, as those portions of the right-of-way used for construction and not maintained within the permanent pipeline corridor would be allowed to revegetate; however, revegetation of PFO wetlands could take several years. Columbia Gas would maintain a 30-foot-wide corridor in PFO wetlands, with selective removal of trees within 15 feet of the pipeline, resulting in less than 0.2 acre of impacts on PFO wetlands for the MXP. Additionally, Columbia Gas would maintain a 10-foot-wide herbaceous strip centered over the pipeline through wetlands, which would allow for growth of PSS wetland habitats. Columbia Gas would mitigate for unavoidable wetland impacts by implementing the procedures specified in its ECS, and by complying with the conditions of its pending section 404 and 401 permits.

In accordance with a MXP-specific wetland restoration plan and its ECS, Columbia Gas would conduct routine wetland monitoring for a minimum of 3 years (or until revegetation is successful) and submit annual reports to the Commission on the status of wetland restoration and vegetation growth. Where revegetation is not successful at the end of 3 years, Columbia Gas would develop and implement remedial revegetation plans, in consultation with a professional wetland ecologist, to actively revegetate any wetland, continue revegetation efforts, and file annual reports until wetland revegetation is successful.

Wetland impacts from the construction and operation of the GXP would include one PEM wetland at the Morehead Compressor Station, one PEM wetland at the Leach C Meter Station, one PEM wetland at the Holcomb Compressor Station, and three PEM wetlands at the New Albany

Compressor Station. The wetland at the Morehead station would be culverted during construction and operation, resulting in less than 0.01 acre of permanent impact. The wetland at Leach C Meter Station would be matted during construction and would be returned to preconstruction conditions following construction. The wetland at the Holcomb Compressor Station would be avoided and no impacts are expected. The New Albany wetlands would be disturbed by TWS during construction; however, permanent impacts would be less than 0.01 acre. Columbia Gulf anticipates that wetland impacts would be approved under the USACE Nationwide Permit Program and would not require compensatory mitigation. We conclude that impacts on wetlands associated with the GXP would be unavoidable, but with implementation of BMPs in Columbia Gulf's ECS, impacts would not be significant.

Based on the types and amounts of wetlands that would be impacted and the Companies' measures to avoid, minimize, and mitigate wetland impacts (as described in their construction and restoration plans) as well as compliance with USACE section 404 and state permit requirements, we conclude that impacts on wetlands would be effectively minimized or mitigated.

5.1.5 Vegetation

The main vegetation type the MXP would impact during construction is forested (about 2,328 acres). Additional vegetation impact types impacted by construction include agricultural lands (about 650 acres), and open lands (about 290 acres). Permanent vegetation impacts associated with operation of the MXP would include conversion of about 810 acres of upland forest, about 164 acres of agricultural land, and about 67 acres of open land. Following construction, all staging areas and pipe yards would be restored to pre-construction conditions in accordance with Columbia Gas' ECS or per landowner agreements.

The main vegetation type that would be disturbed by construction of the GXP is agricultural (about 149 acres). Additional vegetation impact types include upland forested lands (about 22 acres) and open lands (about 13 acres).

Impacts on upland open land, emergent wetlands, and agricultural lands would be short-term as these vegetation cover types would likely return to their pre-construction states within one to three growing seasons after restoration is complete and typically do not require maintenance mowing. The exception would be at aboveground facilities where construction would permanently convert existing vegetation cover into an industrial site.

We received comments during public scoping expressing concern regarding the potential impacts of the MXP on interior forest. Thus, interior forests were assessed by identifying CFAs based upon the acreage of contiguous habitat. During MXP construction, about 2,254 acres of impact would occur to CFAs. Permanent impacts on CFAs, for operation of the facilities, would total about 829 acres; the majority of impacts on CFAs would result from pipeline construction. Interior forest tracks would not be affected by GXP construction.

Impacts on forested uplands, forested wetlands, and scrub-shrub wetlands would be long-term or permanent and would constitute the most pronounced change in vegetation strata, appearance, and habitat. Trees would be cleared within the construction area and replaced by herbaceous plants, shrubs, saplings, and other successional species until trees can again flourish,

which can take several decades or longer to occur. Regeneration of scrub-shrub wetlands would likely require 3 to 5 years to regain their woody composition. Forested uplands and wetlands would take several more years and up to decades in some instances to grow back. Moreover, the forest land on the permanent MXP pipeline right-of-way would be permanently impacted by ongoing vegetation maintenance during operations, which would preclude the re-establishment of trees in the right-of-way. Based on the acreage of mature upland forest and the fragmentation of interior forest blocks and CFAs by construction and operation of the MXP, the permanent conversion of some forested habitat to a new right-of-way corridor, and the length of time required to recover forested vegetation in the temporary workspace, these impacts would be considered significant. Columbia Gas would attempt to minimize these impacts through the implementation of its ECS, in addition to the recommendations made below in section 5.2. Due to the minimal impact on forested areas from construction and operation of the GXP, we conclude the small amount of permanent conversion of forested lands associated with the new GXP facilities would not result in a significant impact.

No WVDNR NHP rare, significant, or unique ecological communities were identified within the MXP area. However, four state-owned WMAs are crossed by the MXP pipeline centerline. These WMAs are managed for habitat and are not considered unique, rare, or significant except for the Lewis Wetzel WMA, which has been recognized as an IBA for the management of cerulean warblers. No federal or state-owned or managed lands are present within the proposed GXP compressor station sites. Additionally, no unique, sensitive, or protected vegetation communities were identified at the GXP sites.

The removal of existing vegetation and disturbance of soils within MXP work areas during construction would create conditions conducive to the spread and establishment of noxious and invasive weeds, particularly where new corridors are established in previously vegetated areas. Invasive species could also spread during MXP operation due to the transmission of seeds or viable plant fragments from infested areas via mowing equipment. To limit the potential spread of invasive species, Columbia Gas states that it is continuing consultations with the WVDNR, WVDEP, and West Virginia Office of the NRCS to develop BMPs to control the spread of invasive and noxious species. Columbia Gas has committed to monitoring for invasive species for 3 years following construction; however, we believe that additional post-construction invasive species monitoring may be needed, and we are recommending that Columbia Gas prepare a project-specific noxious and invasive weed management plan.

To limit the potential spread of invasive species, Columbia Gulf would limit vegetation removal to the extent necessary to construct the project and either burn, chip, or haul cleared vegetation to a commercial disposal facility. Additionally, Columbia Gulf would implement the measures in its ECS, which would promote the establishment of desirable plant species and deter the spread of unwanted plant species. Columbia Gulf would also conduct post-construction monitoring for noxious weed growth in revegetated areas. We conclude that the potential spread of noxious or invasive weeds would be avoided or effectively mitigated for both the MXP and GXP.

5.1.6 Wildlife and Aquatic Resources

The MXP and GXP could have both direct and indirect impacts on wildlife species and their habitats, including the displacement of wildlife, potential individual mortality, and reduction in habitat. Forest fragmentation would increase in certain locations due to clearing, thus reducing the amount of habitat available for interior forest species. With habitat conversion and forest fragmentation, there is also a risk of intrusion by invasive or noxious species. To minimize impacts, the Companies have sited facilities to avoid sensitive areas, co-locate with existing rights-of-way where practicable, and reduce workspace in wetlands and interior forest areas. The Companies' would each adhere to their ECSs, and Columbia Gas would adhere to its Invasive Species Management Plan, as recommended below in section 5.2.

The effect to species that rely on open land habitats would be short-term, and vegetation in these areas would likely recover within 1 to 3 years after construction. Cleared scrub-shrub vegetation would likely require several years to regain its woody composition. Forested lands could take decades to return to pre-construction condition, and Columbia Gas would prevent trees from reestablishing on the permanent right-of-way. Most forest-dwelling wildlife species would not be significantly impacted by the presence of the right-of-way, due to the amount of forested habitat available in the overall project area. Columbia Gas would further minimize impacts by co-locating workspaces with other existing rights-of-way in certain areas (approximately 13.9 percent of the proposed alignment) to reduce the amount of additional clearing required, and by reducing the pipeline construction right-of-way to 100 feet in interior forest areas, where possible.

A variety of migratory bird species are associated with habitats that would be affected by the MXP. Columbia Gas has consulted with the USFWS and WVDNR to implement appropriate steps to avoid and minimize the potential for the unintentional take of migratory birds during project construction and operation. Implementation of Columbia Gas' ECS during construction and operational practices would reduce the potential for impacts on migratory birds. Columbia Gas would attempt to complete vegetation clearing in forested areas before the nesting season begins in April; however, limited vegetation clearing activities may continue into May, with some risk of affecting active nests of migratory birds. Mitigation required for wetland impacts under section 404 of the CWA, particularly mitigation for the conversion of forested wetlands to other cover types, would help in providing habitat mitigation for birds that utilize wetland habitats. We agree that the measures proposed by Columbia Gas could help reduce impacts on migratory birds and are consistent with the goals of the MBTA MOU. However, we have recommended further consultations with USFWS and WVDNR to address impacts on suitable habitat for the cerulean warbler, which was identified in the MXP area. Because the cerulean warbler is considered by the WVDNR as especially sensitive in the MXP area, we have concluded that the significant impact on interior forest habitat and CFAs would extend to this species, although we do not expect direct mortality on the birds themselves.

No bald eagle nests or eagles were identified during site surveys in the vicinity of the MXP or of the GXP compressor station sites in Kentucky. Additionally, the KDFWR did not identify golden eagle nests or documented occurrences in the area during review of the GXP. IPaC data indicate that bald eagles may occur in or near the GXP sites in Tennessee and Mississippi; however, no bald eagle nests or eagles were identified at the project sites or along nearby public roads during field surveys. Additionally, both the TDEC and the MDWFP maintain records of

known bald eagle nest locations in Tennessee and Mississippi, respectively, and confirmed that no bald eagle nests are documented within the GXP counties. Based on the results of biological field surveys conducted by Columbia Gulf and agency consultations, we believe that construction and operation of the GXP would be in compliance with National Bald Eagle Management Guidelines and would not affect the bald eagle.

The MXP pipelines would result in 108 crossings of B1 fisheries and 36 crossings of HQWs. Based on a review of Columbia Gas' MSHCP database, USFWS's IPaC, and consultation with the WVDNR, one protected fish species, the federally endangered diamond darter, and no commercial fish species or coldwater fisheries, are known or believed to occur within waterbodies crossed by or located near the MXP.

No waterbodies classified as a fishery resource would be affected by any of the GXP compressor station sites. Columbia Gulf would implement the measures included in its ECS, which adopts the measures of FERC's Plan and Procedures, to minimize impacts on waterbodies and associated fisheries, such as the installation and maintenance of sediment and erosion controls to manage the quality of storm water runoff during construction. We conclude that the construction and operation of the MXP and GXP would not have a significant impact on fisheries or other aquatic resources.

5.1.7 Special Status Species

To comply with section 7 of the ESA, we consulted either directly or indirectly (through the Companies' informal consultation as our federal representative) with the USFWS and state resource agencies regarding the presence of federally listed, proposed for listing, or state-listed species in the MXP and GXP areas. Within MSHCP-covered lands, Columbia Gas and Columbia Gulf would implement AMMs for species identified in the MSHCP. Where we determine that the proposed activities are consistent with the MSHCP, the subsequent programmatic BO and/or resource agency concurrence letters, no further consultation is required. For non-MSHCP species (i.e., listed species occurring within covered lands but not authorized for incidental take under the MSHCP), Columbia Gas and Columbia Gulf would implement BMPs similar to the AMMs, and additional section 7 consultation may or may not be required. In addition, consultation with the USFWS in compliance with section 7 of the ESA is required for project areas and species that are not covered under the MSHCP (i.e., non-covered lands, non-covered species) if the proposed activity deviates from the MSHCP in scope or location; the activity may affect a non-MSHCP species or designated critical habitat; or the activity otherwise deviates from the MSHCP, programmatic BO, and/or concurrence letters.

Mountaineer XPress Project

According to the USFWS, there are four bat species, one fish species, and eight mussel species protected under the ESA in the MXP project vicinity. Three species (gray bat, Virginia big-eared bat, and northern riffleshell) are MSHCP species associated entirely with MSHCP covered lands; five species (Indiana bat, NLEB, and the clubshell, fanshell, and sheepnose mussels) are MSHCP species associated with both covered and non-covered MSHCP lands; five species (diamond darter and pink mucket, rayed bean, snuffbox, and spectaclecase mussels) are

non-MSHCP species. Columbia Gas initiated specialized surveys for federally protected species in areas not covered under the MSHCP.

We determined that suitable habitat for the Indiana bat and NLEB is present within all counties affected by the MXP. In those areas covered by the MSHCP, Columbia Gas would implement the applicable AMM for these species, including prohibiting clearing activities during certain times of year to protect maternity colonies. In non-covered MSHCP lands, Columbia Gas would prepare a Myotid Bat Conservation Plan. This plan would be implemented in coordination with the USFWS. No known roosting habitat for the Virginia big-eared bat is within 6 miles of the project area, and no AMMs would be required. No further section 7 consultation is required for this species.

To avoid disturbance of the diamond darter population known to exist in the Elk River, there would be no instream work at the Elk River Compressor Station site. We do not anticipate direct impacts on this species, and applicable AMMs for this species (as identified in the MSHCP) would be implemented by Columbia Gas. For any activity within 100 feet of the Elk River with potential effects, Columbia Gas would include special procedures within its EM&CP. Based on these measures and the fact that the project would not directly impact the Elk River, we have concluded that the MXP is *not likely to adversely affect* the diamond darter; and we will seek concurrence on this determination from USFWS.

With USFWS and WVDNR approval, Columbia Gas also conducted initial surveys for protected mussel species in 2015 and 2016. In consultation with the USFWS and WVDNR, Columbia Gas will perform additional stream surveys for mussel species in 2017. If presence is identified during surveys, Columbia Gas and the USFWS will determine the appropriate AMMs to be implemented outside of MSHCP-covered lands. It is anticipated that the AMMs for mussels located outside of MSHCP lands would be consistent with the requirements of the MSHCP. Columbia Gas anticipates completing the remaining mussel surveys in late spring 2017.

West Virginia has no state endangered species legislation; therefore, the only species listed as threatened or endangered in the state are those listed as such by the federal government. The WVDNR NHP does assign state rankings to species considered rare based on the species' documented occurrences and distributions as well as other factors, such as habitat and threats to existing populations. To date, Columbia Gas has not identified any S1 ("Critically Impaired") or S2 ("Imperiled") state-ranked terrestrial species during biological surveys; however, as noted above, surveys are being undertaken for mussels in suitable streams crossed by the MXP.

Gulf XPress Project

All GXP facilities are in areas covered by the MSHCP. Therefore, AMM would be implemented by Columbia Gulf as required for all MSHCP-covered species where it is determined that the project "*may affect*" these species. For non-MSHCP species, the USFWS would address potential take programmatically through tiered Section 7 consultations. Acting as our non-federal representative, Columbia Gulf has completed informal consultations with USFWS for non-MSHCP species potentially occurring at the GXP locations. Columbia Gulf conducted field surveys of all GXP preferred site locations and suitable alternatives in June 2015 for federal and state-listed species.

According to the USFWS IPaC Trust Resource Reports generated for the project locations, 4 bat species, 1 fish, 18 species of mussels, 1 insect, 1 crustacean, and 6 plant species that are protected under the ESA (or candidate species) may occur in the GXP area.

Suitable gray bat habitat (i.e., cave habitat) was not identified at GXP sites during field surveys. Through MSHCP review and consultation with USFWS, we determined the GXP is not likely to adversely affect this species. Potential Indiana bat and NLEB summer habitat was identified in the vicinity of all GXP sites. The Indiana bat and NLEB are covered species in the MSHCP and are listed as LAA. The GXP is likely to adversely affect these species without avoidance and mitigation. Therefore, Columbia Gulf would implement the appropriate AMM for these species, including clearing only during those periods described in the MSHCP, when Indiana bats and NLEBs would be less likely to be affected by construction activities. The Virginia big-eared bat is a covered species in the MSHCP and is considered NLAA. Because no habitat exists for this species at GXP sites within its range, no AMM would be implemented, and no further section 7 consultation is required.

The snuffbox mussel was identified as potentially occurring in Carter County, Kentucky. We have concluded that required habitat for this mussel is not present at the Grayson Compressor Station site. However, the MSHCP contains an administrative requirement that the USFWS must concur with or provide an effects determination for this species. We or Columbia Gulf (as our non-federal representative) will request that the USFWS provide such concurrence prior to construction.

We received comments from the public regarding the potential for the Nashville crayfish to occur in the vicinity of the Cane Ridge Compressor Station. With regard to this species, the USFWS stated that although it does not anticipate the Nashville crayfish to occur at the station site, due to the proximity of the site to Mill Creek where there are known occurrences, they recommend strict sediment and contaminant runoff prevention measures be in place during construction and operation of the facility. Based on the information provided, the USFWS concluded that the requirements of Section 7 of the ESA have been fulfilled. We agree with these findings.

We identified 110 state-listed threatened and endangered species in Kentucky, 36 state-listed species in Tennessee, and 2 state-listed species in Mississippi where GXP activities would occur. Based on review of the site locations, habitat requirements of the species, and general biological surveys, there is no suitable habitat for any state-listed-only species located at the GXP sites; thus no impacts on these species are expected.

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

5.1.8 Land Use, Recreation, Special Interest Areas, and Visual Resources

Mountaineer XPress Project

Construction of the MXP would impact a total of about 3,590 acres. About 76 percent of this acreage would be utilized for the pipeline facilities. The remaining acreage impacted during construction would be associated with aboveground facilities (4 percent), pipe yards and staging areas (13 percent), and access roads (8 percent). Following construction, about 1,074 acres of land would be permanently encumbered by operation of the MXP.

The MXP pipeline right-of-way would generally be allowed to revert to its former use, except for forest/woodland and tree crops. Approximately 130.4 miles of the 170.7 miles of the proposed MXP pipeline routes pass through forested areas. There would be a permanent change in the visual appearance to forested lands within the permanent easement (50 feet wide for the pipelines) because they would be maintained in an herbaceous state for pipeline surveillance and operations purposes. This maintained right-of-way would be mowed no more than once every 3 years, but a 10-foot-wide strip centered over the pipeline might be mowed more frequently to facilitate maintenance and operational surveys. Trees and shrubs in the TWS and ATWS areas would be allowed to regenerate to pre-construction conditions.

Agricultural lands affected by construction would include cultivated croplands and uncultivated lands, such as hayfields. The primary impacts in these areas would be short-term and limited to the growing season concurrent with construction. Farmers would experience some loss of crop production in areas directly disturbed by construction-related activities. Following construction, agricultural practices within the pipeline rights-of-way would be allowed to resume.

Columbia Gas is currently not aware of any existing drain tile systems within the construction work area; however, Columbia Gas is consulting with landowners in an attempt to locate and flag existing drainage tiles. If drainage tiles are exposed or damaged during construction activities, appropriate measures to repair/replace them would be implemented after communication with the landowner and in accordance with applicable regulatory guidelines.

Impacts on visual resources would be greatest where the MXP pipeline parallels or crosses roads and the pipeline right-of-way may be seen by passing motorists; from residences where vegetation used for visual screening or for ornamental value is removed; and where the pipelines are routed through forested areas. A portion of the MXP pipeline (about 22 percent) would be installed within or parallel to existing utility rights-of-way. As a result, the visual resources along this portion of the MXP pipeline have been previously affected by other similar activities. In other areas, the visual effects of construction in forests would be permanent on the maintained pipeline right-of-way where the regrowth of trees would not be allowed, and would be long-term in the TWS. After construction, all disturbed areas within the pipeline right-of-way, including forested areas, would be restored in compliance with the Columbia Gas' ECS; federal, state, and local permits; landowner agreements; and easement requirements. The new aboveground facilities would result in a permanent visual impact throughout the operational life of the MXP.

Columbia Gas' proposed construction work areas would be within 50 feet of 49 houses. To address impacts on residences, Columbia Gas developed site-specific construction plans for

each of the residences. If any damages to residential property result from construction, Columbia Gas would repair the damaged property or provide appropriate compensation to the landowner. All TWS and ATWS on residential land would be restored to its pre-construction condition, or as negotiated with the landowner during right-of-way easement discussions. Landowners would receive a 2-week notification prior to construction on their respective properties. Columbia Gas would implement an environmental complaint resolution procedure for construction and for a period of at least 2 years following the completion of construction. Prior to construction, Columbia Gas would mail a letter describing the procedures to landowners whose properties would be affected by the MXP.

We have reviewed the site-specific plans, mitigation, and associated workspace justifications and noted that the distance between a residence and the construction work area is less than 25 feet for eight tracts. In these locations, the pipeline trench would not remain open overnight. Residential driveways are crossed by the construction work area on eight tracts. Columbia Gas' plans indicate that vehicle access to residences would be maintained at all times, or other accommodations would be made with the landowner. We noted a fenced corral and a shed within the construction work area for two tracts. The plans generally indicate that these and other physical features that need to be protected would be enclosed in safety fence to avoid disturbance during construction. However, it appears that these particular structures may need to be removed or relocated to accommodate construction. Therefore, we are recommending that Columbia Gas provide additional information regarding these tracts.

We received scoping comments regarding the potential loss of privacy from clearing mature trees in residential areas. We believe that the general and site-specific mitigation measures proposed by Columbia Gas would address these concerns, including preservation of mature trees and landscaping at the edge of the construction right-of-way, unless removal is necessary.

The MXP would cross or pass within 0.25 mile of five WMAs managed by the WVDNR and one West Virginia Scenic Byway. During the public scoping process, we received comments regarding concerns with impacts on recreational areas used for hunting. Columbia Gas would work with WVDNR officials to maintain the continued public recreational use of affected WMAs during construction of the MXP. Columbia Gas would adhere to its ECS and WVDNR requirements when constructing facilities within the WMA. Once construction is complete, the MXP is not expected to have permanent impacts on the WMAs ability to continue to serve as a public recreational resource and to protect biodiversity. Following construction, most open land uses, such as hunting, would be able to continue. Columbia Gas would enter into an agreement with the WVDNR to obtain easement rights through the WMAs for a term of 15 years, which would be renewable. Columbia Gas is continuing discussions about the MXP with the WVDNR for each of the WMAs.

About 0.2 mile of a well-developed, existing access road associated with the MXP crosses one conservation easement, the Lantz Farm and Nature Preserve, in the vicinity of MP 29.0 in Wetzel County. The property is owned by the Wheeling Jesuit University and cooperatively managed by the WVDNR. Columbia Gas met with the WVDNR on September 7, 2016, to discuss the project and the current proposed route. Based on the meeting, it appears that Columbia Gas and the WVDNR can successfully execute a license agreement for the current proposed route or the route with slight modifications. Columbia Gas will continue to work with the WVDNR to

finalize the route. Once finalized, Columbia Gas will provide us with an update and summarize the associated impacts. Because a portion of the property was acquired with a Wildlife and Sport Fish Restoration grant from the USFWS, an opinion from USFWS for non-interference of the grant purpose will be necessary under the authority established in 50 CFR 80 prior to WVDNR approving the pipeline easement across the WMA. The WVDNR will provide summary information to the USFWS to aid in a determination of non-interference.

The MXP would cross several recreational trails managed by state, local, and private entities. Within the Lewis Wetzel WMA, the MXP would cross four designated trails and is within 0.25 mile of two additional trails. The MXP would also cross the North Bend Trail, which is a 72-mile-long rail-trail managed by the WVDNR. In addition to the state-maintained trails, the MXP-100 would cross a 2-mile-long nature trail owned by the Roane-Jackson Technical Center and the 67-mile-long Warrior Trail in Marshall County. Columbia Gas would work with each trail management agency to establish safety protocols at each crossing and would make efforts to alert recreational users of trails and other recreation areas of the anticipated time and duration of disruptions associated with construction. Construction of the MXP could temporarily impact the quality of trail user's recreational experience, as well as affect visual impacts on trail-users hiking in areas near MXP construction activities. Columbia Gas would also work with the respective trail management agencies to develop site-specific crossing methods and restoration plans for each trail crossing, which may include the installation of visual screening, such as special plantings. In general, MXP pipeline impacts on recreational and special interest areas would be temporary and limited to the period of active construction. These impacts would be minimized by implementation of Columbia Gas' ECS.

The MXP would not cross any current or proposed wild and scenic rivers or be located within the Coastal Zone as established in the CZMA. No federally managed lands would be crossed by or are within 0.25 mile of the MXP.

Gulf XPress Project

All of the GXP facilities would be sited on land owned by Columbia Gulf. Project construction would temporarily disturb a total of about 198 acres. Following construction, about 82 acres of land would be permanently converted to developed land for operation of the GXP. The primary land use types that would be permanently encumbered would be agricultural (77 percent), forested (15 percent), and open land (7 percent). Developed land, open water, and wetlands would make up the remaining 1 percent of permanent impacts. No houses are within 50 feet of either the temporary or permanent workspace of any of the facilities.

The GXP facilities would be within 0.25 mile of two publicly owned lands, the DBNF and the Malmaison WMA. The DBNF comprises 708,000 acres, of which a portion is about 600 feet east of the Morehead Compressor Station in Kentucky. Public recreational uses of the DBNF include camping, horseback riding, swimming, hiking, target shooting, caving, geocaching, wildlife viewing, boating, and fishing. I-64 is located between the compressor station site and the DBNF; therefore, construction and operation of the station would likely not be noticeable from the DBNF. Columbia Gulf contacted representatives from the DBNF, who indicated that they had no concerns regarding the GXP because the compressor station site is on private lands.

A portion of the Malmaison WMA is about 1,000 feet west of the Holcomb Compressor Station in Mississippi. The 9,483-acre Malmaison WMA is utilized for hunting, fishing, wildlife viewing, and hiking. The GXP could result in temporary and permanent visual impacts on the WMA. However, the presence of forested areas between the compressor station site and the WMA would provide visual screening. Columbia Gulf attempted to contact representatives of the WMA; however, no responses were received.

We received multiple scoping comments regarding a zoning ordinance amendment (Ordinance No. BL2015-1210) enacted in August 2015 by the Metropolitan Government of Nashville and Davidson County requiring that natural gas compressor stations be located within an industrial zoning district. The Cane Ridge site is currently zoned agricultural. Although local ordinances have no bearing on a Commission Certificate, Columbia Gas has agreed to work with the Metropolitan Government to identify recommended site development measures for this property.

We received numerous comments regarding concerns centered around impacts on the Mill Creek Greenway from the proposed Cane Ridge Compressor Station. The Mill Creek Park and Mill Creek Greenway are approximately 0.4 mile south of the proposed compressor station site. Due to the distance, existing tree cover, and existing residential developments that abut the park, any visual and/or noise impacts on trail- and park-users of Mill Creek Park and Greenway would be negligible.

The new aboveground facilities would result in a permanent visual impact throughout the operational life of the MXP and GXP. The Companies have designed aboveground facilities to preserve existing tree buffers within purchased parcels to the extent practicable. To further mitigate visual impacts, the Companies would install perimeter fences and directionally controlled lighting.

5.1.9 Socioeconomics

Construction of the MXP and GXP would not have significant adverse impacts on local populations, housing, employment, or the provision of community services. There would be temporary increases in demand for housing, such as hotels, motels, and other rental units, due to the influx of construction workers. Also, there would be temporary increases in traffic levels due to the commuting of the construction workforce to the MXP and GXP areas, as well as the movement of construction vehicles and delivery of equipment and materials to the construction sites. To address and mitigate traffic impacts related to MXP and GXP construction, the Companies would coordinate with local officials to avoid traffic interruptions and protect the safety of pedestrians, motorists, and emergency vehicles. Further, we are recommending that Columbia Gas prepare a final traffic management plan to address measures for implementing detours on public roadways, timing shifts and worker commutes to avoid heavy traffic periods, and measure to restore roadways damaged during project-related activities.

During MXP scoping, we received multiple comments regarding concerns with reductions in property values that could result from the construction and operation of natural gas facilities near homes, residential areas, or areas identified for future residential or commercial developments. 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, which is designed to provide fair compensation to the landowner for the right to use the property for pipeline construction and operation, including compensation for construction-related damages and for damages associated with residential properties, crops, pasture, and timber. Based on the research we have reviewed, we find no conclusive evidence indicating that natural gas pipeline easements would have a negative impact on property values in general; however, there is always the possibility that any given property may experience some value-related impacts.

We also received comments regarding concerns with local tax losses due to diminished property values, but found no conclusive evidence indicating that natural gas pipeline easements would have a negative impact on property values. The long-term positive economic impacts from the MXP include an increase in annual tax revenue, paid by Columbia Gas, ranging from $50,000 per year in Mason County to $5.6 million in Doddridge County. Increases in annual tax revenues, paid by Columbia Gulf, in the counties affected by the GXP facilities, would also be received. This increase in taxes paid would benefit the local governments and their budgets annually for the life of the MXP and GXP.

Construction of the MXP and GXP would result in minor beneficial socioeconomic impacts due to increases in construction jobs, payroll taxes, purchases made by the workforce, and expenses associated with the acquisition of material goods and equipment. Operation of the MXP would have a minor to moderate positive effect to the local governments' tax revenues due to the increase in property taxes that would be collected from Columbia Gas.

Overall, we conclude that the MXP and GXP would not have a significant adverse effect to the socioeconomic conditions of the MXP and GXP areas.

5.1.10 Cultural Resources

West Virginia Cultural Resources Surveys

As of October 2016, Columbia Gas has documented and assessed 46 archaeological resources within the MXP surveyed area and recommended that 43 of the sites were not eligible for the NRHP. Of the three eligible sites, one was previously recorded, determined eligible for the NRHP, and would be avoided by HDD. The other two sites would be avoided through corridor adjustments. The previously and newly recorded resources include 11 historic-era cemeteries, 20 pre-contact sites, 4 isolated finds of pre-contact artifacts, 10 historic-period sites, and 1 multicomponent site. MXP construction would avoid all 11 historic-era cemeteries recorded during the survey. For the cemetery less than 20 meters from the MXP centerline, Columbia Gas would install construction fencing and/or flagging or signage at the edge of the construction workspace to protect the cemetery from construction impacts.

The MXP-100 Pipeline survey corridor passes through the eastern portion of the Burning Springs Civil War battlefield, approximately 1.2 miles east of the Burning Springs Complex NRHP boundary. The portion of the pipeline that crosses the Little Kanawha River is listed on the NRI due in part to its association with the Burning Springs Complex Site. No further cultural investigations are recommended for this area.

Columbia Gas documented and assessed 167 historic-age architectural resources within the surveyed area, including 149 residential properties, 5 farm complexes without residences, 7 churches, 2 commercial buildings, a bridge (Mud River Covered Bridge), a school, a hospital complex, and a rail line that has been converted to a recreational trail. One of these resources, the 1930s-era Morris Memorial Children's Hospital complex, is NRHP-listed. The hospital complex occupies a hilltop approximately 0.3 mile to the west of the MXP. MXP construction is not expected to have a significant negative impact on the viewshed due to the modern infrastructure already present, and that the visual effects would not be adverse. In addition, the MXP crossing point at Mud River in Cabell County at MP 161.4 is within a segment listed on the NRI as having historic value based in part on the Mud River Covered Bridge. The original location of the bridge is about 1.7 miles north-northwest of the proposed MXP-100 pipeline crossing of the Mud River. This bridge, listed as a National Historic Landmark, was subsequently moved off the river to an isolated pond within the Cabell County Fairgrounds, approximately 1.5 miles north of the proposed crossing of the Mud River. No further cultural investigations are recommended for this area. Columbia Gas recommended that the remaining 166 resources were not eligible for the NRHP. SHPO concurrence is still pending.

Kentucky Cultural Resources Surveys

Columbia Gulf's Phase I archaeological survey resulted in the identification of two new pre-contact archaeological sites and an isolated find. Columbia Gulf recommended that one of the sites and the isolated find were not eligible for the NRHP. Following Phase II evaluation testing, the portion of the other site was recommended as not eligible for the NRHP, and Columbia Gulf recommended no further work for the site. In a letter dated June 9, 2016, the Kentucky SHPO concurred with these recommendations. We concur also.

Columbia Gulf's Phase I architectural survey resulted in the identification of seven previously recorded resources (a cemetery, two residences, two barns, and two farms) and eight newly recorded resources (a bridge, a farmstead, three residences, and three barns). Four of the previously recorded resources had been previously determined not eligible for the NRHP and were not revisited. The remaining 11 resources were recommended as not eligible for the NRHP. In a letter dated September 22, 2016, the Kentucky SHPO concurred with Columbia Gulf's revised report and indicated no historic properties would be affected by the project. We agree with the Kentucky SHPO.

Tennessee Cultural Resources Surveys

Columbia Gulf's Phase I survey for archaeological and historic architectural resources resulted in the identification of one newly recorded pre-contact archaeological site, one previously recorded pre-contact archaeological site, eight newly recorded historic architectural properties (all residences), and four previously recorded historic architectural properties (three residences and a church/cemetery). Columbia Gulf recommended that none of these resources were eligible for the NRHP, and no further work would be required. In a May 16, 2016 letter, the Tennessee SHPO found that "the project area contains no historic properties eligible for listing in the National Register of Historic Places." We agree with the Tennessee SHPO.

The NPS communicated concerns over the potential for impacts on the Trail of Tears at the proposed Clifton Junction Compressor Station site. We have determined that no direct impacts on the Trail of Tears would result from the construction and operation of this compressor station. The station exhaust stack would potentially be visible to motorists from points along U.S. Highway 64; however, as the highway is used for vehicle traffic, the stack would be seen only briefly, and distinct features would be difficult to distinguish given the prevalence of surrounding forested lands and rolling topography.

Mississippi Cultural Resources Surveys

Columbia Gulf's Phase I survey for archaeological and historic architectural resources resulted in the identification of no archaeological sites and nine newly recorded historic architectural properties (seven residences, a radio tower, and a church/cemetery). Columbia Gulf recommended that none of the historic architectural properties were eligible for the NRHP, and no further work would be required. In a May 23, 2016 letter, the Mississippi SHPO concurred with the findings and recommendations of Columbia Gulf. We concur also.

Native American Consultation

Columbia Gulf and Columbia Gas requested information from federally recognized Native American tribes regarding the locations of archaeological sites, burials, or traditional cultural properties within or near the MXP and GXP areas. Columbia Gas sent introductory project letters to 11 tribes on July 14, 2015. The Seneca Nation of Indians and Delaware Nation replied requesting a copy of the survey findings upon completion. The Delaware Tribe of Indians replied with a letter detailing its fee structure for responding to consultation requests. Columbia Gas indicated it would provide the Seneca Nation and Delaware Nation with the survey report. We sent our Notice of Intent and follow-up letters to these same tribes. The United Keetoowah Band of Cherokee Indians of Oklahoma responded on April 8, 2016, and recommended a survey be completed. Columbia will provide the tribe with the survey report.

Columbia Gulf requested information from federally recognized Native American tribes and sent introductory project letters to 21 tribes on July 17, 2015, and two additional tribes on June 1, 2016. Columbia Gulf also conducted follow-up phone calls with the tribes. Columbia Gulf received nine responses to the introductory letter, including requests to be notified of inadvertent discoveries and for copies of survey reports. Columbia Gulf provided survey reports to those tribes that requested them. We sent our Notice of Intent and follow-up letters to these same tribes. The United Keetoowah Band of Cherokee Indians responded on June 22, 2016, and recommended a survey be completed. In a June 23, 2016 letter, the Quapaw Tribe of Oklahoma expressed interest in the GXP and requested copies of all SHPO correspondence. Columbia Gulf provided both tribes with the requested information and the survey reports.

Compliance with NHPA

The Companies' have planned the MXP and GXP to avoid impacting NRHP-eligible resources. If NRHP-eligible resources are identified that cannot be avoided, the Companies would prepare treatment plans. Implementation of a treatment plan would only occur after certification of the MXP and GXP and after the FERC provides written notification to proceed. Portions of the

MXP still require survey and Section 106 consultation with the SHPO is not complete. Compliance with section 106 of the NHPA is complete for all of the GXP components in Tennessee, Mississippi, and Kentucky.

5.1.11 Air Quality and Noise

5.1.11.1 Air Quality

The air quality impacts associated with construction of the MXP and GXP would include temporary, localized increases in tailpipe emissions from fossil-fueled construction equipment and temporary increases in fugitive dust due to surface disturbances caused by construction activities and vehicle travel on unpaved roads. Local emissions may be elevated, and nearby residents may notice elevated levels of fugitive dust, but these would not be significant, and air quality impacts would be temporary and localized. The Companies would each implement their respective Fugitive Dust Control Plan that describes mitigation measures to control fugitive dust during construction activities. We have reviewed these plans and find them acceptable. In nonattainment and maintenance areas, estimated construction emissions would not exceed the General Conformity thresholds. Therefore, we conclude that the MXP and GXP construction would not result in a significant impact on local or regional air quality.

Operation of the MXP and GXP aboveground facilities would result in long-term air emissions from stationary equipment (e.g., turbines, emergency generators, and heaters at compressor stations and M&R stations), including emissions of NO_x, CO, particulate matter, SO_2, VOCs, GHGs (including fugitive CH_4), and HAPs. Modeling results demonstrate that the MXP and GXP compressor stations would not exceed NAAQS, and the project areas would continue to remain protective of human health and public welfare for all listed pollutants. The proposed and modified compressor stations and M&R stations would be a minor source of air emissions under federal air quality programs and would not have a significant impact on local or regional air quality.

Commenters expressed concern about exposure to chemicals from the construction and operation of gas compressor stations and the impacts on human health. Fugitive gas emissions can occur because of leaks from gas pipeline equipment and can be emitted from blowdowns at compressor stations. Fugitive emissions from equipment leaks are estimated to be less than 1 tpy for each GXP compressor station, and blowdown emissions are estimated to be in the range of 5 to 7 tpy. These fugitive gas emissions would be pipeline quality gas that primarily comprises CH_4, ethane, and propane (hydrocarbons) and not highly toxic compounds. The principle source of pollutants from the compressor stations, both HAPs and criteria pollutants, would occur as a result of natural gas combustion. Combustion emissions were estimated for each GXP compressor station, and all GXP compressor station emissions are below the major source HAP thresholds (10 tpy for each individual HAP and 25 tpy for combined HAPs). The remaining criteria pollutants were modeled and estimated ambient concentrations were found to be below NAAQS which are set by the EPA to be protective of the public health.

Based on our analysis and compliance with federal and state air quality regulations, we conclude that operational emissions would not have a significant impact on local and regional air quality.

5.1.11.2 Noise

Noise would be generated during construction of the MXP pipelines and MXP and GXP aboveground facilities. Construction noise associated with the MXP pipelines would be spread over the length of the pipeline corridors and would not be concentrated at any one location for an extended period, except at the proposed HDD sites. Construction noise associated with the MXP and GXP aboveground facilities would be more concentrated in the vicinity of compressor stations and would extend for several months, but would vary depending on the specific activities taking place at any given time.

NSAs near the MXP and GXP construction areas may experience an increase in perceptible noise, but the effect would be temporary and local. Noise mitigation measures that would be employed during construction include the use of sound-muffling devices on engines and the installation of barriers between construction activity and NSAs. Generally, nighttime noise would not increase during construction, with the exception of HDD activity for the MXP.

At the HDD and Direct Pipe sites, construction activity and drilling noise may be prolonged (several weeks to months depending on the length of the drill and the hardness of the substrate being drilled) and extend overnight. Columbia Gas proposes to use these techniques at two locations along the MXP pipeline route (HDD at the Kanawha River and Direct Pipe at Highway 50), and performed ambient noise surveys and acoustical assessments of NSAs within 0.5 mile of the sites to determine background noise levels and the predicted noise levels at NSAs. For entry and exit points at which the predicted noise levels at a NSA are greater than 55 dBA L_{dn}, Columbia Gas would install residential grade exhaust mufflers on engines and install acoustic barriers between the drilling site and the impacted NSA to mitigate noise impacts. Even with mitigation measures at the Kanawha River, the expected impacts at NSA #1 would still exceed 55 dBA L_{dn} and would represent more than a doubling of perceived ambient noise levels. We are recommending that Columbia Gas provide mitigation measures and make all reasonable efforts to ensure residents do not experience noise impacts above 55 dBA L_{dn}.

Based on the analyses conducted and mitigation measures proposed, as well as our recommendation, we conclude that construction of the MXP pipelines (including HDD activities), compressor stations, and regulator stations would not result in significant noise impacts on NSAs. There are no proposed HDD drilling operations for the GXP.

Noise levels associated with the operation of each MXP compressor and regulator station, with the exception of the existing Ceredo Station, are projected to be below an L_{dn} of 55 dBA. The modifications associated with the Ceredo Station would result in a decrease in noise levels at NSAs. Operation of the Sherwood, White Oak, Mount Olive, and Saunders Creek stations would result in a noticeable increase in noise levels, but total noise levels would remain below an L_{dn} of 55 dBA. Noise levels from each GXP compressor and meter station are projected to be below an L_{dn} of 55 dBA. Operation of the Paint Lick, Goodluck, Leach C, and Cane Ridge stations would result in a noticeable increase in noise levels; however, total noise levels would remain below our 55 dBA L_{dn} criterion. Noise from planned or unplanned blowdown events could exceed the noise criteria, but would be infrequent and of relative short duration. To ensure that the noise levels during operation of the compressor stations and meter stations do not exceed the FERC 55 dBA

L_{dn} sound criterion, we are recommending that the Companies file noise surveys at full load conditions and install additional noise controls if the levels are exceeded.

Based on modeled noise levels, mitigation measures proposed, our recommendations, and the temporary nature of construction, we conclude that construction and operation of the MXP and GXP would not result in significant noise impacts on residents or the surrounding communities.

5.1.12 Reliability and Safety

The MXP pipelines and MXP and GXP aboveground facilities would be designed, constructed, operated, and maintained to meet the DOT Minimum Federal Safety Standards in 49 CFR 192 and other applicable federal and state regulations. These regulations include specifications for material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion. Each compressor station would be enclosed within a chain-linked fence and equipped with security cameras, an alarm system, ventilating equipment, automatic shutdown systems, and relief valves.

Safety standards specified in 49 CFR 192 also require that each operator establish and maintain liaison with appropriate fire, law enforcement, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency, and to coordinate mutual assistance in responding to emergencies. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. Columbia Gas would utilize the emergency procedures contained in its Emergency Operating Procedures Manual, which requires communication with emergency responders on an annual basis. Local contact phone numbers, external contact information, equipment or resources available for mobilization, and any specific procedures to be followed for the MXP would be incorporated into the Emergency Operating Procedures Manual prior to commencement of pipeline operations.

Based on the Companies' compliance with federal design and safety standards and their implementation of safety measures, we conclude that constructing and operating the MXP and GXP facilities would not significantly impact public safety.

5.1.13 Cumulative Impacts

The MXP and GXP have potential to contribute towards cumulative impacts on the environment and economy when other past, present, and reasonably foreseeable projects or actions occur within the same geographic and temporal scopes as the MXP or GXP. These projects include FERC-jurisdictional natural gas pipelines and aboveground facilities; non-jurisdictional facilities associated with the MXP and GXP; other natural gas facilities that are not under the Commission's jurisdiction; and other actions including electric transmission projects, transportation projects, and residential and commercial developments.

A majority of the impacts associated with the MXP and GXP, when combined with impacts from other projects, would be temporary and relatively minor overall, and we included recommendations in the EIS to further reduce the environmental impacts associated the MXP and GXP. However, some long-term significant cumulative impacts would occur on upland forested

vegetation and associated wildlife habitats. The MXP could contribute substantially to short-term impacts on the availability of local housing along the MXP-100 pipeline route. However, short- and long-term cumulative benefits, from a combination of multiple projects within a region, on the communities would be realized through jobs, wages, purchases of goods and materials, and annual property taxes paid by the Companies and the other project's advocates.

5.1.14 Alternatives

We evaluated the no-action alternative, system alternatives, MXP pipeline major route alternatives, minor pipeline route variations, and alternative locations for the proposed GXP Cane Ridge Compressor Station. While the no-action alternative would eliminate the short- and long-term environmental impacts identified in the EIS, the state objectives of the Companies' proposals would not be met.

We compared each alternative to the proposed action using three key criteria:

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

For the purpose of analyzing system alternatives, we evaluated potential impacts associated with using other gas suppliers to transport an equivalent volume of gas to meet the MXP purpose and need and to provide firm transportation service to Columbia Gas' TCO Pool, as well as more southerly markets accessible from Columbia Gulf's pipeline. None of the other pipeline systems in the vicinity of the MXP have the capacity to transport the large volumes of gas that would be carried by the MXP, and none of the existing systems would be able to expand their facilities within the schedule required by the MXP's shippers. Because other pipeline carriers in the MXP area would be required to construct new pipeline segments and other appurtenances to reach the receipt and delivery points required by MXP, we do not consider the use of other existing pipeline systems to be a viable alternative to the MXP. Therefore, these alternatives were eliminated from further analysis.

We analyzed two major pipeline route alternatives to the MXP, one that involved looping/upgrades to existing Columbia Gas pipeline systems and one that included modifications to an approved Columbia Gas project currently under construction (the LEX; Docket No. CP15-514). The alternatives reviewed were determined to be not environmentally preferable to the proposed action. Additionally, the constructability issues associated with all of the major pipeline route alternatives and the potential impacts on an increased number of landowners make the alternatives less preferable than the MXP. We received comment letters from four affected landowners requesting alternative routes across their properties and have recommended Columbia Gas evaluate these routes, as discussed in section 3.4 and listed below in section 5.2.

We considered two alternatives involving Columbia Gulf using its existing system to meet the purpose and need of the GXP: a loop-intensive alternative that would include modifications to an existing facility and seven new pipeline looping sections; and a separate alternative that involved a combination of looping and horsepower increases at five existing compressor stations. We do not consider the looping and addition of compression at Columbia Gulf's existing

compressor stations to be preferable to or provide a significant environmental advantage over the GXP. Therefore, they were eliminated from further analysis.

We received public comments regarding alternative sites for the GXP Cane Ridge Compressor Station. We reviewed two alternative sites for the Cane Ridge Compressor Station; however, we did not find that either alternative site conferred an environmental advantage over the proposed site.

5.2 FERC STAFF'S RECOMMENDED MITIGATION

If the Commission authorizes the MXP and GXP, we recommend that the following measures be included as specific conditions in the Commission's Order. We conclude that these measures would further mitigate the environmental impacts associated with the construction and operation of the MXP and GXP. We have included several recommendations that require the Companies to provide updated information and/or documents prior to the end of the draft EIS comment period. We do not expect that the Companies' responses would materially change any of the conclusions presented in this draft EIS; instead, the requested information is primarily related to verifying that our final EIS is complete with up-to-date information on the Companies' ongoing efforts to minimize the impacts of the MXP and GXP and to comply with FERC regulations.

1. Columbia Gas and Columbia Gulf shall each follow the construction procedures and mitigation measures described in their respective applications and supplements (including responses to staff data requests) and as identified in the EIS, unless modified by the Order. Columbia Gas and Columbia Gulf must:

    a. request any modification to these procedures, measures, or conditions in a filing with the Secretary of the Commission (Secretary);

    b. justify each modification relative to site-specific conditions;

    c. explain how that modification provides an equal or greater level of environmental protection than the original measure; and

    d. receive approval in writing from the Director of the OEP **before using that modification**.

2. The Director of OEP has delegated authority to take whatever steps are necessary to ensure the protection of all environmental resources during construction and operation of the MXP and GXP. 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 MXP and GXP construction and operation.

3. **Prior to any construction**, Columbia Gas and Columbia Gulf shall file an affirmative statement with the Secretary, certified by their senior company officials, that all Columbia Gas and Columbia Gulf personnel, EIs, and contractor personnel will be informed of the

EI's authority and have been or will be trained on the implementation of the environmental mitigation measures appropriate to their jobs **before** becoming involved with construction and restoration activities.

4. The authorized facility locations shall be shown in the EIS, as supplemented by filed alignment sheets. **As soon as they are available, and before the start of construction,** Columbia Gas and Columbia Gulf 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.

   Columbia Gas and Columbia Gulf 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. Columbia Gas and Columbia Gulf right of eminent domain granted under NGA section 7(h) does not authorize them to increase the size of their natural gas facilities to accommodate future needs or to acquire a right-of-way for a pipeline to transport a commodity other than natural gas.

5. Columbia Gas and Columbia Gulf 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, staging areas, pipe storage yards, new access roads, and other areas that would not 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 FERC's Upland Erosion Control, Revegetation, and Maintenance Plan (Plan) and/or minor field alignments 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 authorization and before construction begins**, Columbia Gas and Columbia Gulf shall file their respective Implementation Plans with the

Secretary for review and written approval by the Director of OEP. Columbia Gas and Columbia Gulf must file revisions to their plans as schedules change. The plans shall identify:

a. how the Companies will implement the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests), identified in the EIS, and required by the Order;

b. how the Companies will incorporate these requirements into the contract bid documents, construction contracts (especially penalty clauses and specifications), and construction drawings so that the mitigation required at each site is clear to onsite construction and inspection personnel;

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

d. company personnel, including EIs and contractors, who will receive copies of the appropriate material;

e. the location and dates of the environmental compliance training and instructions the Companies will give to all personnel involved with construction and restoration (initial and refresher training as the MXP and GXP progress and personnel change), with the opportunity for OEP staff to participate in the training session(s);

f. the company personnel (if known) and specific portion of the Companies' organization having responsibility for compliance;

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

h. for each discrete facility, a Gantt or Program Evaluation Review Technique (PERT) chart (or similar project scheduling diagram), and dates for:

(1) the completion of all required surveys and reports;

(2) the environmental compliance training of onsite personnel;

(3) the start of construction; and

(4) the start and completion of restoration.

7. Columbia Gas shall employ a team of EIs (i.e., two or more or as may be established by the Director of OEP) per construction spread. Columbia Gulf shall employ at least two EIs for the GXP. 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, Columbia Gas shall file updated status reports with the Secretary on a **weekly basis** until all construction and restoration activities are complete. Beginning with the filing of its Implementation Plan, Columbia Gulf shall file updated status reports with the Secretary on a monthly basis until all construction and restoration activities are complete. On request, these status reports will also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:

a. an update on the Companies' efforts to obtain the necessary federal authorizations;

b. the construction status of each spread, work planned for the following reporting period, and any schedule changes for stream crossings or work in other environmentally sensitive areas;

c. a listing of all problems encountered and each instance of noncompliance observed by the EIs during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other federal, state, or local agencies);

d. a description of the corrective actions implemented in response to all instances of noncompliance, and their cost;

e. the effectiveness of all corrective actions implemented;

f. a description of any landowner/resident complaints that may relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns; and

g. copies of any correspondence received by the Companies from other federal, state, or local permitting agencies concerning instances of noncompliance, and the Companies' response.

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

10. Columbia Gas and Columbia Gulf must receive written authorization from the Director of OEP **before placing their respective facilities 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**, the Companies shall each file an affirmative statement with the Secretary, certified by a senior company official:

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

b. identifying which of the conditions in the Order the Company has complied with or will comply with. This statement shall also identify any areas affected by the project where compliance measures were not properly implemented, if not previously identified in filed status reports, and the reason for noncompliance.

12. **Prior to the end of the draft EIS comment period**, Columbia Gas shall file with the Secretary the following information regarding route variations of the proposed MXP-100 route on the Umstead (milepost 68.0), Hall (milepost 97.1), Elliot (milepost 145.8), and Cobb (milepost 144.9) properties:

a. a brief description and associated aerial and/or topographic maps identifying the requested route variation (or a similar variation that addresses the identified landowner issue(s);

b. a comparison of the environmental impacts, in tabular form, for the proposed route and each of the potential route variations;

c. documentation of correspondence with the landowners regarding any potential route variations; and

d. clarification whether Columbia Gas proposes to adopt the requested route variations or a detailed explanation as to why the requested route variations were not adopted over the corresponding segment of the proposed route. (*section 3.4*)

13. **Prior to the end of the draft EIS comment period,** Columbia Gas shall file with the Secretary the results of a Phase I Landslide Hazard Assessment, which identifies and characterizes (through desktop analysis utilizing published data and reports, aerial photographs, and LiDAR imagery) landslide hazards along the pipeline alignment. The Phase I assessment should consider surface and subsurface water sources in combination with changes in the local ground conditions from recent or historical changes in geologic conditions and/or due to construction-related activities. (*section 4.1.4.4.1*)

14. **Prior to construction**, Columbia Gas shall file with the Secretary for review and approval from the Director of OEP, the results of a Phase II Landslide Hazard Assessment, which includes the results of all field activities to investigate and document the status of all potential landslide areas, and provide a Landslide Mitigation Plan that includes site-specific mitigation measures to be conducted during construction and operation of the project on steep slopes and slip-prone soils. The Landslide Mitigation Plan shall include:

a. a description of how construction activities will be conducted on steep slopes and in areas prone to instability;

b. safety protocols for personnel working on steep slopes or areas prone to instability;

c. measures Columbia Gas will implement if project-related activities result in instability/landslides during, and after, MXP construction; and

d. steps to be taken to stabilize and restore such areas affected by project-related activities.

The Phase II Landslide Hazard Assessments and the Landslide Mitigation Plan shall be developed in consultation with the WVDEP and WVDNR. (*section 4.1.4.4.1*)

15. **Prior to construction**, Columbia Gas and Columbia Gulf shall file with the Secretary, for review and approval by the Director of OEP, a modified version of its ECS (section II.I.1) that is consistent with the 2013 version of FERC's Upland Erosion Control, Revegetation, and Maintenance Plan (Plan) at section V.A.4. (*section 4.2.6.1* and *section 4.2.6.2*)

16. **Prior to construction**, Columbia Gas shall file with the Secretary, for review and approval by the Director of OEP, a modified version of its ECS (section II.D.2) that is consistent with the 2013 version of FERC's Upland Erosion Control, Revegetation, and Maintenance Plan (Plan) at section IV.B.1.a. (*section 4.2.9.1*)

17. **Prior to construction,** Columbia Gas shall:

a. file with the Secretary the location of all water wells and potable springs within 150 feet of all areas of disturbance associated with the MXP pipelines and related aboveground facilities;

b. offer to test all water wells within 150 feet of construction workspaces;

c. identify measures that will be used to protect the water well at milepost 107.2; and

d. provide the status (active, abandoned, capped, etc.) of the two water wells located at milepost 164.3 and, if active, identify measures to protect these water wells during construction. (*section 4.3.1.3.1*)

18. **Prior to construction,** Columbia Gulf shall:

a. offer to conduct testing of water quality and yield at all water wells within 150 feet of construction workspaces; and

b. if testing results indicate any decline in water quality, Columbia Gulf shall provide a temporary water source until a permanent source is available. (*section 4.3.1.3.2*)

19. **Prior to construction,** Columbia Gas shall file with the Secretary, for review and written approval from the Director of OEP, a waterbody crossing restoration plan to restore all intermediate and major waterbody crossing sites using natural design techniques such as:

a. repopulating streambanks in areas of project-related disturbance with local willow cuttings and shallow-rooted containerized native stock; and

b. avoiding the use of riprap or concrete "blankets" except where absolutely necessary.

Columbia Gas shall develop this restoration plan in consultation with the WVDEP, WVDNR, and other appropriate state and federal agencies, and include a provision that

requires Columbia Gas to monitor the results of these efforts until revegetation is successful (based on adjacent undisturbed areas). (*section 4.3.2.4.1*)

20. **Prior to the end of the draft EIS comment period**, Columbia Gas shall file with the Secretary a revised HDD Inadvertent Return Contingency Plan containing specific measures to monitor for, identify, and respond to an advertent release directly into the Kanawha River during the HDD crossing. Columbia Gas shall develop these measures in consultation with the WVDEP and other appropriate West Virginia state agencies. (*section 4.3.2.4.1*)

21. **Prior to the end of the draft EIS comment period**, Columbia Gas shall file with the Secretary:

    a. an alternative stream/source of hydrostatic test water for Grasslick Run, intermittent stream, at milepost 124.46; and

    b. identification of the specific permit or approval(s) applicable to Columbia Gas' proposed hydrostatic test water withdrawals for the MXP, and the status of the permit/approval(s). (*section 4.3.2.4.1*)

22. **Prior to the end of the draft EIS comment period**, Columbia Gas shall file with the Secretary:

    a. the flow regime (cubic feet per unit of time) for each waterbody where Columbia Gas will withdraw hydrostatic test water at the time of the year when hydrostatic testing is anticipated; and

    b. specific measures (including rates and durations of withdrawal) which Columbia Gas will implement to protect instream habitat and downstream uses for each stream. (*section 4.3.2.4.1*)

23. **Prior to the end of the draft EIS comment period,** Columbia Gas shall identify any specific construction, restoration, and/or operation mitigation measures identified through its discussions with WVDNR that it will implement to promote compatibility with the restoration and management of forested areas. (*section 4.5.4.1*)

24. **Prior to construction,** Columbia Gas shall develop, in consultation with the appropriate West Virginia state agencies and local NRCS, a noxious and invasive weed management plan. This plan shall include:

    a. identification of the locations by milepost where noxious or invasive weeds are currently present either within or immediately adjacent to all areas of project-related disturbance; and

    b. development of BMPs and a site-specific plan for each location where weeds are present which:

        (1) describes options for pretreatment (including the month(s) of the year when pretreatment would be effective), treatment during construction (to avoid introducing or spreading invasive species), and post-construction treatment and monitoring;

(2) identifies who was consulted regarding possible treatment options; and

(3) includes whether the landowner/administrator has approved of the treatment options proposed.

Columbia Gas shall file this plan with the Secretary, for review and written approval from the Director of OEP, before implementation and include the comments of the various agencies consulted during its development. (*section 4.5.5.1*)

25. Columbia Gas shall conduct noxious and invasive species monitoring within the maintained rights-of-way **for 3 years** following successful completion of revegetation, as determined by the FERC staff based on post-construction monitoring inspections. Columbia Gas shall not move mowing and maintenance equipment from an area where invasive species have been encountered during operation of the project unless the equipment is cleaned prior to moving. (*section 4.5.5.1*)

26. **Prior to the end of the draft EIS comment period**, Columbia Gas shall file with the Secretary an update regarding the status of MBTA consultations with the USFWS and WVDNR regarding the development of a Migratory Bird Plan (and provide a draft copy of the plan, if available); and identify special measures, if any, that Columbia Gas would implement to reduce impacts on cerulean warbler habitat. (*section 4.6.3.1*)

27. **Prior to the end of the draft EIS comment period**, Columbia Gulf shall file with the Secretary, the USFWS' determination for the GXP impacts on the snuffbox mussel. (*section 4.7.3.2*)

28. **Prior to the end of the draft EIS comment period**, Columbia Gas shall file with the Secretary, the USFWS' determination for the MXP impacts on the diamond darter. (*section 4.7.4.1.1*)

29. Columbia Gas shall:

a. complete required mussel surveys **as soon as conditions allow** and provide survey results to the USFWS and WVDNR; and

b. file an update to the Secretary of any further discussions or progress made with the USFWS regarding recommendations on stream crossing locations and construction methodologies where federally protected mussel species may be present.

Columbia Gas **shall not begin construction** of the MXP until FERC has completed all necessary section 7 consultations with the USFWS for federally listed mussel species, and the Director of OEP authorizes construction or implementation of mitigation measures to begin. (*section 4.7.5.1*)

30. Columbia Gas shall:

    a. complete required bat surveys **as soon as conditions allow** and provide survey results to the USFWS and WVDNR;

    b. **prior to the end of the draft EIS comment period**, file an update with the Secretary of any further discussions or progress made with the USFWS regarding the Indiana bat and the NLEB; and

    c. file its Myotid Bat Conservation Plan with the Secretary **as soon as it is available**.

    Columbia Gas **shall not begin construction** of the MXP until FERC has completed all necessary section 7 consultations with the USFWS for federally listed bat species, and the Director of OEP authorizes construction or implementation of mitigation measures to begin. (*section 4.7.6.1*)

31. **Prior to construction,** Columbia Gas shall file documentation with the Secretary regarding Columbia Gas' consultation with the WVDNR for state-listed mussel species, including any updated stream crossing plans and/or additional mitigation measures for all locations where protected mussels may occur. (*section 4.7.10.1*)

32. **Prior to construction,** Columbia Gulf shall file with the Secretary updated consultations with the KDFWR regarding the state-listed species noted as "consultation still ongoing" in appendix K of this EIS. (*section 4.7.10.2*)

33. **Prior to construction**, Columbia Gas shall file an updated site-specific plan for Tract WV-DO-0278.007 near milepost 51.0 and Tract WV-JA-0368.000 near milepost 124.6 that includes specific impact avoidance or minimization measures for the fenced corral and shed. (*section 4.8.1.3.1*)

34. **Prior to the end of the draft EIS comment period**, Columbia Gulf shall file with the Secretary a site-specific report for the Leach C Meter Station describing existing and proposed visual impacts from nighttime lighting, proposed mitigation including lighting controls, or justification for why no such mitigation measures are required. (*section 4.8.3.2*)

35. **Prior to construction,** Columbia Gas shall file with the Secretary, a traffic management plan for the MXP, which includes:

    a. proposed measures for implementing any detours on public roadways;

    b. timing shifts and worker commutes as to avoid heavy traffic periods; and

    c. proposed measures for restoration of roadways damaged by project-related activities upon completion of construction. (*section 4.9.6.1*)

36. Columbia Gas **shall not begin implementation** of any treatment plans/measures (including archaeological data recovery)**, construction** of facilities, and/or **use** of staging, storage, or temporary work areas and new or to-be-improved access roads **until**:

    a. Columbia Gas files a revised draft architectural resources report, all remaining architectural survey addendum reports, and the SHPO's comments on the reports;

b. Columbia Gas files all remaining archaeological resources survey and evaluation reports, any necessary treatment plans, and the SHPO's comments on the reports and plans;

c. the ACHP is provided an opportunity to comment on the undertaking if historic properties would be adversely affected; and

d. the Commission staff reviews and the Director of OEP approves all cultural resources survey reports and plans and notifies Columbia Gas in writing that treatment plans/mitigation measures may be implemented or construction may proceed.

All material filed with the Secretary that contains **location, character, and ownership information** about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: **"CONTAINS PRIVILEGED INFORMATION – DO NOT RELEASE."** (*section 4.10.4.1*)

37. **Prior to the construction of the U.S. Highway 50 and Kanawha River crossings**, Columbia Gas shall file with the Secretary, for the review and written approval by the Director of OEP, a drilling noise mitigation plan to reduce the projected noise level attributable to the proposed drilling operations at nearby NSAs. During drilling operations, Columbia Gas shall implement the approved plan, monitor noise levels, and make all reasonable efforts to restrict the noise attributable to the drilling operations to no more than a L_{dn} of 55 dBA at the NSAs. (*section 4.11.2.2.1*)

38. Columbia Gas shall make all reasonable efforts to maintain its predicted noise levels from the Sherwood and White Oak Compressor Stations are not exceeded at nearby NSAs, and file noise surveys showing this with the Secretary **no later than 60 days** after placing these stations in service. However, if the noise attributable to the operation of the Sherwood and White Oak Compressor Stations at full load exceeds an L_{dn} of 55 dBA, at any nearby NSAs, Columbia Gas shall file a report on what changes are needed and shall install additional noise controls to meet the level **within 1 year** of the in-service date. Columbia Gas shall demonstrate compliance with this requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. (*section 4.11.2.2.2*)

39. Columbia Gas shall file a noise survey with the Secretary **no later than 60 days** after placing the Mount Olive Compressor Station, and the Ripley and Saunders Creek Regulator Stations in service. If a full-load-condition noise survey of the entire station is not possible, Columbia Gas shall instead file an interim survey at the maximum possible horsepower load and file the full-load survey **within 6 months**. If the noise attributable to the operation of all the equipment at any of these facilities under interim or full-horsepower-load conditions exceeds 55 dBA L_{dn} at any nearby NSAs, Columbia Gas 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. Columbia Gas shall confirm compliance with the 55 dBA L_{dn} requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. (*section 4.11.2.2.2*)

40. Columbia Gulf shall file a noise survey with the Secretary **no later than 60 days** after placing each of the GXP compressor stations in service. If a full-load-condition noise survey of the entire station is not possible, Columbia Gulf shall instead file an interim survey at the maximum possible horsepower load and file the full-load survey **within 6 months**. If the noise attributable to operation of all the equipment at any compressor station under interim or full-horsepower-load conditions exceeds 55 dBA L_{dn} at any nearby NSAs, Columbia Gulf 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. Columbia Gulf shall confirm compliance with the 55 dBA L_{dn} requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. (*section 4.11.2.3.2*)